# SCIENCE-GOSSIP



*AN ILLUSTRATED MONTHLY RECORD OF*

## NATURE AND COUNTRY-LORE

EDITED BY

JOHN T. CARRINGTON

*VOL. II.—NEW SERIES*

1895-1896

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"We have come in search of truth,
Trying with uncertain key
Door by door of mystery."

—*John G. Whittier, in "The Prayer of Agassiz."*

"To solve the problem of the forms of living things is the aim with which the naturalist of to-day comes to his work. How have living things become what they are, and what are the laws which govern their forms? These are the questions which the naturalist has set himself to answer.

"Many of the problems of Variation are pre-eminently suited for investigation by simple means. If we are to get further with these problems, it will be done, I take it, chiefly by study of the common forms of life. Anyone can take part in this class of work, though few do."

—*William Bateson, in "Study of Variation."*

# Our Annual Greeting.

IT is with many apologies to our readers for the irregularities in publication of Science-Gossip during the past year, that we close Volume II. of the New Series. The delays in issuing some of the monthly parts have been unavoidable. It would be as futile as disagreeable to make a long explanation of the delays; rather may we say that arrangements are now concluded for the rapid clearing off of arrears, and the future regular issue of the journal. One result of these unfortunate delays has been to find what a large and wide-spread interest is taken in our magazine; for we have had numerous enquiries from all parts of the world and frequent expressions of dismay in case anything should interrupt its appearance.

We have to thank our numerous contributors who have sent, in such variety, the excellent material from which we have selected the communications that have appeared in the volume now closing. May we ask for a continuance of their support? Again we have to remind them of the value of short notes. Simple observations, when sent for insertion in our columns, often elicit important information from others, facts being placed on record which may later be correlated by a Darwin or a Huxley in some work that revolutionizes human thought.

One of our leading biologists has recently discussed the decadence of amateur naturalists, suggesting that they are being ousted by the scientific student who confines his attentions to laboratory specimens. We understand from this discussion that the time is approaching when the lover of nature is to be as rare as the collector of specimens. With this opinion we entirely disagree. We believe that those who share this theory are simply out of touch with the increasingly great, but unobtrusive body who investigate natural objects in a state of nature. That there is a growing tendency among amateur students of natural history to follow their enquiries in a far more scientific manner than was formerly the custom, most people will allow. Method in observation is the desirable faculty to cultivate, and systematic investigation is now more generally conducted by amateurs than many people imagine. We have made these remarks because Science-Gossip has ever been the journal of the amateur. We will only add, with gratification, that during the past few months, quite casually and independently, two Fellows of the Royal Society occupying most important positions in the scientific world, each wrote to us, "My first taste for the study of Natural Science was acquired from the pages of Science-Gossip." May many of our future readers be able to say the same words from similar eminence.

JOHN T. CARRINGTON.

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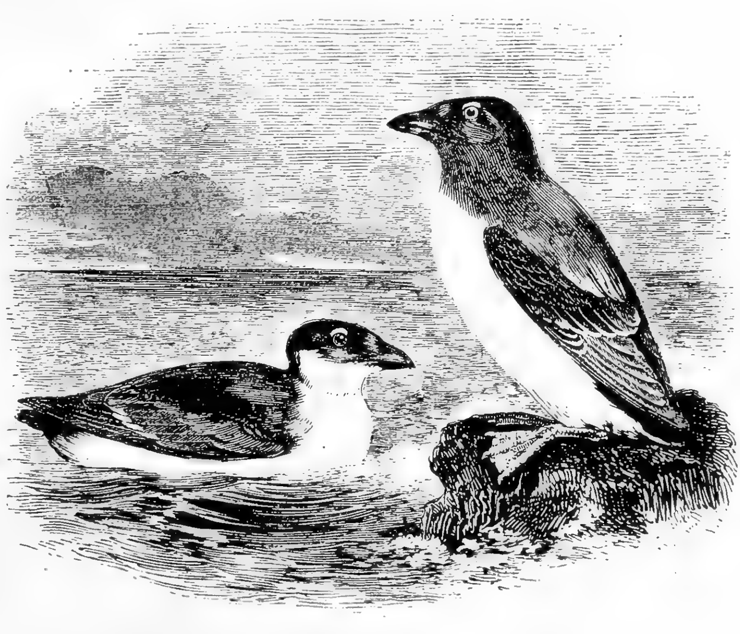
# SCIENCE-GOSSIP.

## VISITATIONS OF THE ROTCHE OR LITTLE AUK.

By PROFESSOR NEWTON, F.R.S.

AMONG the many puzzles which await further elucidation at the hands of ornithologists, and especially the ornithologists of this country, is that of the winter-resort of the millions of birds of the family Alcidæ, which have their summer home on the cliffs of some of the British islands and of Arctic lands so far as man is yet known to have penetrated. The species are few in number, but the individuals are countless, tho' they seem to escape the notice of those people who occupy their business on the great waters, and not only are records of the observation of these birds on the high seas almost wholly wanting—a brief passage in Audubon's "Ornithological Biography" (iv. p. 304) is the only one I can call to mind at this moment—but I have in vain questioned intelligent men, who have often crossed the Atlantic from October to March, for information on the subject. Setting aside the Dovekeys, Guillemots, Razorbills and Puffins which frequent our own coasts, we may here consider the case of the kindred forms which inhabit higher barren latitudes. The Dovekey and Puffin of Spitzbergen, whether they be regarded as local races or good species, have never, to our knowledge, suffered death within British jurisdiction. The Guillemot of Spitzbergen, which commonly bears the name of the Danish zoologist, Brünnich (who, twenty years before our own Pennant, first gave a connected account of northern ornithology) has long been accounted a "British bird," though on very insufficient testimony, and the evidence of its occurrence on the shores of the European Continent is almost as slight. Spitzbergen and Greenland are the chief abodes of a still smaller species of the family — the Rotche — so familiar to all who have visited the Arctic seas, and not unknown to the English reader by its book-name of the "Little Auk," the *Alca alle* of Linnæus and *Mergulus alle* of most modern authors. No bigger than the Dabchick of our ponds, not a year passes without this little bird (which may be found well described in standard works, such as that of Yarrell or of Mr. Dresser) paying a visit—inadvertently we may be almost sure—to some part or other of Great Britain, and



THE ROTCHE OR LITTLE AUK. (*After Bewick.*)

especially to the eastern side of England, while it occasionally appears in Ireland. Very frequently half-a-dozen or more may thus occur. Sometimes they are found washed up by the tide; sometimes they are seen from a fishing-boat or a pier-head and are knocked over by the boys with a gaff or a stone; sometimes they are picked up many miles inland, on a ploughed field or a turnpike road, in a sheep-trough or a coal-cellar, or some equally incongruous place, where they have dropped exhausted, and in almost every case, if they be still alive, death soon follows their capture, even when, as now and then happens, the captor has spared or tried to save the life of his captive. This may be considered the regular state of things, but it is marked by the greatest irregularity, not only as to season of the year, but as to the number of occurrences, and at present it is generally impossible to correlate either season or number with the conditions of the weather—the weather, that is to say, as we have it here, for one can hardly doubt that these unhappy birds are the victims of meteorological influence at some greater or less distance from our shores. Like other extant Alcidæ they are strong on the wing, and of fairly rapid flight, so that they are by no means so much the sport of the winds as many people are apt to believe, though they may well be unable to contend long against a "whole gale." It seems far more likely that the effect of storms upon them is indirect, yet just as serious. These birds gather their food, consisting chiefly of small Crustacea, by diving, and it is obvious that their powers of submergence must have a limit. Now it is well-known that when the sea is running "mountains high," its ordinary inhabitants descend to depths below that to which the agitation of the water extends, and it is quite conceivable that those depths are beyond the reach of the birds which descend from the surface to pursue and feed on the other marine animals. The birds have therefore to seek their living elsewhere, and thus become wanderers. I think someone has suggested that it is extreme cold which drive the Rotches to our shores, but that can hardly be the reason, since examples have not infrequently occurred in the warmer months of the year, and, until the last few weeks, the most numerous visitation known took place at the end of October, so that a low temperature could not account for it. This was in the year 1841, and, when we consider the comparative paucity of observers and natural-history journals more than fifty years ago, and also that it had not then become customary for the village "taxidermist," where such existed, to record in the local newspaper every strange bird that came into his hands, it seems quite possible that the visitation of that autumn may have been on as great a scale as that of the present winter. It was first observed in the north of England, and to Yarrell word was sent by Dr. Edward Clarke, of Hartlepool, that after a violent storm, which had lasted for several days, his attention was called to flocks of birds, till then unknown to the pilots and fishermen. There were several hundreds of them, and five or six were killed at a shot, whenthey proved to be Little Auks. The same thing happened at the same time at Redcar, and Yarrell heard of others obtained all along the east coast to Sussex. A great many were taken at Great Yarmouth ("Zoologist," p. 182). Some found their way to the London market, and at least two met their death in Hertfordshire, while Strickland recorded ("Annals and Magazine of Natural History," viii., pp. 317, 318, 395) six taken in Warwickshire and three in Salop. They occurred also, says Thompson ("Natural History of Ireland," iii., p. 218), even in the very middle of the sister island. But perhaps the most curious fact connected with this visitation is that the survivors of it were seen a little later by John Hancock ("Natural History Transactions of Northumberland and Durham," vi., p. 164) in the act of returning northward, continuing to pass along the coast in detached flocks for several days, and paying a heavy "death duty" as they went their way, for no fewer than twenty-six were received by him alone.

It is too early yet to give details of the recent visitation. It seems to have been first noticed in Scotland, and to have exceeded in magnitude any before chronicled; but by the middle of January the Yorkshire coast was strewn with dead Rotches, and I am informed that 130 had been noted by one Scarborough naturalist, Mr. W. J. Clarke, who, a few days later, saw at least 200 on the wing at once. These, mounting over the cliff, disappeared inland; and then for four hours he watched company after company, numbering from four or five to fifty or sixty, fly southward while "the sea was also full of them." For the same space of time, so I learn from Dr. Hewetson, of Leeds, a gunner on Filey Brigg saw an unceasing stream of these birds pass southward. Similar observations were made in Lincolnshire, and in Norfolk upwards of 250 are known to have met their death. Accounts from other parts are yet to come, but there is no doubt about what they will tell, and the number of observers is now so great that we may rely on obtaining a pretty accurate knowledge of the extent of their movements. The "wreck chart," that is sure to be prepared, will be looked for with interest. Whether it will throw any light on the hitherto unsolved problem of the ordinary winter-resort of this and kindred species, is more than I dare to predict. Let us hope that it may, and that this vast and apparently useless loss of life may not have been wholly unserviceable.

*Magdelene College, Cambridge; 14th February, 1895.*

# GREAT FROSTS OF THE CENTURY.

By E. D. Anderson and A. E. Mansford.

THE recent frost is exceptionally interesting from having occurred so late in the season, such a spell of continuous cold rarely happening in February. It may be considered to have commenced on January 22nd, and continued for twenty-eight days. One or two slight thaws took place in the day-time, but the mean temperature at Greenwich for the period was about 27° F., and the mean of the lowest night temperatures 21° F., or 11° of frost. On nine consecutive nights a minimum of 20° F. or under was recorded. The mean of the day temperatures in the great frost of 1890–1 was about 1° higher; and the mean of the night temperatures 4° higher, and none of the frosts of the present century have had a lower mean night reading than the frost of January and February, 1895.

Many low readings are reported from the various stations in the British Isles; among them are: Holyhead, 17° F.; Donaghadee, 16° F.; Liverpool, 12° F.; Oxford, 7° F.; Greenwich, 6·9° F.; Cambridge and Aberdeen, 6° F.; York, 3° F.; Wick, 2° F.; Durham and Brookeborough, *minus* 2° F.; Glenglee and Loughborough, *minus* 5° F.; Stamford, *minus* 8° F.; Braemar, *minus* 12° F., or 44° of frost. Very low temperatures are frequently quoted by individual observers, but they should be accepted with great caution, as not only may the instrument used be defective, but also its position and environment materially affect the reading. To ensure accuracy it is essential for a duly-tested thermometer to be placed in the open in a properly constructed screen, which should be about four feet from the ground, and so arranged that when ever the sun is shining its rays may reach it without the intervention of any vegetation or building. The varying influence of position on temperatures recorded may be exemplified by the following comparison of readings taken at Tulse Hill (London, S.W.).

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Feb. 6th, | | 9 p.m. | in the screen | | 20° F., | on the snow | | 17° F. |
| ,, | ,, | midnight | ,, | ,, | 13·5° F., | ,, | ,, | 7° F. |
| Feb. 7th, | | 1.30 a.m. | ,, | ,, | 11° F., | ,, | ,, | 5° F. |
| ,, | ,, | lowest during early morning | ,, | ,, | 8° F. | ,, | ,, | 4° F. |

The lowest reading on the snow at Tulse Hill was 0° F. on February 8th, when in the screen the thermometer registered 6° F.

On the Continent, also, intense cold has been experienced. Among the reports forwarded are: Berlin, 7° F.; Lyons, 6° F.; Paris, 5° F.; Munich, 1° F.; Brussels, 0° F.; and Moscow, *minus* 18° F. The above low temperatures are, however, far from equalling the record of Verkoyansk, in north-east Siberia (Lat. 67° 34′, Long. 153° 31′), where, although only 164 feet above sea-level, in February, 1892, was registered *minus* 93·6°, or 125·6 degrees of frost. The lowest known reading in the United Kingdom was experienced in December, 1879, at Blackadder in Berwickshire, *minus* 23° F., or 55 degrees below freezing-point being recorded.

Snow crystals of exceptional size and beauty were remarked in London during the last week in January, 1895, and there were considerable falls of snow in Ireland and Scotland. The greatest snowstorm known in the Lake District during the present generation took place on February 5th, and on the same day the fall in the Isle of Man was exceptionally heavy.

The most noticeable of the frosts of the present century, with their mean and minimum temperatures in London, are as under:

1813–14, December 26th to February 5th, forty-two days; the mean temperature for that period being 27·3° F., and the lowest temperature recorded 8° F. A week of unusually dense fog preceded the frost, which then set in with such severity that a fair was held on the Thames, which lasted six or seven days; several printing-presses were erected on the ice, and shilling donkey-rides, skittles, and dancing were among the amusements indulged in. There are records of the Thames having been frozen over in Roman and Saxon times, as well as during the winters of 1150, 1281, 1434, 1515, 1564, 1608, 1620, 1634, 1683, 1715, 1739, and 1789, and it is supposed that the reason it has not happened since 1813-14 is that owing to the removal of old London Bridge, the narrow arches of which prevented the ice-floes from being carried out to sea, the so-called "scour" of the river is much increased, rendering it difficult for the ice to form into a continuous mass.

1838, January 5th to February 23rd, fifty days, mean temperature 28·9° F. minimum, *minus* 4° F. The burning of the second Royal Exchange took place during this frost, which was so intense that the fire-hose was found to be frozen, and when at length the Fire Brigade did get all into working order, as soon as they ceased to play on any part of the building huge icicles were speedily formed.

1855, January 10th to February 25th, forty-seven days, mean temperature 29·7° F., minimum 11·1° F. This frost is generally known as the "Crimean winter," it having extended to the Continent and entailed severe suffering amongst our troops then in Russia.

1860–61, December 15th to January 19th, thirty-six days, mean temperature 29·9° F., minimum 8° F.

Temperatures several degrees below zero were registered in many parts of England.

1879, November 14th to December 27th, forty-four days, mean temperature 31° F., minimum 13·7°.

1881, January 7th to 26th, twenty days, mean temperature 27° F., minimum 12·7°. It is remarkable that this mean is the same as for the present year's frost as calculated up to February 15th. *Minus* 4° F., was recorded at Wick, and *minus* 7.5° F. at St. Michael's-on-Wyre, Garstang, Lancashire. At the close of this frost a severe easterly gale and an exceptionally heavy fall of snow occurred over the south of England.

1890–1, November 25th to January 22nd, fifty-nine days, mean temperature 39.3°, minimum 12° F. This frost was not only the longest of the present century but was also very severe in England, in many parts of which the thermometer reached zero. In Ireland and Scotland, however, the weather was much milder.

It has been observed that the spring and summer months succeeding these prolonged frosts have generally been fairly dry, though not perhaps exceptionally warm. Hitherto no periodicity has been remarked in the recurrence of prolonged frosts, nor has any satisfactory explanation been suggested to account for their visitation.

Though many deaths have been traced to the recent severity of the weather, yet the death-rate has been considerably lower than in the frost of 1891, when in London it ran up to 29·7, or in that of 1880, when it reached 46·7. During the first week of the present frost the Registrar General's returns gave 17·6, the second week 19, and the third 21. The unusual amount of sunshine and the absence of damps, have probably contributed largely to this satisfactory result. Many hundreds of our song-birds have, however, succumbed to the effects of the frost; numbers of sea-gulls have taken refuge inland, some arctic birds have been observed in Lincolnshire, a seal was seen on the ice in Morecambe Bay, and about a hundred little auks were picked up on the shore at Filey in a very exhausted condition.

On the Continent the plains of Piedmont have been invaded by hordes of wolves, which have killed many of the villagers, whilst at Tenda the Alpine troops have been told off to wage war against these ravenous beasts.

In the London parks the ice has been unusually thick, on February 15th measuring at Finsbury Park nearly eleven inches, and on the Serpentine about six inches, at a later date it exceeded nine inches, that thickness having been only once previously attained since 1881. The strength of the ice on the Serpentine was effectively demonstrated on February 13th, when 600 Grenadier Guardsmen marched across it with their band.

*February 21st, 1895.*

## NOTES OF A HOME NATURALIST.

IN the second week in December, 1894, I took a glass jam-jar, some eight inches high, and dipped it nearly full of water from an old fish-stew at Shiplake Court, close to where I live. This fish-stew is always a favourite preserve for me, as a dip invariably brings up life in some form to be found in its stagnant waters. With a small hand-net I dipped for a weed or so, the result was I picked up some apparently dead pieces of *Ceratophyllum demersum* (or horn-weed). These pieces were like brown oval lumps, devoid of all apparent life, a few pieces of *Lemnia polyrhiza*, or greater duckweed, and *Lemnia trisulca*, or ivy-leafed duckweed, two tiny water snails (*Lymnea peregra*), one gyrinating water-beetle, one water-louse (*Asellus aquaticus*), and a pale-coloured nematode, and a leech. The bottle contained also *Daphnia shæfferi* (tailed water-fleas), and *Cyclops quadricornis*, in the water dipped. At first I kept the bottle in a room without a fire; now, for three weeks, in my drawing-room, in which is a daily fire. It has been an endless amusement in dull days to look at; at the moment I am writing this, February 3rd, 1895, the horn-weed, far from being brown, has shot out into the most vivid green lovely plants, the largest oval brown "lump" is over five inches long, the smaller ones all in lovely foliage. Probably from the folds of the weed, there have been born, since I fished, at least three nematodes—one with a sort of barley-sugar-coloured jointed body and a round excrescence at head—two pale white leeches or nematodes (I do not know which to name them), three cadises—two of *Phryganea grandis* in their curious leaf-cases, one of *Limnophilus rhombicus*—which grow daily. They are most diligent in adorning their cases with weed, etc. The water-fleas (*Daphnia* and *Cyclops*, or vaulters), are immensely grown, and seem to have produced and multiplied, considering the animated specks I see flying every way. The *Cyclops*, with their curious hanging egg-bags, are very funny. Sometimes the egg-sacs are both colourless, then full and dark, then one will be shed and the other still be dark, and then again both will be void, or entirely disappeared. Fond as I am of aquaria, I never have kept them in winter. As I leave home every summer for some time, I empty the contents of my bottles back into their own habitats before leaving. If I could only persuade others to take a glass jam-bottle and fill it in a similar way I think they might find endless amusement and diversion for a dull five minutes in this hard, cold winter, when the home naturalist almost despairs of finding material for study. My bottle is become a "thing of beauty," and an endless amusement in watching its different inhabitants.

(Mrs.) EMILY J. CLIMENSON.

*Shiplake Vicarage, Oxon.*

# ARGON, THE NEW ELEMENT.

THE year 1894 will go down to posterity as marked by one of the greatest of scientific discoveries. During several years past the Right Hon. Lord Rayleigh, F.R.S., has been occupied with a series of intricate investigations of various gases and their physical measurements. For some time he has been puzzled by the varying weights of nitrogen under different chemical conditions. This led him to suspect that associated with this gas was some matter as yet uninvestigated. It came about by finding that nitrogen obtained from the atmosphere was one half per cent. heavier than when extracted from chemical compounds. This was mentioned at the last meeting of the British Association, at Oxford, and caused Mr. William Ramsay, F.R.S., Professor of Chemistry at University College, London, in conjunction with Lord Rayleigh, to pursue these investigations, the result being the discovery of one, if not two, new elements.

These facts were placed unreservedly before the world by these gentlemen at a special meeting of the Royal Society held on the 31st of January last, in the theatre of the University of London, before an audience, perhaps never more brilliant in this country. Three papers were then read on the new gas, which proved the splendid results still to be obtained by patient and well-directed original research.

The new gas is named Argon, and has been obtained from the air by atomolysis, by red-hot magnesium and by sparking with an electrical current. Critical examination shows that Argon is absolutely distinct not only from nitrogen, but from all other matter. An exceedingly interesting paper upon its spectroscopic analysis was read by Mr. William Crookes, F.R.S., as one of the three above referred to. We select from an abstract of Mr. Crookes' statements, the following extracts to show how the gas behaved under his treatment. The spectra illustrating his paper, so far as refer to the comparison of Argon and nitrogen, are herein reproduced from photographs taken by this eminent physicist.

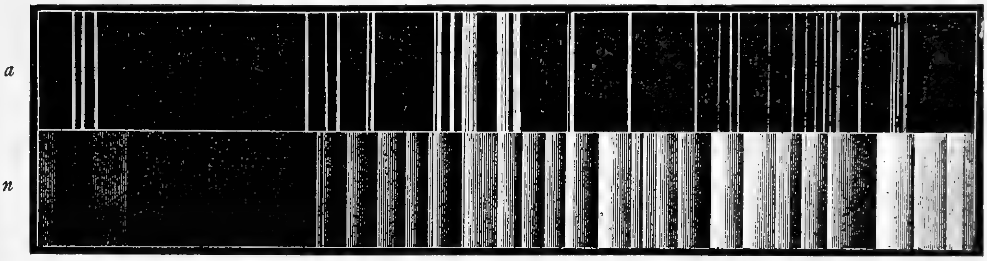
Mr. Crookes said: "Through the kindness of Lord Rayleigh and Professor Ramsay I have been enabled to examine the spectrum of this gas in a very accurate spectroscope and also to take photographs of its spectra in a spectrograph fitted with a complete quartz train. The results are both interesting and important, and entirely corroborate the conclusions arrived at by the discoverers of argon.

"Argon resembles nitrogen in that it gives two distinct spectra according to the strength of the induction current employed. But while the two spectra of nitrogen are different in character, one showed fluted bands and the other sharp lines, the argon spectra both consist of sharp lines. It is, however, very difficult to get argon so free from nitrogen that it will not show the nitrogen flutings superposed on its own special system of lines. I have used argon prepared by Lord Rayleigh, Professor Ramsay and myself, and, however free it was supposed to be from nitrogen, I could always detect the nitrogen bands in its spectrum. These, however, soon disappear when the induction spark is passed through the tube for some time, varying from a few minutes to a few hours.

"The pressure of argon giving the greatest luminosity and most brilliant spectrum is 3 mm. The best pressure for nitrogen is 75 or 80 mm. At this point the colour of the discharge is an orange-red, and the spectrum is rich in red rays, two being especially prominent at wave-lengths 696·56 and 705·64. On passing the current the traces of nitrogen bands soon disappear, and the argon spectrum is seen in a state of purity.

"If the pressure is further reduced, and a Leyden jar intercalated in the circuit, the colour of the luminous discharge changes from red to a rich steel-blue, and the spectrum shows an almost entirely different set of lines. It is not easy to obtain the blue colour and spectrum entirely free from the red. It appears that a low electromotive force (3 cm. spark, or 27,600 volts) is required to bring out the red, and a high E.M.F. and a very hot spark for the blue. The red glow is produced by the positive spark, and the blue by the negative spark.

"I have taken photographs of the two spectra of argon partly superposed. In this way their dissimilarity is readily seen. In the spectrum of the blue glow I have counted 119 lines, and in that of the red glow 80 lines, making 199 in all. Of these




SPECTRA OF (*a*) ARGON AND (*n*) NITROGEN.
(*From Photographs by Mr. W. Crookes, F.R.S.*)

26 appear to be common to both spectra. The disappearance of the red glow and the appearance of the blue glow in argon as the exhaustion increases also resembles the disappearance of the red line of hydrogen when exhaustion is raised to a high point.

"I have prepared tubes containing other gases as well as nitrogen at different pressures, and have examined their spectra both by eye observations and by photography. The sharp line spectrum of nitrogen is not nearly so striking in brilliancy, number or sharpness of lines as are those of argon, and the most careful scrutiny fails to show any connection between the spectra. I can detect no lines in common. Between the spectra of argon and the band spectrum of nitrogen there are two or three close approximations of lines, but a projection on the screen of a magnified image of the two spectra partly superposed will show that two at least of these are not really coincidences.

"I have found no other spectrum-giving gas or vapour yield spectra at all like those of argon, and the apparent coincidences in some of the lines, which on one or two occasions are noticed, have been very few, and would probably disappear on using a higher dispersion. Having once obtained a tube of argon giving the pure spectra, I can make no alteration in it, other than what I have explained takes place on varying the spark or increasing the exhaustion, when the two spectra change from one to the other. As far, therefore, as spectrum work can decide, the verdict must, I think, be that Lord Rayleigh and Professor Ramsay have added one, if not two, members to the family of elementary bodies."

The remarkable discovery made by Lord Rayleigh and Professor William Ramsay opens up a new field for investigation, the extent of which cannot even be conjectured; it is one from which the most important results may be expected in the future. Few subjects have created a more widespread interest than has this discovery, not only in scientific circles, but among the general public. Excellent accounts have appeared about it in some of our daily papers, but by far the best was that in "Nature," of February 7th last, in which number appeared also a leading article describing the origin of the discovery. J. T. C.

## ABNORMAL ASH PLANT.

WE have received from Lieut.-Col. Blathwayt, of Batheaston, a photograph of an abnormal growth of ash, which we have reproduced in the hope of some discussion and elucidation of the causes of these growths. He says in his letter: "The interesting notice in the February number of SCIENCE-GOSSIP on Professor Hartig's 'Text-Book of the Diseases of Trees,' put me in mind of a curious abnormal growth on an ash tree *(Fraxinus excelsior)* which I found in a hedge-row some years ago. It was a young shoot about five feet long, growing from the base of a young tree that had been cut close to the ground, and which, at about eighteen inches from the top, suddenly turned in a spiral, making three complete turns and a half. Just below where the first turn commenced the stem began to flatten out forming a kind of wing, and this flattening extended to bark, wood and pith. Below the curve the stem was half an inch thick, and at the first turn the width had reached three-quarters of an inch, increasing gradually up to the growing point, at which the width was an inch and a half, the thickness diminishing in proportion. On the flattened side there were several notches which looked something like cuts made by a knife; but their position was such that they could not have been thus caused unless the curving and flattening of the stem had taken place after the shoot had almost attained its present length, which is most improbable. I enclose a photograph of the branch two-thirds natural size." We might remind our readers that observations of this character, though at one time slighted by those who only took interest in normal types and sneered at "freaks," may lead to much collateral evidence. The remarkable book on "Materials for the Study of Variation," by Mr. William Bateson, which we reviewed in the last volume of SCIENCE-GOSSIP, has drawn attention to sports in Nature. We hear that Mr. Bateson has in hand a similar work on plants, so that material such as Colonel Blathwayt now brings forward cannot fail to be of service to him and those who are working in his field of inquiry. This will be especially valuable if accompanied by correct pictures and exact descriptions of the surroundings and probable causes of the particular sport discussed.

ABNORMAL GROWTH OF ASH.

# STRUCTURE AND GROWTH OF THE CELL-WALL.

By Arthur J. Maslen.

THE cellular structure of plants was first described by Robert Hook about the middle of the seventeenth century. He distinguished between the hollow spaces and the dividing walls, to the former of which he gave the name of cells. But he really does not appear to have seen very much. A little later two anatomists, Malpighi and Grew, studied the subject and published figures of cells, and to their work must be attributed the foundation of our knowledge, although their works had but little resemblance to modern descriptions of vegetable anatomy. Thus, Grew conceived of the walls of all cells being composed of an extremely fine web. They both combined the physiological consideration of the functions of organs with the examination of their structure. But they did investigate the cell-wall. The subject lay practically dormant from Malpighi and Grew to the beginning of the present century, excepting, perhaps, Wolff (1733-1794), who pointed out that but one cell-membrane lies between two adjacent cells, a point which succeeding anatomists were a long time in determining.

At the beginning of the present century the subject was investigated by a Frenchman, Mirbel, and he made the first important contribution to our knowledge from several points of view, and his ideas agreed in the main with those of Wolff. An important discovery was made in the second decade of this century by the younger Moldenhawer, who succeeded in isolating the cells of tissues by boiling and macerating in water (1812). This brought him into direct antagonism with Mirbel as to the structure of the cell-wall. He found that the cells and vessels were closed tubes and sacs after isolation, and must necessarily, as it would seem, so lie one against another in the living plant, that the wall between every two spaces is formed of two laminæ. He also conceived of the cell-wall being a sort of lacework. The younger Moldenhawer may be taken as closing the first section of this century, during which time he had improved the methods of observation, compared his own observations with those of others with great acuteness of judgment, and did all that could be expected with the instruments of his time.

From 1812 to 1828 no important advance was made, although great improvements were made in the compound microscope, thus enabling succeeding observers to have the advantage of improved instruments. Now we come to Von Mohl, a man intimately acquainted with all branches of botanical science, many of which he materially advanced. He made the solid framework of cells the object of special and searching examination, and he never forgot that the interpretation of visible structure must not be disturbed by physiological views. His views on growth in thickness of cell-membranes and the sculpture caused by it was published in 1828. He conceives of all organs being originally formed of thin-walled closed cells, which in the tissues are separated by walls formed of two lamellæ on the inside of which new layers were formed which lie one upon another and represent the secondary thickening layers, whilst on the inner side of the membrane thus thickened by apposition there may (in some cases) be seen a tertiary layer. He also supposed that pits and spiral and other thickening was due to deposition of thickening material locally on the inside of the originally smooth thin cell-wall.

Von Mohl also definitely called the layer which gives way when a tissue is macerated, the intercellular substance, although he afterwards abandoned this more and more until he limited its occurrence to certain cases only.

Coming now to what we may call the more modern views of cell-thickening and growth we reach Nägeli. Following naturally from Nägeli's conception of the micellar structure of protoplasm, which he considered to be made up of crystalline groups of molecules, to which he gave the name of micellæ, and which are always separated from one another by water. The distance between the micellæ varies; when water is given off the micellæ come closer together, and *vice versa*. On this conception has been based the intussusception theory of the growth of the cell-wall.

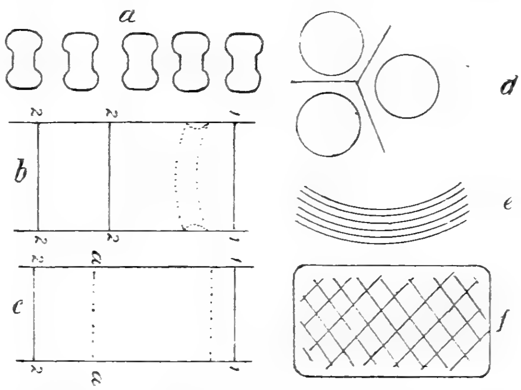
The intussusception theory holds that the crystals (micellæ) can be moved about, get farther apart, etc., and fresh cellulose micellæ are intercalated between those already present (accompanied by increase in size of the micellæ already present), forcing them apart, and thus the wall grows both in surface and in thickness. On examination of the cell-wall in section, it is seen to be made up of concentric layers, to which was given the name of stratification (Schichlung). In surface view the cell-walls are seen to have fine lines running across them, often crossing one another at right angles. This is striation (Streifung).

Nägeli viewed these appearances as the optical expression of watery or less watery layers.

According to his view there is no reason why the striation lines of one and the same lamella could not cross one another. This was one of the fatal things that upset his theory. We do not have two series of crossing lines in different directions in one layer, but they belong to two. This theory was the first attempt to apply mechanico-physical considerations to the explanation of the phenomena of organic life.

Next came Strasburger, following Dippel and others. He throws over altogether Nägeli's conception of micellæ, and to his mind only *molecules* of cellulose exist. To him the lamellæ, seen as stratification, are the expression of intermittent thickening by apposition, thus re-instating Von Mohl's theory of cell-wall growth. The outer coat of a lamella differs from the main body of the same lamella, and the place of junction of the lamellæ is therefore indicated by difference in the refractive index. Striation he explained by saying that each lamella is not plastered on as a whole, but as a ribbon, or more in one place than in another, the striæ being the contact lines.

A few years ago an important paper on the cell-wall and striation was published by Krabbe, who insists that striæ do not correspond to what Strasburger believed, but that the lamella in ordinary cells are plastered on as one sheet, and that the whole appearance of striation is due to subsequent change. Since the publication of this paper, Strasburger has re-investigated the question, and has practically abandoned his theory of striation, although still maintaining that thickening takes place by apposition, especially in such cases as the bars in tracheides and the spiral thickening in some vessels.




CELL-WALL.—*a*. Bordered pits in section. *b*, Œdogonium showing thickening ring (dotted lines). *c*, Œdogonium showing thickening ring stretched out (*a a*), so intercalating new piece of cell-wall. *d*, Middle lamella (three lines), secondary thickening layer and limiting layer. *e*, Cell-wall, showing stratification. *f*, Cell-wall, showing striation.

Apposition explains the growth in thickness of cell-walls, and derives confirmation from the study of the growth of starch grains, which almost certainly takes place in this way. But growth in surface has always been somewhat of a difficulty from the apposition point of view. This was at first overcome by assuming that the layers were stretched by pressure exerted from within, and that whilst in this stretched condition fresh lamellæ were plastered on, and that the optical properties were the expression of tensions. But there are cases where cell-walls grow in surface when there can be no question of stretching, as by reducing artificially the turgidity of cells when the growth in surface is not retarded to such an extent as might be expected.

The peculiar mode of cell-growth seen in *Œdogonium*, etc., is also a difficulty from the apposition point of view.

Here a solid ring appears which splits and eventually stretches out and increases the size of the cell-wall. The ring shows no signs of growth by apposition, and Strasburger himself admits that it probably grows by intercalation of fresh material, although not at all according to Nägeli's theory.

Lastly we come to Weisner, who says that while the cell-wall is growing it always contains protoplasm, by the activity of which what he calls dermatosomes, which form ultimately the cell-wall, are secreted. This finds some confirmation from the subsequent changes that cell-walls undergo, *e.g.*, lignification, etc. When the cell-walls are at all thickened in a tissue we can see clearly two regions—the party-wall or middle lamella and the rest of the wall (secondary layer) on each side. There can also be distinguished a third portion — the inner limiting layer, or tertiary layer.

The middle lamella is partly the primary septum common to two cells, and this commonly, when the secondary layers are changed, retains a cellulose character. It differs from the surrounding wall, in that it is most soluble in Schultz's macerating fluid, and, therefore, gives way first. It also gives way when schizogenous intercellular spaces are formed.

The secondary layer shows the stratification, and is the layer which principally undergoes secondary changes, lignification, etc. But the growth and thickness of a cell-wall is often not uniform; thickenings take place locally, sometimes on the outer side, as in pollen-grains, and often when cells are combined into tissues on the inner surface, giving rise to annular, spiral, scalariform, and other thickenings, and to simple and bordered pits. In the latter case the unthickened parts of contiguous cells are opposite one another.

Although cell-walls are always first formed of cellulose (except pectose) they frequently undergo chemical, accompanied by physical, changes. These changes do not generally begin until the cell has acquired its full size.

With regard to lignification, there is some doubt as to what causes this change, and the term "lignin" is but a cloak for ignorance. Two substances, coniferin and vanillin, are always associated with lignified cell-walls, and it is these substances that give the colours with re-agents. By prolonged boiling in alkalies these substances can be extracted, and then the walls give the reactions for cellulose, so that the cellulose basis is simply permeated with these other substances. Lignified cell-walls are hard, pervious to gases and liquids, etc. Lignification commonly takes place in the xylem vessels, parenchyma, selerenchyma, etc. The middle lamella is commonly strongly lignified, often partly suberized and changed in other ways.

In suberization, the secondary layer becomes infiltrated with a substance (suberin), the deposition of which in the cell-walls results in the formation of cork. This substance (suberin) includes really a number of different substances. The middle lamella is commonly lignified. We can extract the corky substances by warming in alkalies and then treating with alcohol, and the framework gives the ordinary cellulose reactions. Cork-cells are impervious to water and gases and will stand the action of strong $H_2$ $SO_4$ for a considerable time. When a cell becomes corky it becomes larger, and Strasburger has pointed out that cork walls, under polarised light, show colours due to stretching. Suberization takes place in the periderm of stems and roots, the exodermis of roots, radial walls of endodermis, etc. Cuticularization is a change closely related to the foregoing, and cutin closely resembles, and probably is a form of suberin. The same reactions (KOH, etc.) that distinguish cork, distinguish cuticularized tissue.

Cell-walls may be converted into mucilage, that is to say, mucilage may either come as a primary substance from the protoplasm, or by degeneration of the cell-wall. These vary in composition and in reactions with micro-chemical re-agents. Some turn blue with iodine and $H_2$ $SO_4$, but most turn yellow. The middle lamella but seldom undergoes this change (ex., Ivy), Mucilaginous cell-walls when dry are hard and horny, but when moistened become sticky and swell up. Mucilaginous cell-walls are common in the coats of seeds, as linseed, quince, etc. This change may go on so far as to result in the conversion of the cell-wall into gum, soluble in water (ex., peach, plum, etc.)

Frequently during the genesis of cells a substance is formed—not cellulose, but soluble in boiling water and alkalies—to which is given the name of pectose. This may be a forerunner of cellulose. Another substance occurring in the cotyledons of leguminous plants, palm and liliaceous seeds, is known as amyloid. This is allied to dextrose and gives the blue colour with iodine without dehydrating agents.

*16, Hadley Street, Kentish Town, N.W.;*
*January 31st, 1895.*

## PSEUDO-ALBINO SPARROWS.

By K. Hurlstone Jones.

SEVERAL notices have of late appeared in this paper referring to pseudo-albino sparrows—I use the term for want of a better. This abnormality of colouring is, as far as my personal experience goes, by no means uncommon; almost every winter I have observed, from time to time, sparrows which represent this curious condition. The feathers which have lost their colouring matter are almost always the primary feathers of the wings and the rectrices, or quill feathers of the tail. Sometimes the whole of the primary feathers in the wing are white, and the same applies to the tail. Much more frequently one, two, or three or more will be uncoloured and the rest quite normal. Generally, I believe, the metacarpal primaries are more liable to lose their colour than the digital. I have also seen skylarks presenting the same curious condition, but not so frequently as sparrows, and we have in the Manchester Museum a good specimen of a skylark presenting uncoloured primary and tail quill feathers.

Observations are all very well as far as they go, but only useful in that from them it is possible to draw deductions. We require to know how the condition has come about, and also we have several rather important questions to ask about the condition as it stands at the present day. With regard to the origin of the condition, it is only possible to theorize. Several theories suggest themselves to one, all of which have this in common, that they point to hereditary influence. In the first place, it is within the range of probability that the ancestors of the sparrows, and indeed of all the other birds, carried uncoloured feathers, such feathers being obviously less evolved than those which are coloured. It is possible, presuming the above to be true, that albinos revert to an original type, and that pseudo-albinos are abortive attempts at reversion. Secondly, it may have been necessary when the winters were much more severe in this quarter of the globe than they are now, for the birds to change their plumage and lose the colouring matter of their feathers in the winter, in order to gain a protective colouration, just as the ptarmigan does to-day. Reversion might take place as before. It is significant with reference to this, that the pseudo-albinos have at least, as far as personal observations go, been largely noticed in the winter. Thirdly, and in some way perhaps probably, these albinos are the productions of direct hereditary influence. An albino individual pairing with a normally-coloured specimen of its own species would probably produce some parti-coloured descendants. The only objection to the last theory is, that albino varieties do not as a rule get the opportunity in these days of precise fire-arms, of propagating their species.

However, whether all the albinos fall victims to the destructive instinct which we inherit or not, there can be no doubt whatever of the extent of hereditary influence, and the way in which hereditary traits crop up after a lapse of perhaps several generations, and there is no abnormality for which this is more true than albinism. In some recent observations made upon albinism in mollusca, I demonstrated very clearly the marvellous extent to which albino peculiarities are transmitted from one generation to another, and everyone is aware how they are transmitted in man and other mammalia.

There are several questions which we ought to put with regard to the condition, apart from its origin. Are pseudo-albino sparrows, and of course other birds as well, born pseudo-albinos, or have they the capability of becoming so later in life? If pseudo-albino varieties have changed at some time in their existence, later than their fledging, how did they get rid of the melanin granules from their feathers? This last question is complicated by the fact that there is no circulation in the plumules of the feather, or in the shaft. Thirdly, can a pseudo-albino revert to the normal type, and if so, how does the colouring matter become deposited? Fourthly, if the uncoloured feathers are removed, will those which grow in their places be uncoloured or typical? There are several other things I should like to add, but I am afraid I am already taking up too much space. These notes are confessedly hastily put together, and very crude, but I hope that I have said enough to make it plain to the readers of SCIENCE-GOSSIP that there is work to be done, and observations are worth making on this very neglected subject. I hope we shall hear more about this question in future pages, so that as our knowledge increases, we may get nearer to the truth.

*St. Bride's Rectory, Manchester; Feb. 11th, 1895.*

## THE FAUNA AND FLORA OF IRELAND.

By E. L. LAYARD, C.M.G., F.Z.S.

I HAVE been much interested in Mr. R. F. Scharff's article on this subject, as it has deepened the impression left on my mind by a visit to Ireland last autumn.

Being my first visit to the "Emerald Isle," things connected with my favourite pursuits naturally most attracted attention. My son and I travelled from Dublin, right across to the opposite side of the island, to the sea coast of the wilds of Connemara. From Dublin to Galway we went by rail, so there was not much opportunity for observation, but from Galway to the west coast the journey was performed on outside cars, so we had plenty of time to notice things as we drove along. We remained six weeks on the coast. Both my son and myself have been assiduous bird collectors, and we were both struck with the dearth of bird life throughout the country. Perhaps our surroundings were not well fitted for it. There was nothing but bog and rock, and the usual plants of such a region. Where we lived there was not a tree for many miles in any direction, though formerly there must have been timber, for large tree-trunks and roots are constantly found by the peat cutters while cutting peat, the sole fuel used in the place. These tree-trunks—chiefly, we were informed, pine—are wonderfully preserved in the bog, and are perfectly sound and much harder than the same kind of timber of the present era. We saw large logs being sawn into boards for boat-building purposes, for which they are preferred.

We noted especially the absence of all swallows and swifts. Only once, after leaving Galway, did I see one of the former—not hawking for flies, but hurrying along as if he wished to "get out of that." It never greeted my sight again. We saw crows, sparrows, and an occasional lark. A couple of pairs of stone-chats evidently had nested in a stone wall we constantly passed. Wind-hover hawks were generally visible, and we once or twice saw a peregrine falcon, probably the same bird, or one of a pair nesting in the neighbourhood. These were about all the land birds we noticed. Of water-birds and sea-birds there were rather more. Herons, curlews, ducks, plover, snipe, gulls and terns, oyster-catchers, sanderlings, guillemots and cormorants are all I can remember, and they did not by any means abound.

Of frogs there was a small species common enough, and I should think hardly an introduction in such an out-of-the-way place. With the exception of grasshoppers, I noticed a great scarcity of insects; humble bees were very rare; butterflies were also scarce. I noted the grayling—two or three examples,—the common meadow-brown, a painted-lady or two, a small blue, and once I saw a butterfly that I thought was an Aran-brown. Among the land mollusca the common garden-snail (*Helix aspersa*) was plentiful in a cultivated garden. Nothing else turned up, but on the Island of Aran, my son found on the walls of the old ruins of the Firbolg Fort, a singular dark variety of *Helix ericetorum*. The animal was so mottled with black, and apparent through the shell, that when I first saw it I fancied we had found a wandering colony of the European *Helix terveri*. I hunted in vain for any fresh-water molluscs, such as *Bythinia* or *Planorbis*.

Of the flora, I regret to add I can say little, as I am ignorant of botany, but I recognised *Asplenium trichomanes* in great profusion and beauty, in the old walls between Galway and Oughterard, as we drove along; and I found, after a search, the sundew (*Drosera*) on some of the bogs.

Mr. Scharff's paper will cause us to take a greater interest in the subject and make closer observations, if we visit Ireland again this ensuing summer, which we hope to do. Certainly our weather was inauspicious, cold north and north-east winds the whole time, and yet I never saw finer and larger fuchsias, really high bushes.

*"Otterbourne," Budleigh, Salterton; February*, 1895.

## CADDIS-WORMS & DUCKWEED.

MY attention was attracted last May by the remarkable manner in which some caddis-worms cleared one of my vessels of duckweed (*Lemna minor* and thin fronds of *L. gibba*). Five of these creatures disposed of, on the average, twenty plants daily, and I estimated that in a pond covered with duckweed one caddis-worm to every four square inches of the surface would not merely check the growth but in the course of two months would clear the surface of the duckweed altogether. Though most of the plants are eaten, many die from being partially devoured; and, as in this species the larvæ construct their cases of the fronds, quantities of the plants are expended in the constant repairs of their homes. Here, then, is one explanation of the absence of duckweed in certain ponds where caddis-worms abound, as in the Black Pond at Oxshott. It is in the spring, when the duckweed is beginning to cover a pond, that these larvæ are best able to carry out their destructive mission. Perhaps some of the numerous readers of this journal would be able to put these results to the test of further observation. We know far more of the forms of the *Lemnæ* than we do of the conditions in which they live, and an agency that allows these plants to flourish in one pond and banishes them from another may prove to affect the distribution of these plants in different regions of the globe. HY. B. GUPPY, M.B.

6, *Fairfield West, Kingston-on-Thames; Feb. 4th*, 1895.

## PERTHSHIRE SOCIETY OF NATURAL SCIENCE.

By T. M. McGregor.

THE Perthshire Society of Natural Science was founded in Perth on February 28th, 1867, for the avowed purpose of "carrying on the practical study of natural science, by the exhibition and preservation of specimens, the reading of communications, by lectures, excursions, and by the formation of a library and museum"; and was inaugurated on March 7th of the same year, under the presidency of the late Dr. F. Buchanan-White. The ordinary meetings of the Society were held in the Glovers' Hall, George Street, until October, 1869. In this place the Society had no room for the storage of specimens, so it was decided to look out for more commodious premises, the members being of opinion that "had the Society a room of sufficient size in which to begin its museum, there would be no lack of donations." It was not, however, till October, 1869, that it was announced that a room had been secured, at Kirkside, to serve as a "store-room" for the Society's collections. In the Third Annual Report the members were asked to assist "in getting up a complete museum of the natural products of the county—now that there is accommodation for them." These premises were also found to be unsuitable for the purposes for which they had been secured, so in May, 1870, the Society moved to rooms in St. Ann's Lane, which it continued to occupy till May, 1881.

In the Eighth Annual Report we find the curator (Col. Drummond-Hay) complaining of want of space, but the Society seems to have remained in an apathetic state until November 15th, 1875, when the Council took into consideration "the propriety of having larger rooms that might be fitted up as a museum." It was ultimately agreed to take a lease of a room in the Exchange Buildings, George Street, which seemed suitable. Before this was done, however, further consideration of the matter had led to broader views. At the Tenth Annual Meeting, in 1876, Sir Thomas Moncreiffe reviewed the whole matter of the Society's museum, pointing out the difficulties that lay in the way of depositing valuable specimens in the rooms then occupied by the Society, and mentioned a site which might be secured for a suitable museum.

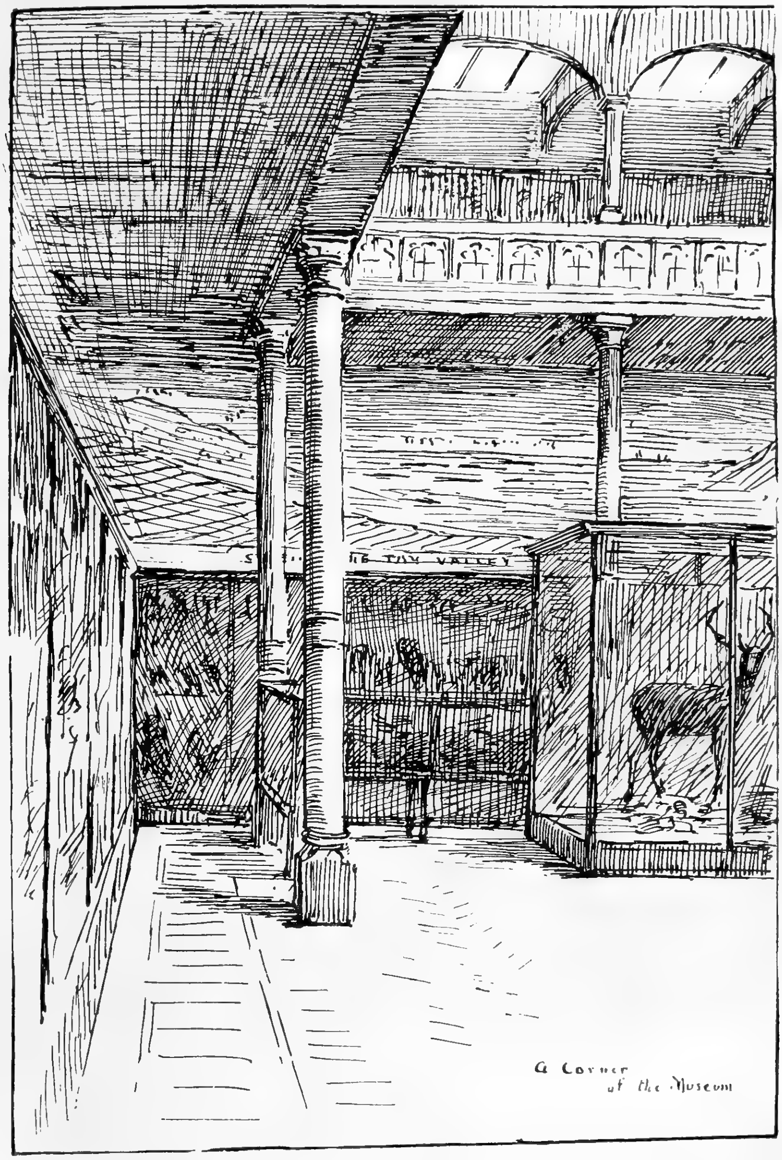
No definite steps were taken in this direction until March, 1877, when Sir Thomas Moncreiffe (then President of the Society), in his presidential address, again brought forward the scheme of building a natural history museum (in South Tay Street), together with a large public hall. The proximity of this large public hall to the museum would make the former available for lectures, conversaziones, etc., for which the lecture-room in connection with the museum might prove too small. As the outcome of various meetings, the museum committee resolved on April 4th, 1878, to take steps to raise funds to carry out the scheme of building a museum, etc., in South Tay Street, and they were encouraged in their efforts by the promises of handsome donations from well-known residents in Perth and others. In August of the succeeding year (1879), the Society received a very severe blow in the death of its large-hearted President, Sir Thomas Moncreiffe, Bart. Had not he, by reason of his untiring energy and perseverance, prepared the way for the successful carrying forward of his favourite scheme, it is only too probable that it would, at this time, have fallen into abeyance. His enthusiastic earnestness, however, was destined not to be lost upon his fellow workers. They justly deemed that the most appropriate memorial to their late President, would be the raising of a fund for the carrying out of his cherished idea. With this object in view, a large and influential committee was appointed, a canvass for subscriptions organised, plans prepared, and a site secured. About this time, Dr. Jas. Geikie, F.R.S., succeeded Sir Thomas Moncreiffe in the presidency of the Society. The subscriptions promised up to the date of opening were exactly £1,787, while the contracts for the erection of the building, exclusive of incidental expenses, were £1,720.

MONCRIEFFE MEMORIAL MUSEUM BUILDINGS, PERTH.

So well, therefore, was the appeal for subscriptions to the Moncreiffe Memorial Museum responded to, and so heartily did the public sympathize with the projected scheme, that on Saturday, October 1st, 1881, at 3 p.m., the Perthshire Natural History

Museum was opened in presence of a large and influential assemblage of subscribers to the fund, and of members of the Perthshire Society of Natural Science. The ceremony took place in the hall of the Perth Working Boys' and Girls' Society, Dr. James Geikie, F.R.S., President, in the chair.

Thus we see that in less than fifteen years this humble body of students and lovers of nature—the founders of the Perthshire Society of Natural Science—had the gratification of meeting in a pretentious building of their own. This was the result of their patient labour, for which even the




MONCRIEFFE MEMORIAL MUSEUM.

most sanguine member had hardly dared to hope. During these fourteen-and-a-half years of its existence, the Society had held 114 ordinary monthly meetings, at which 169 papers, including fifteen presidential addresses, had been read. In addition, various lectures had been given under its

The Natural History Museum Buildings consisted of (1) lecture room, (2) laboratory, (3) library, and (4) museum. In addition to these, a large space of ground remained unoccupied behind the museum building, upon which the museum extension of 1894 is now built.

auspices, 57 excursions made, and two very successful conversaziones held.

In regard to publications the Society had brought out several in this period, the first being the inaugural presidential address, which was followed by a small volume of "Proceedings," a continuation of which, was, however, abandoned in favour of "The Scottish Naturalist," the first number of which appeared in January, 1871. The publication of this journal was retained by the Society till 1878, when it was taken over by Messrs. Blackwood and Sons, under the same editorship. In 1883, after the lapse of a few months, it began a new career in the hands of Messrs. Cowan and Co., of Perth. The year 1892 saw a new development of it under a change of ownership, its new title being "The Annals of Scottish Natural History," under which designation it is now being published.

Other publications of the Society are the "Fauna Perthensis," the first part of which also appeared in 1871, as a catalogue of the Perthshire lepidoptera, which was followed by "The Proceedings of the Perthshire Society of Natural Science," the first part being published in 1881.

Up to March 8th, 1888, fully 600 persons had been admitted as members of the Society, the greatest number elected in one year being seventy-eight, and the least five. At this date the museum contained about 20,000 specimens, while the library boasted the possession of about 600 volumes, so that the resolution of 1867 of forming a museum and library had been well carried out. Rumours were at this time prevalent as to a projected museum extension, but it was not until the 10th of March, 1892, that the newly-elected President (Mr. Henry Coates, F.R.S.), in acknowledging the indebtedness of the Society to its retiring President, Dr. F. Buchanan White, proposed to raise a testimonial fund to him, "to be devoted to the scheme of museum extension which he has had so much at heart." As the result of this suggestion, an appeal was issued during the summer of 1892, and so wonderfully generous was the response, that, of the large sum of £2,500 asked, nine-tenths were subscribed in a few weeks.

By March 9th, 1893, the President was able to report that plans had been prepared and estimates received for the museum extension, and without further delay building operations were commenced on the spare ground already referred to. The plan of building adopted consists of a central hall, thirty-four feet wide by forty-four feet long, with a gallery running around it. It is entirely lighted from the roof, which is lofty and arched, and supported on iron columns. In connection with the museum are work-rooms, herbarium-room, etc.

The new museum building is to be exclusively devoted to the collections of Perthshire Natural History, while in the old building the Index Collection will be arranged. The proposed arrangement of the Perthshire Collections is as follows: vertebrata on the ground floor, the mammals being in tall cases in the centre, while the birds, fishes, reptiles, and amphibians will occupy the wall-cases around the sides In addition to these, an interesting collection of Perthshire birds'-nests and eggs will be displayed in table-cases round the area. As many of these will be mounted with their natural surroundings, they will undoubtedly prove a most attractive feature of the museum.

The gallery will be devoted to the invertebrata, the botany and the geology of Perthshire, the land and fresh-water shells and the fossils being displayed in desk-cases round the gallery front, and the other collections in wall-cases. For the geology and the entomology, special cases have been designed, which present some novel features, and which are thought to be specially adapted for the display of small specimens. They are wall-cases, with glass fronts, sloping at a high angle, and with false backs to correspond. The lower part of the case is in the form of a cabinet, for the storage of reference collections, while the higher part is for the display of diagrams and photographs, the middle portion only being for the display of specimens. By this arrangement the specimens will be neither too high nor too low to be conveniently examined. The botanical collections will include a series of specimens of the native timbers of Perthshire, illustrated by photographs of the trees, both in summer and winter conditions, and also by dried specimens of the leaves, flowers, etc. An instructive geological feature of the museum is a series of large diagrams painted in oil-colours, round the walls, illustrative of the geology of the county. These have been most carefully designed by the President, from the Geological Survey maps. They are correctly drawn to vertical and horizontal scales, the prominent topographical details being also indicated. There is also shown, at a lower elevation on the wall, a colour-key and explanation of the respective geological signs. As these diagrams are painted in the bright and harmonious colours selected by the Geological Survey, the effect on the walls is highly artistic, besides being of great educational value.

The museum has been furnished throughout in the most substantial and complete manner possible, the cases being all of polished mahogany and plate-glass, the latter being in whole sheets from top to bottom of the cases. The total estimated cost is now between three and four thousand pounds, and the Council hope to be able to meet the whole of this heavy outlay before the building is ready to be opened to the public, which it is expected will be early next winter. The Council have recently appointed a thoroughly competent scientific curator in the person of Mr. Alex. M. Rodger, formerly assistant to Professor D'Arcy W. Thompson, University College, Dundee, and under his able guidance the arrangements of the collections will be pushed on with all possible speed.

It is therefore encouraging to know that—thanks to the combined effort of a humble body of zealous workers, and to the hearty co-operation of their fellow-citizens and others, Perth will at no distant date be in possession of a Natural History Museum, which will at once be an honour to science and a credit and an ornament to the city. Surely such monuments as these bode well for the advancement of science.

No history of a society would be complete without a brief notice of the life and work of its founder and organiser; and with the name of the Perthshire Society of Natural Science that of the late Dr. Frank Buchanan White must ever be associated. From the date of its foundation to the day of his death, December 3rd, 1894, he devoted much of his valuable time to promote the interests and welfare of this Society; and his diligent work and exemplary care won for him the esteem and admiration of all with whom he came in contact. His natural modesty led him at all times to under-estimate his own abilities, and to under-value his own services, his aim being to keep these persistently in the background; but those who were more closely conversant with the affairs of the Perthshire Society of Natural Science know only too well how very much that Society is indebted to him for its present influential position. Even the casual reader of its "Transactions" cannot but be struck by the amount of valuable work done by him, and by the wide range of his subjects.

For the first five years of the Society's existence Dr. White held the post of president; for the next two years he was secretary. In 1882 he was elected editor, which post, however, he resigned, in April, 1883. He was re-appointed president in 1884, and held this office till March 10th, 1892, when he retired, as already stated, from office in favour of Mr. Henry Coates, F.R.S.

It is impossible in a passing tribute to his memory to do justice to the many excellent qualities which endeared him to his fellow-workers, as only those who knew him best, and who enjoyed the privilege of his personal friendship, can adequately estimate the great loss which the Perthshire Society of Natural Science and all students and lovers of nature have sustained in his untimely end. Certainly his was a record of "duties well-performed and days well-spent."

The block of exterior of the Museum building is from photos by Mr. Magnus Jackson, of Perth; while the sketch of interior is by Mr. W. M. Fraser, of the same city.

*Perth; February 15th, 1895.*

## NATURAL HISTORY EXHIBITION.

THE City of London Entomological and Natural History Society held an exhibition of natural science objects in the library of the London Institution on February 5th, which was well supported by members, exhibitors and visitors.

The most important and novel exhibit was that of Mr. Thomas Hanbury, of fruit, seeds and flowers from his well-known gardens at La Mortola, in Northern Italy. Among these were freshly-gathered fruit still attached to the branches with green leaves, of thirty species of oranges, lemons and citrons. One beautiful orange was grown on a tree which is a direct descendant from the orange tree which still flourishes at Rome after 600 years cultivation. This is the more interesting as there seems little reason to doubt its history, which attributes to the parent the honour of being the first plant of *Citrus aurantium* that was introduced into Europe. The whole time it has been tenderly cared by successive generations of monks of the monastery, where it grows. Other portions of this fine exhibit included deliciously-scented fruit of Chinese quince (*Cydonea sinensis*), various sprays of *Hakea* trees allied to the eucalyptus, with oddly-shaped fruit, curiously hairy cones of *Banksia marcescens*, and many more. Mr. F. J. Hanbury showed a fine collection of British plants, many being exceedingly rare and some now extinct, for instance, *Orchis hircina*. The most important portion of this exhibit was upwards of fifty species and varieties, being a portion of Mr. Hanbury's magnificent series of the British Hieracia, or hawk-weeds, accompanied by specimen copies of his handsomely-coloured drawings and monograph of this group, now in process of publication. Mr. Hanbury drew our attention to specimens of *Hieracium hyparcticum* from Sutherland, its only known station in these Isles. This is interesting because it is a common plant in Southern Greenland and Norway, with this single known connecting-link between the two continents.

The president of the society, Mr. J. A. Clark, showed a large case of wasps' nests. Those of *Vespa britannica* were attached to heather, fir, yew and ivy. One nest of *V. arborea* was found on Wimbledon Common. He had also six drawers each of British and exotic lepidoptera, the former containing many fine varieties. Among the president's birds were two cinnamon-coloured blackbirds (both from the same district in Monmouthshire), an almost white variety of yellow-bunting, and a hawfinch with a strong band of white feathers on the wing covers. Mr. C. H. Williams brought a perfect hermaphrodite, *Argynnis paphia*. This fritillary butterfly shows the male markings on the left pair of wings and those of the female on the right-hand side. Mr. A. H. Perks, an example of *Zyganea filipendulæ*, taken by himself in Worcestershire, with pale patches of colour in the red under-wings, also a remarkable *Smerinthus tiliæ* from the same county. Mr. George Elisha, twenty drawers of micro-lepidoptera, so well known for their beautiful preservation. Other lepidoptera were shown by Mr. C. A. Briggs (four large drawers of his celebrated British Lycænidæ), Mr. F. J. Hanbury, Dr. J. E. Sequeira (Exotic), Mr. W. A. Pearce (North American), Mr. J. W. Tutt and others. Coleoptera, by Oliver E. Janson, G. A. Lewcock and E. A. Newbery. A large hornet's nest taken at Ware, with preserved insects from it, by Mr. H. A. Auld. Birds were represented by the President, Mr. F. J. Hanbury, a fine series of cases, and a pair of polecats from Norfolk; also by A. F. Bayne, Dr. Sequeira and Mr. Ashmed. Other orders were sparsely in evidence. Microscopy made a brave show, several tables being occupied by instruments. Entomological apparatus from Mr. J. T. Crockett, and a beautifully-made forty interchangeable-drawer insect cabinet by T. Gurney, of Broadway, London Fields. Portable electric lamps suitable for entomologists in night work, made by the National Electric Company, attracted much attention. There were not many actual novelties in the exhibition, but there was one important addition to the British flora in a specimen of the new *Pyrus*, found by the Rev. A. Ley, in Brecknockshire, which will be shortly described and named, as it appears to be new to science. This was among Mr. F. J. Hanbury's numerous exhibits.

## REPORTS OF TWO SOCIETIES.

The Natural History Society of Glasgow issues its "Transactions" from 1892 to 1894, with one plate, illustrating a paper on "The Land and Freshwater Shells of Palestine," by G. A. Frank Knight. The report of this Society occupies 166 large 8vo pages. The various papers read at the meetings of the Society are varied in their subjects, some being of more than local interest. Attention may be drawn especially to those on fungi, and an interesting report, edited by Prof. Thomas King and Mr. D. A. Boyd, upon the "Disappearance of Native Plants in the Flora of West Scotland."

The English Arboricutural Society's "Transactions" for 1893-4 are issued by Messrs. Coward, of Carlisle, containing some very interesting articles and prize essays upon the growth of trees. The membership of the Society extends to about three hundred, the Secretary being Mr. John Davidson, Haydon Bridge-on-Tyne. Considering the tendency latterly showing itself for forestry in England, this Society should receive good support.


"Flora of Berkshire."—Mr. Druce announces that his "Flora of Berkshire" is in the press, and will be on the same plan as the "Flora of Oxfordshire."

London Catalogue.—The ninth edition of this list of British plants is in the hands of the printers. We hear that the annoying subject of nomenclature is to be well to the fore. We hope the synonyms will be fully explained where the changes of names are thought necessary.

New British Roses.—The Rev. E. S. Marshall, F.L.S., announces two new British members of the intricate family of Rosaceæ. They are from Boxley Warren, East Kent, being allied to *Rosa rubiginosa* (Sweetbriar). There seems little doubt they are the result of hybridisation.

Fruiting of Euonymous Japonica.—I enclose for your inspection cutting from Euonymous bush in fruit, as it is, I believe, most unusual for it to flower and bear ripe seed-pods in this country. I have noticed it this winter in several and by no means sheltered situations, in the open air, in this town.—*J. C. Eccles*, 3, *Dudley Terrace, Ventnor, Isle of Wight; February 6th*, 1895.

A British Pyrus new to Science.—The Rev. Augustine Ley has discovered what is considered to be a new *Pyrus* in Wales. This will be shortly described by him in a contemporary devoted to botany. We trust we may at a later date be able to place a description, by the discoverer, of this important addition to our flora, before our readers, accompanied by a drawing taken from a freshly-gathered specimen. Mr. Ley has kindly promised to do this when the shrub is next in flower.

Flora of Ireland.—In reference to the article last month by Dr. Scharff, I may mention that a paper of mine on "The Minute Aquatic Flora of Ireland," was read before the Linnean Society in December, 1891. It was printed in the Journal of the Society in the following year; it dealt with a very large number of species, many of which were not previously known to occur either in England or Scotland, and many were new to Science.—*Wm. West*, 15, *Horton Lane, Bradford; Feb.*, 1895.

Coltsfoot as a Weather Prophet.—Many people consider that when the flowers of *Tussilago farfara* have appeared, as they do in the last winter months, the severe weather has disappeared for the season, and nothing more serious may be expected than an ordinary course of easterly winds. Experience, however, shows that this popular opinion, like so many others when investigated, is not borne out by facts. The flowers appear in the south of England frequently as early as the beginning of February, and we have seen them in mild seasons even in January. During a course of observation extending over several recent years it has been noticed that the earlier these flowers appear, the more likely are we to suffer from a severe period towards the end of March, or beginning of April, with considerable fall of snow. The frequency of these spring snows has passed into a proverb among country people, who speak of the "Blackthorn Winter."

# GEOLOGY

Fossil Bacteria.—The following interesting note, on the discovery of fossil bacteria, appears in the "Revue Scientifique": "The silicious beds of Esnost and Regny, which belong to the culm, enclose numerous bacilli in the midst of almost unrecognisable vegetable remains. A new species *B. vorax*, has been studied by M. B. Renault, and appears to have been the chief cause of the destruction of vegetation. The 'rods' are divided into cells, each containing a spore; six to eight spores have been counted in one 'rod'; young 'rods' have also been found composed of two, three and four cells; the spores escape from one of the extremities. It is the most ancient of the known bacteria."

Dendrites and Oldhamia.—In examining certain dendrites which I have, alongside with small specimens of *Oldhamia radiata* from Bray, I have been much struck with their similarity in appearance. The latter, found fossil in ancient Cambrian beds, have long occupied an undecided position between animal and vegetable. I would throw out as a suggestion the possibility of the fossil being, after all, but the impressions left by crystals formed before the hardening of the material of the rock. *Oldhamia antiqua*, which you figure at the head of your Geological column, will illustrate what I mean. By the way, I may say how interesting and well-considered the whole of the head-pieces are.—*E. A. Martin, Thornton Heath.*

Section of Chalk at Croydon.—I think your correspondent, Mr. A. Absell, is wise in placing a query after the words "Thanet Sands" (vol. i., N.S., page 285). From his description of the uneven surface of the chalk, and of the contents of the clefts and fissures which he mentions, I should strongly suspect that the overlying formation is of recent alluvial age. Looking at the winding valley which leads from the Downs into Croydon (Croigdeane, a winding or crooked valley), there is every reason to suppose that the valley once drained part of the hills there, and that the present site of old Croydon was formerly a wide expanse of mere and marsh (*cf.* Waddon Marsh). Hence it would be expected that on the inclines at the sides of the valley we should find various alluvial deposits, and this is in fact what we actually find. I know the road to which reference is made, although I cannot call to mind the particular cuttings. His description would serve almost accurately to describe one of the many fissures and wedge-shaped clefts which seem to push themselves downward into the chalk round about Brighton and Hove. With regard to the dip of the chalk, this is of course towards the north at Croydon, but in regard to the two sections referred to, an important factor is omitted in the description. Did the faces, or the outcrops at the faces of the sections, both run in parallel direction? If they did, there was apparently a difference in the degree of dip; this, however, is not uncommon in the chalk.—*Edwd. A. Martin, Thornton Heath; February*, 1895.

# BOOKS TO READ

*Progress of Science: its Origin, Course, Promoters and Results.* By J. Villin Marmery. With an Introduction by Samuel Lang. 376 pp., Crown 8vo. (London: Chapman and Hall, Limited, 1895.) Price 7s. 6d.

This will be found to be a book of reference alike for the Students of Science and for the general reader. Some idea of the large amount of valuable material digested in its pages may be gathered from the general index, which embraces over 2,500 references to facts and persons. It is a concise survey of the history of science from the earliest attempts to understand the subject down to this present year. Especially fascinating is the chapter on the progress of scientific knowledge among the Arabs, from the ninth to the fifteenth century; even though we may individually know already the facts set forth by Mr. Villin Marmery, yet as arranged by him one cannot resist reading on page by page to the end of the chapter. The author reminds us that "the Arabian race is gifted with an intellect which, under proper direction and cultivation, yields the most admirable effects. A general fact shows this very forcibly. It took the Greeks six centuries, the Romans seven, ourselves ten to emerge from barbarism into civilisation; the Arab's transition did not exceed one hundred years—a phenomenon which speaks volumes with respect to their natural gifts." We presume the author desires to convey the idea that we have emerged from our "ten," but one can hardly think this is so, when we find the following footnote at the end of one of his pages. "In a town of 130,000 people, which enjoys the benefit of a public lending library, the Essays of Herbert Spencer had in six months been issued eighteen times. Not one had read the three volumes through, for the writer of the present work found pages uncut in them!"

A much abbreviated biographical dictionary is arranged, in chronological order, of upwards of 400 men of science who have good claims to fame, the work of each being explained. These are tabulated in one of the eight appendices at the end of the book. By the way, we are pleased to see an effort has been made to avoid the ugly word "scientists," which we find only once, that being in the title of a chapter, and may be the perpetration of the "man who made the index," and not of the author. This work undoubtedly shows great learning and research upon the part of Mr. Marmery, and is one which will frequently be useful to all students and writers on scientific subjects, and invaluable to school teachers.

There is a very marked difference between the literary style of the couple of pages forming Mr. Samuel Laing's introduction and the general body of the work. In the former, the sentences are elegantly written, figuratively expressed and full of metaphor, as becomes the finished craftsman; whilst Mr. Marmery sacrifices everything to brevity and conciseness. Still we do not think he has overdone the pruning, for his work appears to be well done. J. T. C.

*Birds of the Wave and Woodland.* By PHIL ROBINSON. 244 pp., crown 4to, with 44 illustrations by CHARLES WHYMPER and others. (London: Isbister and Co., Limited. 1894.) Price 10s. 6d.

As a specimen of modern book production, Messrs. Isbister and Co., have succeeded in issuing a beautiful work. It states on the title-page that the illustrations are by Charles Whymper and others, but very few are those which do not bear Mr. Whymper's well-known signature. The two picturesque drawings which we reproduce by permission of the publishers, are different examples of that artist's style in this work. There are no less than eighteen full-page drawings, and many of the others are nearly as large. Evidently expense has not been considered, for we have the full benefit of the wood engraver's art in these pictures, instead of the growing tendency for process blocks.

Mr. Phil Robinson's letterpress is as facile and readable as is usual with him. Pleasant enough to become most interesting is he as he rambles through his woodlands and by side of his waves. Always cheerfully confident in his facts and assertive as is his wont, but as was said, if we mistake not, of an ornate edition of Rogers' "Italy," on its appearance—"were it not for the plates, the book had been dished." Why cannot our author take time for thought as he writes? We have no doubt he remembers now that many of his statements which are subject to correction, could have been accurately written by himself, had he thought of his bird experiences at Marlborough, when he and his brother used to find many "good things." A busy life, with some adventure, soon rubs off little corners of memory and the tendency to verify before committing oneself to the cruel glare of public print. Still, as we have said, this is a readable book containing many passages of distinct literary merit. For those who care more for beauty than science, we may say we have not lately met with a book which is more pleasing or more readable in its pleasant chattiness. J. T. C.

NESTING-HOLE OF WRYNECK.

From "*Birds of the Wave and Woodland.*"

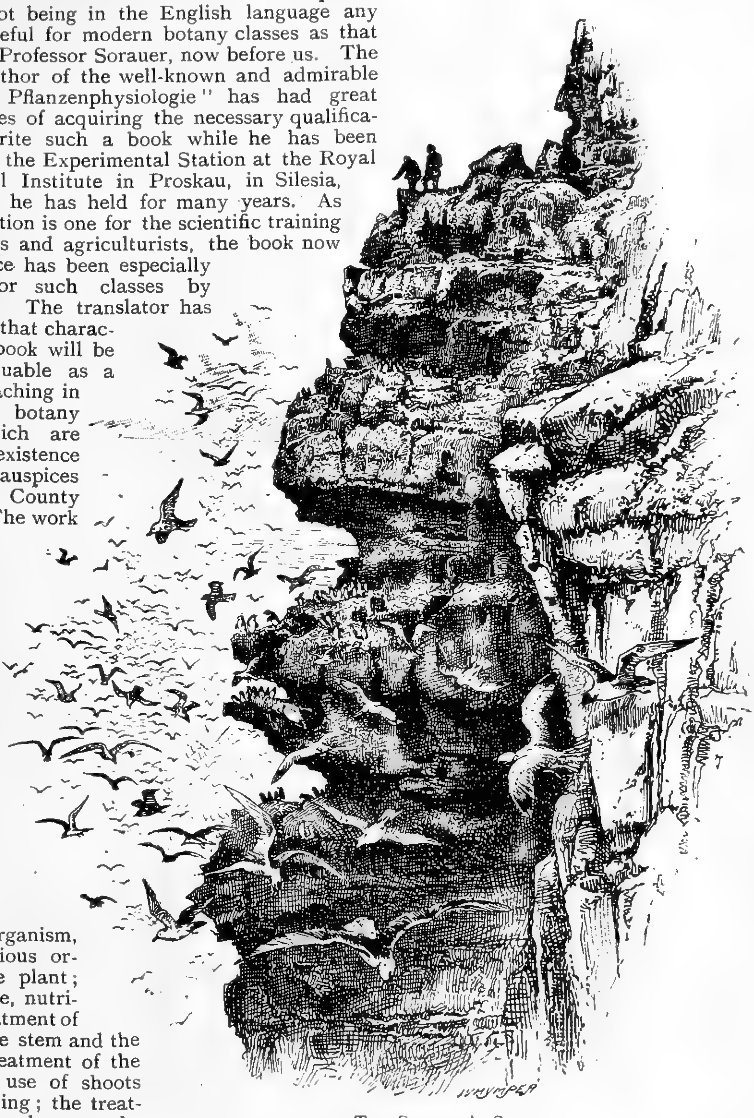
*A Hand-book to the British Mammalia.* By R. LYDEKKER, B.A, F.R.S., V.P.G.S., etc. 352 pp. 8vo, illustrated with thirty-two coloured plates. Allen's Naturalist's Library. (London: W. H. Allen and Co., Limited. 1895.) Price 6s.

The difference between the old "Jardine's Naturalists' Library" and the present series becomes more apparent as it proceeds. This is largely to be attributed to the greater scientific treatment of modern popular works on natural history than was the custom half-a-century ago. Mr. Lydekker has brought his geological information to his aid in preparing the latest treatise on the wild mammals of Britain. This has been judiciously applied, not too speculatively as a rule, and forms one of the most pleasing features of the book. We are a little sorry to read on page 16, when introducing the bats, "Since bats are, on the whole, less interesting than many other British mammals, our notices of the various species will be comparatively brief." It is because they are so little known or understood in this country that they are generally considered uninteresting. We should like to have seen more notes from the author, on the life-history and habits of these strange animals, in view of inducing those with a taste for natural history, who have opportunities for observing, to take more interest in them; for we feel sure there is much still to learn about bats. These remarks, however, do not apply to some other parts of this hand-book, which is throughout most interesting, not to say entertaining. It is a valuable book and will be most useful, especially to those residing in the country, for it is quite surprising how very little is generally known about our wild mammals.

J. T. C.

*A Popular Treatise on the Physiology of Plants, for the use of Gardeners, or for Students of Horticulture and of Agriculture.* By Dr. PAUL SORAUER. Translated by F. E. WEISS, B.Sc., F.L.S. 266 pp. large 8vo, with 33 illustrations. (London and New York: Longmans, Green and Co., 1895.) Price 9s. net.

In his preface, as translator of this book, Professor Weiss says he undertook the work in consequence of there not being in the English language any book so useful for modern botany classes as that written by Professor Sorauer, now before us. The original author of the well-known and admirable "Populäre Pflanzenphysiologie" has had great opportunities of acquiring the necessary qualifications to write such a book while he has been Director of the Experimental Station at the Royal Pomological Institute in Proskau, in Silesia, which post he has held for many years. As that institution is one for the scientific training of gardeners and agriculturists, the book now under notice has been especially prepared for such classes by the author. The translator has maintained that character, so the book will be found invaluable as a basis of teaching in the new botany classes which are coming into existence under the auspices of various County Councils. The work is divided into a dozen chapters, which are really divisions of the whole subject. They are such as the introduction which defines the conceptions to be formed by the student of a vegetable organism, and the various organs of the plant; the structure, nutrition and treatment of the root, the stem and the leaf; the treatment of the shoot; the use of shoots for propagating; the treatment of the leaves; the theory of watering; the flower and fruits, and seeds. The illustrations are clear, and descriptions of them simple and plain.



THE SEA-BIRD'S CITADEL.
*From "Birds of the Wave and Woodland."*

*Half Hours with the Stars: A Plain and Easy Guide to the Knowledge of the Constellations.* By RICHARD H. PROCTER, B.A., F.R.A.S. 22 pp. large 4to, with 12 maps. (London: W. H. Allen and Co., Limited.) Price 3s. 6d.

This well-known and popular star-atlas is being again issued by the publishers. By its aid and the accompanying explanations there is no difficulty in finding the position of the principal star groups night after night throughout the year, and it is true for any year.

*The Planet Earth: An Astronomical Introduction to Geography.* By RICHARD A. GREGORY, F.R.A.S. 116 pp. 8vo, with 36 illustrations and frontispiece. (London and New York: Macmillan and Co., 1894.)

As a primer for young people this little work will be found useful. The illustrations are well selected and the letterpress simply yet lucidly written. It is quite a book we can recommend for home instruction of intelligent young people, and should help to teach observation of things around them. Even persons with limited technical knowledge will be able to teach their children many simple but necessary facts in connection with the world they live in by the aid of this book.

*Popular Natural History for Boys and Girls.* By W. J. GORDON. 256 pp. 8vo, and 86 engravings. (London: Religious Tract Society. 1894.) Price 2s. 6d.

This is a pleasantly-written book, giving an outline of the larger animals of this world. It is simply expressed, and contains at the beginning a "brief explanation of some of the scientific terms used in this book," which will be very useful to the young people for whom it is intended, from an educational point of view when reading other books.

## COUNTRY LORE

WILD BIRDS IN LONG FROSTS.—In Northern Asia, North-Eastern Europe and North America, where there is a settled climatic condition in winter-time, the birds have acquired the hereditariness of migration, during the prolonged frosts, which, roughly speaking, extend from December until April, without any lengthened intervals of mildness. On the Tundras of Siberia or the prairies of Canada, in the winter season, there are scarcely any indications of bird life beyond snow buntings and one or two other species. In Britain, however, we have now no settled frozen period, and when such comes upon us, of comparatively short length, we find not only the human inhabitants of these islands unprepared, but in greater degree the wild birds and some other animals. The birds are by far the greatest sufferers. During the present severe frost reports have come from all parts of this country of large numbers of blackbirds, thrushes, finches, gulls, and other species having been found dead on the snow. The cause of the death of these may probably be attributed as much to thirst as hunger and cold, water in most country districts being unattainable. This mortality must have extended to very many thousands of birds throughout our islands. Although nature is relentlessly cruel in her workings, yet out of this sweeping destruction by cold and starvation the balance is perhaps being maintained. The Acts of Parliament which have been passed in the last quarter of a century for the protection of our wild birds are no doubt admirable in themselves, but considering how scarce have become the natural enemies of the smaller birds it is probable that over protection would create a feeble race, this being invariably the result of artificial interference with the natural law of the "survival of the fittest" as instanced by the grouse disease. Careful search through early numbers of the "Gentleman's Magazine" and other records of a century or more ago, seems to show that when the natural enemies, such as hawks, were plentiful there was not even in the most severe frosts so great a mortality as has occurred this year among the small birds. The probable reason being that in those times the more feeble were killed at intervals throughout the year, and the strong survivors were better able to bear the rigour of winter. This severe frost and consequent wholesale destruction has done for the small birds what the "Black Death" of the middle of the fourteenth century, and other epidemics, did for the human race in England. Devastating and dreadful though they must have been, yet their effects on the social and physical life of the inhabitants of England were undoubtedly good. One cannot, however, help feeling sorry for the individual birds which are thus suffering, and so do all in one's power, in a small way, to frustrate the purposes of nature by providing our feathered friends with food and water; especially water, as they probably suffer far more pain from thirst than from hunger, when the ponds and streams are frozen hard.—*Flora Winstone, Epping; February 16th*, 1895.

## PHOTOGRAPHY

FOSSIL PINE.—It is remarkable how perfectly the cellular structures are found to be preserved in the vegetation of the remote past; even so far back as the coal-measure period many plants are met with which still retain all the details of structure almost as sharply defined as they are found in recent plant-life. Fig. 1 is a transverse section and Fig. 2 a longitudinal section, prepared from the trunk of one of the fossil pines found at Cromer, in Norfolk.

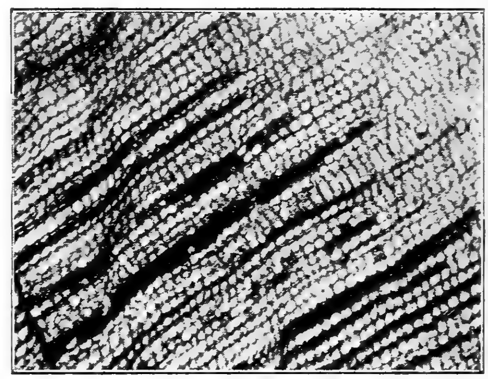


Fig. 1.—Transverse section.

The strata in which the trees are found is the tertiary below the Chillesford clay and above the upper chalk, and is associated with remains of *Elephas antiquus, Rhinoceros etruscans, Trogontherium cuvieri*, etc. For other information on the characteristics of the geology of this portion of East Anglia, I would refer your readers to the

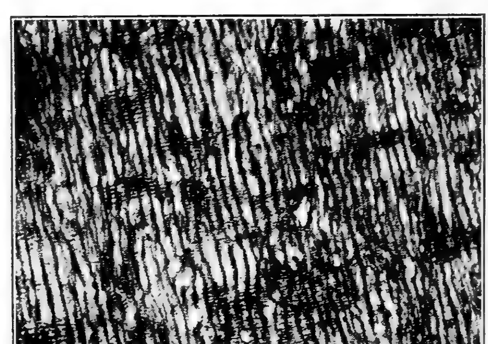


Fig. 2.—Longitudinal section.

contributions of Mr. John Gunn, M.A., to the "Quarterly Journal of the Geographical Society," vol. xxvi., and again in 1876. The sections were cut from one of the specimens in our museum by Mr. T. Henderson, of Dunstan-on-Tyne, and the photo-micrograph is enlarged sixty diameters.—*W. W. Midgley, F.R.Met.S., Museum, Bolton.*

# MICROSCOPY

Vegetable Sections.—Will someone please tell me, through the pages of Science-Gossip, which is the best book on cutting, staining and mounting vegetable sections.—*J. Stephenson*, 23, *Avenue Parade, Accrington; February 15th*, 1895.

Mounting Delicate Micro-Organisms.—I should be much obliged if anyone would inform me through the pages of Science-Gossip of the best manner of mounting small animalcula for the microscope. I have tried in vain to mount a specimen of Cyclops, but the creature is so small that it seems impossible to kill it without crushing it altogether, and if one leaves it to dry up of itself on the slide it twists itself into such contortions that it is no use as a specimen.—*(Miss) C. M. Gibbings, Sunnyside, Mears Ashby, Northampton; February 11th*, 1895.

Micro-Organisms of Sewage.—Some little time ago the Main-drainage Committee of the London County Council appointed Mr. J. Parry Laws and Dr. F. W. Andrews to investigate the micro-organisms in London sewage. The object of this enquiry was to ascertain the species of bacteria present, and their influence on the health of the metropolis. The report is perhaps more satisfactory than was anticipated. With regard to the bacterial flora of sewage, some species which are abundant in other places, cannot survive in a main-drainage system, while others exist in incredible numbers. For instance, it was found on the 26th January, 1894, that an average of 2,781,650 bacteria occupied each cubic centimetre of fresh sewage from St. Bartholomew's Hospital. Many of these seem to disappear in their journey to the outflow, for the average at Barking appeared to be only 1,900,000 per ccm. This report is sold, price 4d., by Stamford, 26, Cockspur Street, S.W.

Preserving Sea-Weeds.—The following recipe is recommended by Dr. J. P. Lotsy, for preserving examples of Florideæ for microscopic examination. "The specimen is first laid in a one per cent. solution of chrome-alum in sea-water and kept there for a period varying from one to twenty-four hours, according to the size and texture of the species. The chrome-alum is then completely washed out, and the specimen placed in a mixture of 5 ccm. of 96 per cent. alcohol in 100 ccm. of water and vigorously stirred. The amount of alcohol is then increased by increments of 5 ccm. every quarter of an hour until it amounts to 50 ccm. The specimen is then removed and placed in a mixture of 25 per cent. alcohol in distilled water, and the quantity of alcohol again increased in the same way, till it amounts to 50 ccm. alcohol to 100 ccm. of water. The same process is again repeated with 50, 60, 70, 80 and 90 per cent. solutions of alcohol in distilled water; the specimen being finally preserved in the last."

Adaptation in Melicerta.—Some years ago I was quartered with my regiment at Leeds, and being very fond of microscopic work, pond life for preference, I managed to forage for miles round in ponds and brooks for different specimens. On the whole I was tolerably successful, yet in all my searchings I never found a single *Melicerta ringens*. Happening to be on leave about that time down in Suffolk, I found a pond, near the place I was staying at, which swarmed with *Melicerta* on *Chara nitella*. On my return to Leeds I took a large jar of them with me and emptied them into a finger glass, which I put outside my window. The air of Leeds is not exactly pure, and there is, all day long, a continuous fall of black smuts from the thousand tall chimneys which by no means consume their own smoke. Indeed there is a saying that snow comes down white only once a week, on Sundays, when the furnaces are damped down. At all other times it is black. I did not look at my *Melicerta* for three or four days after my return, when I found the little creatures had worked the smuts up in the pellets which make up their habitations. The lower part of the cases were, as usual brown, the upper part, when the Leeds smoke came in, quite black. I may add it did not seem to do them any harm.—*(Major) J. Stunt, St. Peter's, Jersey.*

Royal Microscopical Society.—Mr. A. D. Michael, F.L.S., devoted his presidential address, delivered on January 16th, to reviewing the history of the Royal Microscopical Society. It appears that the society is now upwards of half a century old. On the 3rd of September, 1839, in the drawing-room of No. 50, Wellclose Square, now a far from fashionable neighbourhood at the eastern side of the Tower of London, there met at the invitation of its owner, Edwin J. Quekett, F.L.S., seventeen gentlemen, and out of that meeting rose the now important society. Edwin Quekett must not be mistaken for his celebrated younger brother, John, though he was a man of scientific reputation, practising medicine at Wellclose Square, where he died in 1847, only thirty-eight years old. This meeting was purely accidental, but included the Rev. William Quekett, Chas. Foulger, Edward Newman, D. Farre, Geo. Jackson, Joseph J. Lister, F.R.S., Geo. and Conrad Loddige, Cornelius Varley, Solly Reade, N. B. Ward (inventor of Wardian cases) and others. Such were the gatherings of "Bowerbank's Band of Brothers," held for friendly discussion; and at one of these, it is said that Bowerbank exclaimed "God bless the microscope, let us have a society." Out of that remark, further discussed at Ward's house, was formed the Royal Microscopical Society. The name adopted was "The Microscopical Society of London," the first president being the late Professor Owen. The initial purchase of the society was practical, being a diamond and cutting-board for glasses for microscopical slides, for the use of the members, a provisional committee having fixed uniform sizes of 3 inch × 1½ inch and 3 inch × 1 inch. The society shortly afterwards arranged, for a rental of £20 per annum, to use the rooms of the Horticultural Society at 21, Regent Street. In 1841, Daniel Cooper established his "Microscopical Journal," having obtained permission to publish the "Transactions" of the society. Among those who joined the society in the first year were Richard Beck, Professor Thomas Bell, John Birkett, of Guy's Hospital, Geo. Bask, Sir James Clarke, John Edward Gray, of the British Museum, Chas. Hullah, the musician, Dr. Lindley, Van Voorst, the bookseller, and Erasmus Wilson. In 1852, the society moved to the Chemical Society's rooms at 5, Cavendish Square, but a year later it moved back to their old quarters, remaining until 1856, when King's College became its home, until the Council was able to finally settle in its present rooms in Hanover Square.

# ZOOLOGY

A Mild December.—A note in your last issue in reference to the mildness of the last weeks of 1894, reminds me of two insects which I saw on December 27th, when walking through a small wood near Halstead, Essex. The first noticed on a tree trunk was a perfect specimen of *Hybernia lencophearia*, and a few minutes later a crippled *Phigalia pedaria* (*pilosaria*.) I may mention that the wood is on a slope facing south and is well protected from both north and east winds.—*F. E. Filer*, 58, *Southwark Bridge Road, S.E.; January*, 1895.

Gulls in London.—Although it is so well-known that there has been a remarkable assemblage of gulls in London during the late frost, we have not noticed any account of the species which visited the Thames between the bridges. On several occasions the number must have exceeded several thousands, which were to be seen among the floating ice on the river from Greenwich to Chelsea. They appeared to be nearly all specimens of the black-headed gull, *Larus ridibundus*, chiefly immature. On one occasion there must have been at least five hundred of these birds between Blackfriars and Waterloo Bridges. It was amusing to see numbers of people feeding the hungry birds, many persons appearing to think that every wild thing is "bun-iverous." The gulls seemed to enjoy ærated bread as much as the most luscious sprats.

Bird Notes from Canterbury.—The severity of the weather in these parts has been unprecedented within the memory of the oldest inhabitants. The mortality among the birds has been great Missel-thrushes, thrushes, redwings and field-fares perishing by hundreds. Robins, blackbirds and larks are scarce, but probably have migrated until the weather changes. Tits of all sorts seem as lively as ever. A splendid pair of Bohemian wax-wings (*Ampelis garrulus*), have been sent to the local taxidermist for preservation, and a magnificent specimen of a magpie (*Pica rustica*), whilst flying past a house in the country fell dead, doubtless owing to the effects of the intense cold upon the action of its heart, as it was in no way damaged. I obtained the specimen, and a minute examination failed to reveal it had been the victim of a stray shot, as I at first anticipated. Eleven geese, probably bean-geese, were in the neighbourhood two days ago, but, so far as I am aware, they have escaped the designs of prowling wild fowlers. It is said an Iceland falcon (*Falco islandus*) was shot at Maidstone, but I do not know if the statement is true. To-day I have received by post an immature black-headed gull (*Larus ridibundus*) picked up dead at Leatherhead, in Surrey. In all probability, from the abrasion on its head, it had flown against a barbed wire and was stunned, but owing to its low state and cold it had no chance of recovering. It was in such a poor state, so small and thin, that it was sent to me under the impression it was either a "Buonaparte's" or else a "Little Gull." But the white inner-webs with dark margins to the outer primaries show the species.—*H. Mead-Briggs; February* 15th, 1895.

Little Auks in Scotland.—These hardy little mariners, that live on the rolling deep, rarely visit our shores unless to seek shelter from some unusual blast. Immense numbers of these unfortunates must have perished in the North Sea in the recent gales of January. Many were wind-borne and wafted far inland, and reported from many places in the north-east of Scotland. Some were found dead but many in a helpless state all destitute and thin, nine specimens came under my observation here, eighteen miles from the sea.—*W. Sim, Gourdas, Fyvie, N.B.; February* 13*th*, 1895.

White Irish Hares.—At page 266 of Science-Gossip for February, 1895, in Professor Scharff's interesting sketch on the "Fauna and Flora of Ireland," it is stated that "in Ireland, the arctic or mountain hare does not change its dress to white as it does in cold countries, but remains in its brown summer hue throughout the winter." I do not know on what grounds Professor Scharff has been led to make this statement, for as far as my experience goes, in County Down, it is quite incorrect. At Firnebrogre, near Downpatrick, a very large number of hares are killed or taken every year, and it is found that a considerable number of these turn very white in the winter, while nearly all assume a much lighter shade of fur when the cold weather sets in. The Irish hare is considered to be exceptionally strong and suited for coursing purposes, and a large number of these hares are exported annually to England and Scotland for various coursing meetings.—*Wm. E. Warrand, Major-General R.E., Harold Road, Margate; February* 10*th*, 1895.

Little Auks in Scotland.—In "Life of a Scotch Naturalist" we have from the pen of Thomas Edwards a description of these interesting birds, as observed by him on one of his rambles round the Banffshire coast. He says: "It is a grand sight to see one of these diminutive but intrepid creatures manœuvring with the impetuous billows of a stormy sea. Wave follows wave in rapid succession bearing destruction to everything within reach; but the little auk, taught by nature, avoids the threatened danger either by mounting above the waves or by going beneath them, reappearing unhurt as they spend their fury on the shore." Such a description would lead one to the conclusion that no storm was too strong for the little auk. We have it recorded, by Edwards himself, that after a severe storm which occurred in December, 1846, he counted lying along the coast, between the Burn of Boyne and Greenside of Gamrie, a distance of nine miles, close upon sixty little auks. In the storms that visited us during the latter half of December, 1894, and the beginning of the following January, we have had many instances recorded in our local newspapers of the little auk being picked up at various places all round the north-east coast of Scotland; some alive and others dead. The following are some of the places and number of birds found along the coast, between Aberdeen and Inverness, which I took note of at the time: one alive at Buckie; one dead between Portgordon and Buckie; one alive at Walkerdale, two miles inland; one dead, Haddo House, Methlick; two dead, Inverness (cock and hen); one dead, Ferryhill, Aberdeen; one dead, Nairn; one dead, Brodie. A large number, some alive, found at Westside, Portsoy. Such are some of the records from the shires of Aberdeen, Banff, Nairn, etc.—*James Stott*, 2, *Balmoral Terrace, Aberdeen*; *February*, 1895.

# SCIENCE GOSSIP

During the year 1894, no less than 1,377,588 persons visited the Royal Gardens, at Kew, which is about 450,000 less than in 1893. The difference in weather is said to be accountable for the reduction.

Mr. John W. Taylor, F.L.S., after a period of twenty-one years as editor and director of the "Journal of Conchology," has retired. The journal becomes the sole property of the Conchological Society of Great Britain and Ireland, and will be edited by Mr. M. E. Hoyle, M.A., of Manchester.

Mons. J. Poisson describes in "La Nature" the explosive fruit belonging to a species of acacia. These seed pods are of the shape and colour of miniature cigars, being three centimetres long. When placed in water, the pods, after two or three minutes, explode with a loud noise, throwing one valve with many of the seeds into the air.

Writing to "Symons's Monthly Meteorological Journal," Mr. G. H. Elder, of Blackheath, says that during the remarkable thunderstorm of January 23rd, his watch suddenly stopped. He says it had never done so before; and afterwards he met no fewer than four people who said the same thing had happened to their watches.

An interesting communication upon the "Animals found in the Mitchelstown Cave" in Ireland, appears in the February number of the "Irish Naturalist," by Mr. Geo. H. Carpenter, B.Sc. This cave is said to be the only one in Britain containing members of the blind subterranean fauna. This may be attributed, however, to imperfect exploration.

The "Proceedings of the Liverpool Geological Society" are issued, being part 2. vol. viii., edited by Mr. H. C. Beasley. The presidential address, by Mr. E. Dickson, F.G.S., on "The Estuary of the Ribble," is a careful compilation of what is known of the geology of that important region of Lancashire. Professor W. A. Herdman, F.R.S., contributes "Notes on the Submarine Deposits of the Irish Sea."

There was sold by auction, for forty-eight guineas, on February 21st, at Stevens' Great Auction Rooms, Covent Garden, what is considered to be the largest egg known of the huge extinct bird of Madagascar, *Æpyornis maximus*, probably the "Roc" of Arabian romance. There are remains of three species of *Æpyornis* to be found in the drifted sands of the southern part of Madagascar.

Europe is suffering from a serious wave of the so-called influenza epidemic, somewhat similar to to that which followed the severe frost of 1891. There seems no doubt that it is produced by a microbe which readily spreads among human beings and some of the domesticated animals. A medical contemporary points out the danger of children using toys which are inflated by the breath of street hawkers suffering from that disease or others, such as tuberculosis.

It is announced that the Danish Government has established a permanent meteorological station at Angmegsalik, upon the eastern side of Greenland, in latitude 65° 37'.

The Society for the Protection of Birds has issued its Fourth Annual Report, being for 1894. Established in 1889, it has now a members roll of no less than 11,500. There are some interesting notes in this report upon the probable early extinction of several species of birds in different parts of the world, to satisfy "Christian women of Europe with ornaments." Among these is the egret of Indo-China.

The Right Hon. Lord Rayleigh, F.R.S., Professor of Natural Philosophy in the Royal Institution, will deliver a course of six experimental lectures on "Waves and Vibrations," at the Royal Institution, on Saturdays, March 2nd, 9th, 16th, 23rd, 30th, and April 6th. His lordship will also deliver the Friday evening discourse on April 5th, when his subject will be "Argon, the new Constituent of the Atmosphere."

A statement has been made to the effect that one of our more uncommon plants is likely to be exterminated in some of its stations by interested persons. It is the wild balsam or "touch-me-not" (*Impatiens noti-me-tangere*). A rare geometroid moth, *Eustroma reticulata*, feeds only on this plant, and to enhance its scarceness is said to be the object of this wanton destruction of the balsam in the neighbourhood of Windermere.

Mons. Mer has given the result of a series of measurements, taken with great care and exactitude, on a number of trees in the Vosges during the extremely wet season of 1888, and the correspondingly dry one of 1893. These careful observations have shown that dry seasons have a very marked tendency to diminish the growth of trees in height, and, to a less degree, in breadth. Very damp seasons do not affect the height to any marked extent, but have a great tendency to attenuate the growth in breadth. The growth is normal in ordinary seasons.

The influence of the newer tendency to introduce scientific thought and investigation into many subjects which were a few years ago considered no more than hobbies is to be noted among the "bird-fanciers." The Bird Cage Club, with a large membership, holds regular meetings at which abstruce subjects connected with birds in captivity are discussed and "Proceedings" published. Now, we receive the "Avicultural Magazine," the organ of the Avicultural Society for the study of foreign and British birds. It is to be distributed monthly free to the members.

Sir Benjamin Ward Richardson, M.D., F.R.S., is nothing if not original. It is unusual for an editor of a magazine to write the whole of the journal himself without outside aid. Such, however, is the case with "The Ascelepiad," which Sir Benjamin not only edits, but fully writes. It is a half-crown quarterly, devoted to medical and allied scientific subjects. In the last number (42, vol. xi.) he gives a series of "Rules for the Prevention of Consumptive Disease," which will be found well worth studying. He recommends pure air as the first rule, active outdoor exercise, uniform climate, uniform warmth in dress, regular hours of rest, sunlight, outdoor occupation, muscular amusements, cleanliness, avoidance of colds, and ample diet of easy digestion. Each of these rules are explained in detail.

## SCIENCE ABROAD

THE CANADIAN ENTOMOLOGIST. Vol. xxvii., No. 2. February, 1895 (London, Ontario).—The article on *The Coleoptera of Canada* is continued by Mr. H. F. Wickham, the Cucujidæ of Ontario and Quebec being treated with illustrations. Prof. T. D. A. Cockerell, of Las Cruces, New Mexico, has an article on *Canadian Coccidæ*.

JOURNAL OF THE TRINIDAD FIELD-NATURALISTS' CLUB (Port of Spain).—The first dozen pages are devoted to an obituary notice, with portrait, of the late president, Dr. Thomas Beaven Rake, M.D. (Lond.), who so sadly died from yellow fever, as already stated in SCIENCE-GOSSIP, on August 24th last, the day of the annual meeting of the society. At the meeting of the Club on October 5th, Mr. Urich read an interesting paper on *The Habits of Fungus-Growing Ants*, referring to seven species represented by the genera *Atta*, *Apterostigma* and *Sericomyrmex*. Mr. A. B. Carr clears up the mystery of the author of the sad and weird night-call of "Poor me one" heard from February to June. It has hitherto been attributed to the small ant-eater (*Cyclothurus didactylus*). He, however, watched and caught "Poor me one" in the act, which, when shot, turned out to be a large goat-sucker (*Nyctbius jamaicensis*), a strictly nocturnal bird feeding on night beetles, the large fire-fly being its chief victim.

BULLETIN OF THE BOTANICAL DEPARTMENT, JAMAICA. Vol. I., parts x., xi., xii., and vol. II., part i.—The end of Vol. I. covers the three parts for October, November and December, 1894, and is devoted to *Notes on the Most Interesting Plants in Castleton Gardens*. The gardens are now about thirty years old, but as botanical gardens are comparatively in their infancy. Still they contain much of interest. They are now the only grounds of that character in Jamaica, as the old garden at Bath is nearly abandoned as a botanical establishment. Castleton is nineteen miles from Kingston, the drive there being full of beauty, and through most characteristic scenery of the island. The marvellous variety of the tropical vegetation is simply bewildering; groves of bread-fruit trees with their handsome foliage, clumps of feathery bamboos, rows of bananas, tobacco fields and hill-sides covered with patches of yams, sugar-cane, cocoa, coffee, cocoanut palms, etc. Such a prospect and association of plant-life makes one long to visit the spot. Among the plants described as growing in the gardens is the now familiar *Aruacaria imbricata*, or monkey-puzzle, and an account is given of its discovery. Just a hundred years ago the great navigator Vancouver was returning home from the north-west coast of America, and put into Valparaiso. He was entertained by the Viceroy of Chili, when Menzies, the botanist of the expedition, found at dessert some unfamiliar nuts, which he pocketed. On the voyage home he raised five seedlings from some of these, the produce being the monkey-puzzle pine, which was thus introduced to Europe and science. These parts of the Bulletin are full of interest, and compiled with judgment in view of popularising an interest in the scientific study of plants and trees and the botanical gardens generally. In a pleasant manner one hundred and nine different kinds of plants are discussed, especially from the point of view public utility. The opportunities in Jamaica for successfully conducting botanical gardens are of the greatest, and the administration is evidently doing good work in not only popularising the subject, but in distributing plants of economic value, with the object of encouraging their growth in the island. The January number of the "Bulletin" for this year contains an article on *Caterpillars attacking Cocoa Trees*, a plague of that kind having manifested itself in one district of the island. The spread of this destructive species (*Theobroma cocas*) would be most disastrous. In an epidemic of caterpillars of a large moth (*Entricha punctata*) infesting pine-trees (*Pinus sinensis*), at Hong Kong, rewards were paid for the caterpillars, which were collected by shaking the trees and picking them up from the ground with pincers or gloved fingers. Some extent of the trouble may be gathered from the fact that 60,000 catties, or nearly thirty-six tons, were brought in to the police stations, and a further 5,000 catties of cocoons. The catty runs to about 500 larvæ or 800 cocoons. Thus rewards were paid for the enormous number of 35,000,000, which were destroyed by immersion in either boiling- or sea-water, after which they were carefully buried for sanitary reasons. Prof. T. D. A. Cockerell continues his *Notes on Coccidæ or Scale-insects of Jamaica*, reaching the thirty-fourth species. The correspondence upon the use of bananas for meal and flour is continued.

LA NATURE (Paris, February 2nd, 9th, 16th and 23rd).—Mons. J. Deniker describes some Flying Crustacea, illustrated by three beautiful drawings. These interesting animalculæ were found to be *Pontellina mediterranea*, and were first observed to have the power of flying by Dr. Ostroomouff, a Prussian naturalist, who found them on the Crimean coast in the Black Sea. *An Ascent of The Sacred Mountain of Fuji-Yama*, in Japan, is described by Mons. Albert Tessandier, who gives an illustration showing the side of the crater with its curious formation in columns, not unlike our Giants' Causeway. In the issue of February 9th, Mons. Oustalet describes a fine living specimen of the snow leopard, or ounce, now in the Jardin des Plantes, in Paris. The handsome illustration indicates an animal which appears to be less spotted than the specimen recently added to our own Zoological Gardens. The well-worn subject of *Photography in Colours* is again attacked, M. G. Mareschal treating upon further attempts in this direction. On February 16th, Mons. H. M. Villon scientifically discusses *The Decomposition of Butter*, and the preservation of the same useful article. He illustrates the microbes which tend to make butter rancid, and also a cryptogamic fungus or mould which appears on butter in its decaying stages. He points out that the rancidity of butter is due to many causes: first is the action of oxygen in the air, when the butter is exposed to light, which saponifies the fatty matter and decomposes it into its elements, these being combined into various oxides; secondly, by the action of microscopical organisms, microbes, and cryptogamia such as *Pencillum*, *Oïdium laetis* and *Oleorum microclodus*, which saponify the butter in the manner of oxygen and light.


| | 1895. | Rises. h.m. A.M. | Sets. h.m. P.M | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* ... | Mar. 1 | 6 48 | 5.37 | 22.49 | 7° 34′ S. |
| | „ 10 | 6.28 | 5.53 | 23.22 | 4° 5′ |
| | „ 20 | 6.5 | 6.10 | 23.59 | 0° 9′ |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| *Moon* ... | „ 1 | 3.33 | 11.25 A.M. | | |
| | „ 8 | 10.16 | 6 0 | | |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| | „ 15 | 12.35 A.M. | 4.18 | | |
| | „ 22 | 5 18 | 10.6 | | |
| | | *Rises* A.M. | *Souths.* A.M. | | |
| *Mercury*... | „ 2 | 5.59 | 11.22 | 22.8 | 8° 3′ S. |
| | „ 12 | 5.31 | 10.37 | 21.59 | 11° 16′ |
| | „ 22 | 5.19 | 10.26 | 22.25 | 11° 2′ |
| | | *Souths.* P M. | *Sets.* P.M. | | |
| *Venus* ... | „ 2 | 1.34 | 7.40 | 0.15 | 0° 26′ N. |
| | „ 12 | 1.40 | 8.12 | 1.0 | 5° 36′ |
| | „ 22 | 1.46 | 8.44 | 1.45 | 10° 34′ |
| | | P.M. | A.M. | | |
| *Mars* ... | „ 2 | 5.11 | 1.15 | 3.51 | 21° 44′ N |
| | „ 12 | 4.55 | 1.7 | 4.15 | 22° 51′ |
| | „ 22 | 4.41 | 1.0 | 4.40 | 23° 45′ |
| *Jupiter* ... | „ 2 | 7.3 | 3 19 | 5.44 | 23° 21′ N. |
| | „ 22 | 5.50 | 2.6 | 5 50 | 23° 25′ |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| *Saturn* ... | „ 2 | 10.34 | 3.39 | 14.22 | 11° 24′ S. |
| | „ 22 | 9.11 | 2.18 | 14.19 | 11° 4′ |
| *Uranus* ... | „ 2 | 11.55 | 4 27 | 15 10 | 17° 24′ S. |
| | | *Souths.* | *Sets.* | | |
| *Neptune* ... | „ 2 | 6.6 | 2.6 | 4.47 | 20° 55′ N. |

### Moon's Phases.

*1st Qr.* ... Mar. 4 ... 0.40 p.m. *Full* ... Mar. 10 ... 3.38 a.m.
*Last Qr.*... „ 17 ... 5.32 a.m. *New* ... „ 25 ... 10.25 a.m.

A total eclipse of the Moon will take place on March 11th, visible at Greenwich; first contact with shadow, 1.54. a.m.; beginning of total phase, 2.52. a.m.; end of total phase, 4.27. a.m.; last contact with shadow, 5.24. a.m.

There will be a partial eclipse of the Sun on March 26th, but it will be practically invisible at Greenwich, as the magnitude of the eclipse, as seen there, will be only ·013.

William Wesley and Son, Essex Street, London, have issued a small selection and guide to astronomical works, which is issued free to their customers. It will be found useful to those beginning to take interest in astronomy.

New Form of Telescope.—At the last meeting of the Royal Astronomical Society, Dr. Common made the important announcement that he had succeeded in constructing a new form of reflecting telescope, with eminently satisfactory results.

The Nature of Comets.—Professor Lewis Boss, Director of Rochester Observatory, U.S., is of opinion that comets are the result of an electrical action in the surrounding nebulous matter, similar to that which produces the Aurora Borealis. He further inclines to the hypothesis that the tail of the comet is the result of an electro-magnetic action repulsive to the sun and the nebulous matter.

At a recent meeting of the Chicago Academy of Sciences, Dr. T. J. J. See discussed the theory of the heat of the Sun. He considers the age of the solar system is more than 100,000,000 years, and regards Lord Kelvin's estimate as a fair approximation.

Encke's Comet has recently been a very brilliant object, and was quite visible to the naked eye. Viewed with a low power it had apparently a sharply-defined stellar nucleus. It will not be again well-placed in the northern hemisphere, but it is hoped that southern observers will be able to take some observations.

Mr. W. W. Campbell, of the Mount Hamilton Observatory, has been discussing the atmosphere of the planet Mars, which is generally considered to be similar to our own. He points out that by availing himself of the opportunity for this research, when Mars and the Moon are at equal altitudes, an observer saw one strong line on the planet's spectrum which was absent from that of the Moon. So when passing behind the atmosphere of the Moon, that of Mars might be measured.

The "Astrophysical Journal" is a new international review of spectroscopy and astronomical physics issued by the University of Chicago; W. Wesley and Son, of Essex Street, London, being the English agents. No. 1 appeared in January, and the annual subscription is eighteen shillings. It is a quarto journal of one hundred pages, produced in the admirable manner in which the publishers of magazines in the United States seem to excel beyond the rest of the world. The full-page photographic reproductions include: plate i., taken June 29th, 1892, 11h. 40m.—15h. 4m., Pacific standard time, by E. E. Barnard, with the six-inch Wellard lens of the Lick Observatory, of the stella region near Messier ii; plate ii. is a similar photograph taken October, 20th, 1892, near Chi Cygni; plate iii., three photographs of the variable star, O.A. 16, 121, and its spectrum, taken at Areguipa, Peru; plate iv., five drawings of Mars, made in May and June, 1894, with the Melbourne four-foot reflector. These photographs are beautifully reproduced. The journal "Astronomy and Astro-Physics" has been purchased by the University of Chicago, and this new journal is practically a continuation of it in a somewhat altered form.

The editors of the "Astrophysical Journal" are George E. Hale, Director of the Yerkes Observatory, and James E. Keeler, with a large staff of assistant and associate editors. It is the outcome of a long-cherished idea of Mr. Hale, and the result of a meeting held in New York on November 2nd, 1894; such meetings will be held annually, and be confined to the Board of Editors.

The most important paper in the January "Astrophysical Journal" is one on "The Modern Spectroscope" by F. L. O. Wadsworth, of the University of Chicago, extending to twenty-seven pages, illustrated by a plate (v.). It is a general consideration of the design of astronomical spectroscopes. A short paper by Edward C. Pickering, of the Harvard College Observatory, on "The Discovery of Variable Stars from their Photographic Spectra" is illustrated by plate iii. above referred to. By the system of spectroscopic photography of many thousands of stars, annually carried out at Harvard, Mrs. Flemming has, during the past five years, discovered thirty-four new variable stars, and has shown that sixty-five known variables have a similar spectrum. The variation has been confirmed by Mr. Pickering in every case.

# NOTES & QUERIES

Animal Hairs.—"The people of one race, whose name I forget, pluck out the hairs from the face, leaving them only on the tip of the chin." Does this extract from Mr. Lord's paper (Science-Gossip, N.S., vol. i.), refer to the men of British New Guinea? In the Imperial Institute Journal (No. 1, page 27) there is a short report of Mr. Bellyse Baildon's lecture describing a journey in New Guinea. From this report I have copied the following: "One seldom sees hair on the face of a man, except among old men who cease to take interest in their personal appearance, the younger men making a practice of picking out the hairs as they appear."—*Thos. Winder, Bloomfield Villa, Sheffield.*

Names Wanted.—In reply to your correspondent who asks (page 284, vol. i., N.S.) for the scientific names of certain insects, I am sorry I cannot give them with any certainty without a detailed description, or, better still, seeing the insects themselves. but thus far I can answer. (1) The "Soldier Beetles" belong to the genera *Telephorus* and *Rhagonycha*, of which we have about twenty-two species in Britain, and among the commonest, *T. rusticus* (black, thorax red with a black spot), *T. lividus* (entirely testaceous), *T. pellucidus*, *T. nigricornis*, and *R. fulva* (elytra reddish, testaceous, with the apex black), this last being the commonest of all. (2) The spider alluded to is one of the *Lycosides*, of which there are many species, perhaps *Lycosa herbigrada*, *L. nigriceps*, or *L. saccata*. (3) The larger of the two flies is probably the female of *Bibio marci*, so-called because it first appears about St. Mark's Day. The smaller one with the yellow body may possibly be *B. hortulanus*, the "Bibion de St. Marc rouge" of the French.—*Linley Blathwayt, Lt.-Col. Batheaston; Feb. 4th*, 1895.

Symbiosis of Plants and Animals.—Kerner and Oliver, in their "Natural History of Plants," under the heading of Animal and Plants considered as a great symbiotic community (vol. 1. page 254) say that there is no need for surprise when cases come under observation wherein a quite unmistakably animal organism enters instead of a fungus, as one of the partners in a symbiotic community. Certain Radiolariæ have small yellowish spots upon them, which were formerly held to be pigment cells, but have proved to be little algæ, with cells furnished with true chlorophyll. Similar properties are exhibited by the fresh-water polyp, *Hydra*, and by the sea-anemones. Small algæ occur in social union with these also in the shape of cells with membranes made of cellulose and containing chlorophyll and starch grains in their protoplasmic bodies. These algæ are in no wise injurious to the animals with which they are associated; on the contrary, their presence is beneficial, their partners reaping an advantage from the fact that the green constituents split up carbonic acid under the influence of the sun's rays. In so doing they liberate oxygen which may be again taken in by the animals direct, and serve a useful purpose in their respiration and all the processes connected therewith. Conversely, the alga, in association with the animal's body, will derive a further advantage from the latter, inasmuch as it receives at first hand the carbonic acid exhaled by the animal in breathing. The small algæ, living socially with animals, cannot be reckoned as parasites in any case, nor can the animals be looked upon as parasites of the algæ, but we have here the phenomenon of mutual assistance and of a bond serving for the benefit of both parties, precisely similar to that noticed in the case of lichens and in the others which have been described before. A friend of mine, five or six weeks ago, cut two hydras in two; within twenty-four hours the tail half of one had grown two tentacles, and the body of the other half had rounded off. Two days after no perceptible change had taken place, but a week after they had broken up entirely, and the algæ was floating about in the water. I think this verifies Kerner and Oliver's statement.—*J. Stephenson*, 23, *Avenue Parade, Accrington; February 14th*, 1895.

The Ginger-beer Plant.—In response to Mr. Fielding's wish expressed (Science-Gossip, N.S., vol. i., page 284), for information respecting this obscure organism, having at one time a plant in my possession, I can give the following particulars. All that was necessary for the production of fairly good ginger-beer was to add to the plant in a large bottle a quantity of water, some sugar, and a little ginger, and leave it for a short while. Soon a vigorous fermentation and ebullition of gas commenced, and in a short space of time the ginger-beer was ready for drinking, but if left too long it rapidly passed into the acetous stage, not at all agreeable to the palate. One had only to repeat this process to obtain an indefinite quantity of ginger-beer. The plant increases by this use, and soon needs dividing. I have frequently read of its exhibition at the meetings of scientific societies, but no one seems to know much about it. When looking through some back volumes of the "Journal of Botany," I noticed that at a meeting of the Linnean Society, a few years ago, Professor Bayley Balfour exhibited specimens, and showed its microscopic structure. The following is quoted from the report given in the journal: "He (Professor Balfour) pointed out that, although well known to, and used by, many people as a means of manufacturing an acid drink out of sugar solution and ginger, yet no scientific account of the organism had appeared, except a short note by Mr. Worthington Smith, in the 'Gardener's Chronicle.' It had the appearance of a white nostoc, and is composed of a bacterium passing through all forms of rods, coils, and filaments, which apparently constitutes its greater part, and associated with this is a sprouting fungus. Judging from descriptions and figures by Kern, of the 'Kephir,' used in the Caucasus to induce fermentation in milk, the ginger-beer plant closely resembles this; but there are many points of difference. As one tradition of the introduction of the ginger-beer plant to Britain is that it was brought by soldiers from the Crimea, the resemblance is interesting." When walking in the country some months ago, I went into a cottage that had the familiar legend, "Ginger-Beer sold here," in the window, and found the occupiers possessed two or three vigorous plants in full work, and quite a wholesale brewing of the refreshing beverage in progress. I have no doubt a specimen could be secured for Mr. Fielding at this place, and when more genial weather returns, I will try and procure one.—*E. J. Elliott, High Street, Stroud, Glos.*

# TRANSACTIONS

Royal Meteorological Society.—The usual monthly meeting of this society was held on Wednesday evening, February 20th, at the Institution of Civil Engineers, 25, Great George Street, S.W., Mr. R. Inwards, F.R.A.S., President, in the chair. Mr. W. Marriott gives an account of the thunderstorm and squall which burst over London so suddenly on the morning of January 23rd. It appears that this storm passed across England in a south-south-easterley direction at the rate of about forty-seven miles an hour, being over Northumberland at 4 a.m., and reaching the English Channel by 11 a.m. Thunder was first heard in the vicinity of Leeds, and accompanied the storm in its progress across the country. One of the most remarkable features of the storm was the sudden increase in the force of the wind; for in London it rose almost at one bound from nearly a calm to a velocity of thirty-six miles an hour. This sudden increase of wind caused considerable damage, and at Bramley, near Guildford, twenty-eight trees were blown down along a track 1,860 yards in length. Mr. E. Mawley presented his "Report on the Phenological Observations for 1894." Between the third week in March and the third week in May plants generally came into blossom in advance of their usual time, and towards the end of April the dates of first flowering differed but little from those recorded at the same period in the very forward spring of 1893. The cuckoo made its appearance even earlier than in the previous year. The year 1894 was a very productive one, and both the hay and corn crops proved unusually heavy; but much of the latter was harvested under very trying conditions as regards weather. The frosts of May 21st and 22nd entirely destroyed the previous prospect of a glorious fruit season. Indeed, the only really good crop was that of pears, which were singularly abundant throughout nearly the whole of England. Mr. A. B. Macdowal read a paper on "Some gradual weather changes in certain months at Greenwich and Geneva."

The South London Entomological and Natural History Society.—January 24th, 1895, annual general meeting, T. W. Hall, Esq., F.E.S., Vice-President, in the chair. The council and treasurer's reports were read, and the officers and council for the year were elected as under: President, T. W. Hall, F.E.S.; vice-presidents, C. G. Barrett, F.E.S., and J. Henderson; treasurer, R. Adkin, F.E.S.; librarian, H. J. Turner, F.E.S.; curator, W. West (Greenwich); hon. secretaries, Stanley Edwards, F.L.S. (corresponding) and Hy. J. Turner, F.E.S. (report). Council: T. R. Billups, F.E.S., C. A. Briggs, F.E.S., J. H. Carpenter, C. Fenn, F.E.S., F. E. Filer, W. Mansbridge, F.E.S., and W. A. Pearce. In the absence of Mr. Step, the retiring president, Mr. Hall read the Annual Address.—February 14th, 1895, T. W. Hall, Esq., F.E.S., President, in the chair. Mr. W. Furneaux, F.R.G.S., of Omany Road, New Cross, was elected a member. Mr. C. A. Briggs exhibited on behalf of Mr. Carrington, to whom it had been sent by Mr. J. C. Eccles, the fruit of *Euonymus japonica*, from Ventnor. This species of shrub very rarely flowers in this country. Mr. Peach, a specimen of the genus *Xanthia*, from Wimbledon, said to be *X. ocellaris*, but which all present considered merely a var. of *X. gilvaco*. Mr. Atkin, *Vanessa urticæ*, var. from Sutherland and North Ireland, and commented upon the similarity of these to the Japanese form called *V. connexa*. He also exhibited series of *Trygæna filipendulæ*, from Sutherland, taken 2,000 feet above the sea. A discussion ensued. Mr. Williams, series of *Enchlöe cardamines*, with forms which some authorities term *A. alberti*, and read notes thereon.—*Hy. J. Turner, Hon. Report Sec.*

The Annual Dinner of this Society was held at the Bridge House Hotel, London Bridge, on the evening of February 26th, the President, Mr. T. W. Hall, being in the chair. There was a numerous attendance, and the speeches showed the great interest taken in the Society by the members, who, not unfavourably, criticised its present prospects and meetings. A suggestion was made that the Society should acquire a lantern and screen for use of the members when reading papers or making exhibits. It is to be hoped that at an early meeting some arrangement may be made for carrying out this suggestion, if possible without encroaching on the funds of the Society. These dinners, and the exhibitions, have proved an advantage to the Society by introducing new members.

Norfolk and Norwich Naturalists' Society.—The monthly meeting of the above society was held on January 28th, in the committee-room of the Castle Museum, Mr. T. Southwell (ex-president) in the chair. The Chairman congratulated the society on the change of their place of meeting to the commodious and spacious committee-room of the Castle Museum, and, alluding to the intimate relations which had existed between the Norfolk and Norwich Naturalists' Society and the old Museum for a period of twenty-six years, trusted that for many years to come they might work in concert with the Castle Museum greatly to their mutual advantage. Mr. Southwell referred to the active part which the society had taken in promoting the passage of the amended Wild Birds' Protection Act of 1894, in the form in which it finally became law, and said that there was a motion before the County Council as to the best method of putting its provisions into effect. After explaining that the Act gave the County Council authority to recommend to the Home Secretary either the prohibition of the taking of the eggs of certain "named species," or the taking of any eggs within certain "specified areas," he dwelt on the difficulties attending the carrying out of the first proposal, owing chiefly to the practical impossibility of identifying the eggs of some of the birds which require protection whereas the protection of "areas," which, as a rule, would be private property, was both easy effectually to define, and devoid of hardship to anybody. He concluded by moving a resolution, respectfully suggesting to the committee of the County Council the desirability of recommending the later course. This was seconded by Mr. E. H. J. Eldred, and, after some discussion, during which letters, approving the "area" principle, were read from Sir Edward Newton, Mr. John Cordeaux, and Mr. Cresswell, of Lynn, was duly carried. Mr. Stacey Watson, of Yarmouth, read a paper on the herring fishery of the year 1894. A communication was read from the Rev. Julian Tuck, of Tostock, stating that a Brunnick's guillemot had been sent to a bird stuffer in Bury, which was shot at Guyhirn, near Wisbech, about January 12th, and which he had secured for his collection. Its occurrence in the midst of the present abnormal visitation of little auks seemed noteworthy. It was also mentioned that a second example of this bird had been obtained near Scarborough about the same time, thus establishing its claim as a British species, which before had been doubtful. Mr. A. W. Preston's valuable "Meteorological notes for 1894" were read. Mr. Southwell read a note on the occurrence of two very immature specimens of the Grampus (*Orca gladiator*) on the Norfolk coast, about the middle of November last, one of which Mr. Patterson had sent to Norwich for the Museum, but it was found to be too much damaged to make a good specimen, and was, therefore, sent on to the Cambridge Museum, for purposes of dissection. A list of Coleoptera, captured in 1894, in West Suffolk, was sent by Mr. W. H. Tuck, of Tostock House; as was a list of West Norfolk Mollusca by Mr. T. Pitch. Mr. F. Danby Palmer also sent an interesting note on the transported mulberry-tree at Great Yarmouth. Mr. Roberts exhibited a very unusual variety of the Chaffinch.

Society for the Protection of Birds.—Mr. Sydney Buxton, M.P., presided at the annual meeting of the society for the Protection of Birds, held at Westminster Palace Hotel. He pointed out that the society, of which the Duchess of Portland is president, was originally called into existence by the pitiless destruction of birds, especially during the nesting season, to supply the demands of fashion in female dress and decoration. It had indirectly assisted to bring about the protection in this country of the feathered tribe generally. Sir William Flower, director of the Natural History Museum at South Kensington, mentioned incidentally one good result of the fashion which the society was formed to protest against. A lady visitor to the museum was found to be wearing in her hat a small bird of plumage, of which, although its existence and habitat were known, the authorities had never been able to obtain a specimen. The fair wearer was induced to part with her ornament in the interests of ornithology. The Rev Canon Rawnsley, Mr. Montagu Sharp, the Hon. Miss Powys, and others spoke warmly in support of the objects of the society, and the report of the committee for the past year was unanimously adopted.

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s*. 6*d*. for twelve months (including postage), are now due.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

T. A. Dowse (Cavendish Square).—(1) Bones may be made whiter by soaking in Eau Javelle, which is a preparation of hyperchlorite of sodium. (2) Yes, at the discount shops.

Thomas Edwards.—(1) *Helix nemoralis*, var. *cornea* (123) (45), incomplete. (2) ditto, var. *libellula* (123) (45), incomplete. (3) next month.

Several questions will be answered next month, unavoidably standing over.

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Offered, British marine shells and side-blown eggs in exchange for minerals; Hematite and Agate wanted.—A. Kelly, 27, Spa Street, Aberdeen.

Collection of over 150 assorted minerals, or Statham's four-guinea chemical chest; would exchange for astronomical books; send list.—R. Hancock, 71, Berners Street, Lozells, Birmingham.

For exchange, "Knowledge," vols. I. and II. bound, III. IV. and V. unbound; "Family Physician," 33 parts; "Book of Health," 28 parts, complete; anything scientific.—E. A. Martin, Carew Road, Thornton Heath.

Several volumes "Sunday at Home" and "Leisure Hour" (back years), bound; lot of numbers of "The Lady," "Gentlewoman" and "Queen"; exchange; offers requested. —Thomas Tibbett, Stanley Cottage, Dunstable.

Science-Gossip, volume for 1881, in publishers' cloth; also Balfour's "Manual of Botany"; offers wanted, botanical or microscopical books preferred.—W. P. Quelch, 8, Eccleston Road, Ealing Dean, W.

Offered, British land, freshwater and marine shells; also foreign shells, fossils, minerals and crystals. Wanted, other shells, fossils, minerals and crystals not in collection; lists exchanged, too long for insertion.—Thos. Edwards, Waterloo House, Coventry Street, Leicester.

Micro. slide, hair of platypus, offered for other slide or good material for mounting.—John Moore, 223, Great Russell Street, Birmingham.

Wanted, double nose-piece and any other good apparatus for the microscope; books, and land and freshwater shells offered.—A. Alletsee, Clifton Milward Crescent, Hastings.

Wanted, mosses, also Hobkirk's book on mosses, also 20 lessons in British mosses, in exchange for birds' eggs (side blown) or mosses not in collection.—Send lists to Peter Yates, Ellesmere Street, Astley Green, near Manchester.

Offered, fine specimens of Cardium rusticum, Cardium tuberculatum, Lucinopsis undata, Pecten, vars. maximus; prammobia, ferrolnsis and vespertina, Nassa reticulata, Lutraria eliptica; exchange marine shells.—Mr. Hutland, The Priory, Shrewsbury.

Microscope lamp in wood case, small collection of shells suitable for beginner, for exchange for foreign stamps, postcards or curios.—Dr. Waters, 21, Westbourne Park Road, Bayswater.

Small punt, built for observation of life on river. Wanted, microscopic objectives, especially $\frac{1}{6}$ and $\frac{2}{3}$-inch.—For full particulars, apply L. Noon, Esq., Manor Road, Farncombe, Godalming.

Cidaris papillata, Echinus miliaris, Echinocyamus pusillus, Palmipes membranaceus, Ganiasten templetoni, G. equestris, Astronyx loveni. Wanted, asterina gillrosa, Uraster trispida, Ophiocama bellis, O. brachiata, O. filiformis.—William Daw, 127, Loch Street, Aberdeen.

Micro. slides for exchange; desiderata, pamphlets or works on pond life, or other slides.—Chas. W. Maw, Bradford, Yorks.

Birds in Flesh.—Wanted, terns, gulls, plovers and many others; many rare specimens (skins or in flesh) offered in exchange.—A. Ward, 10, Hood Street, Coventry.

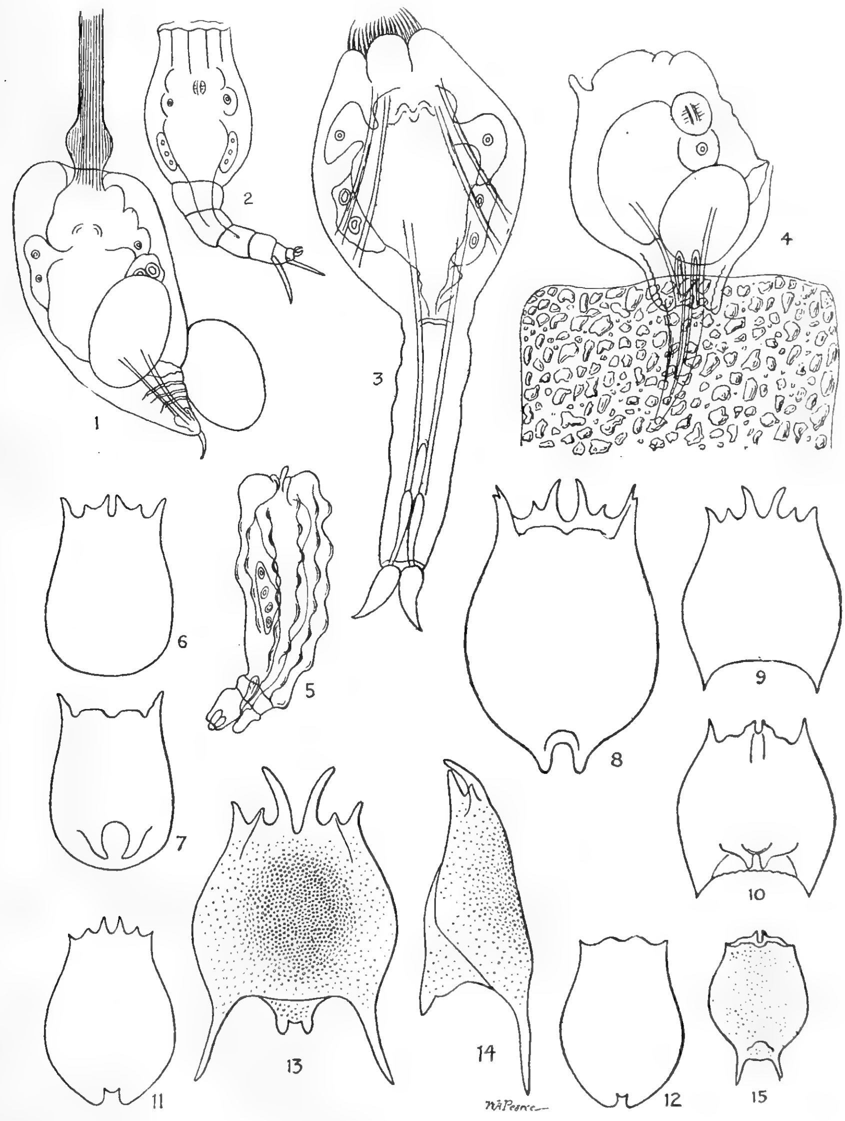
Wanted, a good microscope stand, preferably Powell and Lealand's No. 3 or their "Portable;" exchanges, photographic or other apparatus.—J. Tatham, Rathronan Lodge, The Avenue, Surbiton.

Foreign stamps wanted in exchange for micro-photos (Dancer) and miscellaneous micro. slides.—J. Ling, Mount Villa, Newtown, Worcester.

# SYRIAN ROTIFERS.

By C. F. Rousselet, F.R.M.S.

IN the July and August numbers of the "Revue Biologique du Nord de la France" of last year (1894), an interesting paper has been published, by Dr. Th. Barrois and Dr. E. von Daday: "Contribution à l'étude des Rotifères de Syrie," with a description of eleven new species, as one of the results of a journey undertaken by Dr. Barrois, in 1890, through Syria, Palestine, and Egypt. Our knowledge of Syrian Rotifers, as well as those of many other countries, is almost nil, and it is, therefore, all the more to be regretted that Dr. Barrois did not use better methods of collecting and preserving these animals, and, above all, that he did not examine them on the spot. He visited many




Syrian Rotifers.

lakes and ponds, and placed his material, collected presumably with a net, at once in alcohol, with the inevitable result that the rotifers were all hopelessly contracted. Only forty-five species are enumerated as occurring in Syria, of which the following eleven are described as new :—*Floscularia brachyura*, *Oecistes syriacus*, *Rotifer forficatus*, *Notops macrourus*, *Adactyla verrucosa*, *Notholca orientalis*, *Brachionus melhemi*; *B. obesus*, *B. bursarius*, *B. pyriformis*, *B. caudatus*.

In the description of these eleven new species there are some evident errors which, in the interest of science, it is necessary to point out. It is greatly to be regretted that Dr. Daday should have made a number of new species out of dehydrated soft-bodied forms, contracted out of all shape, and of which neither the description nor the figures give any of the characters which will enable one, or the authors themselves, to recognize them in the living state. As the original paper is not readily accessible, I have reproduced here all the principal figures, and I add the original diagnosis to enable the reader to judge of the value of these new species.

*Floscularia brachyura*, sp. n. (Fig. 1). Diagnosis: Foot rudimentary, terminating in a curved hook, case absent.

All that can be said of this figure is that it represents a floscule, and it can be almost any one of the twenty-six known species, but possibly a free-swimming kind, of which there are three. The curved hook-like structure can very well be the remainder of the dehydrated foot or the rest of the peduncle which several species possess. Without a knowledge of the shape and number of the lobes, it is quite impossible to say that this is a new species.

*Oecistes syriacus*, sp. n. (Fig. 4). Diagnosis: Dorsal antenna single, foot long, case granular.

It is quite impossible for any one to say if this figure represents an *Oecistes*, *Limnias*, or even *Melicerta*, as the form of the trochal disc is quite unknown. The single "dorsal" antenna is really ventral, as the figure shows it clearly on the opposite side to which the cloaca is situated, and the latter is always dorsal in rotifers. In fact, the dorsal antenna in these three genera is always single, and very minute, whilst the ventral antennæ are often long and always two in number. If this animal only shows one ventral antenna is it not more than probable that the other is hidden by the complete contraction, or lost by the mode of preservation? However this may be, this animal cannot possibly stand as a new species.

*Rotifer forficatus*, sp. n. (Fig. 2). Diagnosis: Foot cylindric, the two spurs of penultimate segment of foot long and lanceolate, the two pointed toes forceps-shaped.

This figure can represent a *Callidina*, or *Philodina*, as well as a member of the genus *Rotifer*. Only the forceps-shaped toes are notable, provided their shape is not due to the alcohol.

*Notops macrourus*, sp. n. (Fig. 3). Diagnosis: Body oval, foot long and stout, toes broad and pointed.

This figure can very well represent *Notops brachionus* when in a state of complete collapse; the skin is very soft and will assume all kinds of shapes when placed in alcohol.

*Adactyla verrucosa*, sp. and gen. nov. (Fig. 5). Diagnosis: Body elongated, furnished with strong longitudinal furrows; foot with two joints, last joint terminated by a disc-shaped opening; toes absent.

This can represent any one of the larger Notommatadæ—the head and toes retracted inside the body, and the whole completely shrivelled up by the dehydrating action of the alcohol.

It is really a great pity that these forms should have been described as new species when not one of the characters necessary to identify the living animals is known. This can only be characterised as useless work, encumbering the list of species of rotifers with names with which the systematist does not know what to do, and which finally will have to be ignored.

We now come to the new species of loricated rotifers, the lorica of which has, of course, been better preserved by the alcohol.

*Notholca orientalis*, sp. n. (Fig. 8). Diagnosis: Lorica shield-shaped, posterior end with a round opening, occipital margin elevated in the middle, mental margin undulate with sinus in the centre.

This animal, as represented by Dr. Daday's figure is no other than *Pompholyx complanata* of Gosse. In the text, Dr. Daday says, "the posterior part of the lorica is pierced by a round opening for the passage of the foot." This is a strange statement and evidently a lapsus, as no species of *Notholca* has a foot, and "foot wholly wanting" is a character of the family Anuraeadæ, of which *Notholca* is a genus, so that a rotifer with a foot cannot be a *Notholca*. *Pompholyx* also has no foot, and the round opening in the lorica is there for the passage of the eggs, which are carried about suspended on elastic threads.

*Brachionus melhemi*, sp. n. (Figs. 13 and 14). This species is not new; it is a common variety of *B. bakeri*, such as is often found in the neighbourhood of London, and I have long possessed a mounted slide of it. It is well known that in the genus *Brachionus* the size and shape of the anterior and posterior spines, as well as the stippling of the lorica, are subject to very considerable variation, so much so, that even *B. brevispinus*, Ehrgb., with the posterior spines much reduced, can be considered a variety of *B. bakeri*, as intermediate forms are found, and one such intermediate variety has been named *B. rhenanus* by Lanterborn. A constant character of *B. bakeri*, which, unfortunately, is not mentioned in the description of that species in

Hudson and Gosse's work is that the border of the foot-opening is always prolonged into a shelly sheath of some size with a square notch on the dorsal side of it.

*Brachionus obesus*, sp. n. (Figs. 9 and 10). Diagnosis: Lorica sub-quadrate, smooth; posterior end prolonged into two short pointed processes; occipital margin with six spines, the median pair the largest and curved outwards; mental edge undulate, projecting forward, with sub-square sulcus in middle.

The lorica of this animal resembles so much that of *B. brevispinus*, on the one hand, and *B. rhenanus*, on the other, that the three might be considered to form a series in the variation of the same species; their close affinity to *B. bakeri*, as mentioned above, is unmistakable. The shape of the mental margin, however, is peculiar. Size of lorica: length $\frac{1}{124}''$ to $\frac{1}{106}''$, width $\frac{1}{150}''$ to $\frac{1}{130}''$.

*Brachionus pyriformis*, sp. n. (Figs. 11 and 12). Diagnosis: lorica pear-shaped, smooth; occipital margin with six straight spines, the central pair the largest; mental edge undulate; lorica rounded, without spines posteriorly.

This appears to be a well-characterized new species. Size: length of lorica $\frac{1}{135}''$, width $\frac{1}{170}''$, length of foot $\frac{1}{125}''$.

*Brachionus bursarius*, sp. n. (Figs. 6 and 7). Diagnosis; Lorica elipsiform, smooth, posterior end rounded, without spines; occipital margin with six spines, the median and external pairs of equal size, the intermediate pair smaller, the external pair sometimes, but not always, bifid at extremity; mental margin with two low broad lobes, divided by a sulcus in the middle.

This animal resembles *B. urceolaris*, but has some peculiarities which may entitle it to specific rank. Dr. Barrois says that the lateral spines are often bifid at the point, but not always, so not even that unusual character can be depended upon. Size: length $\frac{1}{120}''$, width $\frac{1}{155}''$.

*Brochionus caudatus*, sp. n. (Fig. 15). Lorica shield-shaped and stippled; occipital margin with two short pointed median spines with deep sulcus between them, mental margin undulate with broad sinus in the middle. Posterior end of lorica broadened and furnished with two long spines; foot very long, furnished with two small toes.

The form of the lorica of this evidently new species greatly resembles that of *Schizocerca diversicornis* of Daday, except that the large anterior marginal spines are quite absent. The posterior spines are said to be slightly divergent and recurved. The structure of the foot is not mentioned in the text, but is represented in one of the figures like that of an ordinary *Brachionus*, very stout and of great length with two small toes at the end. In *Schizocerca* the foot is forked at the extremity. Size: length of lorica $\frac{1}{145}''$, width $\frac{1}{210}''$.

It will be seen that only three or four of the rotifers described as new by Drs. Barrois and von Daday can properly be included in the list, the remainder being either known already or quite unrecognisable from their figures and descriptions.

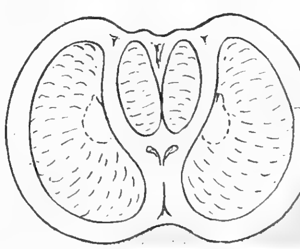
*Hexarthra polyptera* (Schmarda) and *Pedalion mirum* (Hudson). A word also on these two rotifers which Dr. Daday continues to confound, although his error has long ago been pointed out by Dr. Hudson. *Hexarthra polyptera*, discovered by Dr. Schmarda in Egypt, in 1853, and not seen since, is a heart-shaped rotifer with six limbs all on the ventral surface, radiating from a common centre exactly like the limbs of a cyclops larva. *Pedalion mirum*, first found by Dr. C. T. Hudson, at Clifton, in 1871, on the other hand, is a conical rotifer with six limbs disposed all round the body, one dorsal, one ventral, and two pairs on the sides, and all six directed backwards. It is difficult to imagine how anyone can confound two creatures so different as these in structure, and Dr. Daday must therefore not be surprised if no student of the rotifera, either here or on the Continent, follows him in this identification.

Drs. Barrois and von Daday's paper has also been published, with some slight additions, in Hungarian, in "Mathematikai és Természettudomanyi Értesitö," xii., 1891, 1 plate.

*27, Great Castle Street, Regent Street,*
*London, W.; March, 1895.*

## DOUBLE FRUIT OF CITRUS AURANTIUM.

I RECENTLY purchased some oranges of the variety with blood-red pulp, and one proved to be a monstrosity, or, if I may so term it, a double orange. On opening this fruit it turned out that the



DOUBLE FRUIT OF CITRUS AURANTIUM.

"outer" specimen contained an inner one, almost perfectly formed, as shown in the bisectional drawing I send you. The inner specimen possessed no peel, neither had it any pips or seeds.

C. H. CROUCH

*21, Cassland Crescent, South Hackney;*
*March 13th, 1895.*

# WEE CUMBRAE.

By John Smith.

On June 17th, 1893, the Geological and Natural History Societies of Glasgow had an excursion to the island of Little Cumbrae, at the south entrance of the River Clyde. The weather was of that fine quality so prevalent that year. The reason for so much sunshine, which made 1893 a noted year, possibly lay in more than one cause. There appeared to be less dust in the air and fewer icebergs in the Atlantic. The fine weather we had appeared to depend more on the extra quantity of direct sunshine than on an increase in temperature of the winds, for, with all the heat during the day, they blew cold evening and morning.

On the Fairlie shore of the mainland, south of Cumbrae, the calciterous sandstone and conglomerate is seen dipping, at a high angle, in places almost in a perpendicular direction. Towards the hills, as they are ascended, especially by the beds of the Fairlie, or Glen Burns, the dip gets gradually flatter, till where the traps overlay the sandstones it is reduced to the small angle of ten or fifteen degrees.

Crossing over to the island of Big Cumbrae, the sandstone is seen to dip in an opposite direction to what it does at Fairlie, showing that the firth at this part is excavated in the position of a large anticlinal bend in the strata, probably accompanied by pitching. Sailing along the Big Cumbrae shore, we note those two conspicuous features—the Lion Rock (so called from its appearance) and the Diel's Dyke, which are traditionally believed to be the "lan'stills" of a large bridge that spanned the firth from Cumbrae to Fairlie. In this instance tradition must be founded on fable, as the two objects in question are parts of trap dykes, cutting through the sandstone. By marine denudation these have been rendered conspicuous, the sandstone beds on either side of them being softer than the dykes, having been denuded away. At the south-east end of the Big Cumbrae a "plane of marine denudation" is both conspicuous and extensive, going right up to the base of the sandstone cliffs, and showing us that during the last raised beach period the land, relative to the sea, must have remained for a very long period at the same level. In this raised beach, near Millport, the shell, *Trochus lineatus*—a species now extinct in the Clyde—is to be found in some plenty, and was first discovered there by the famous "Cumbrae Naturalist." This shell still lives in the British seas, further south. I found it not infrequently in the Ardrossan Shell Mound, indicating the high antiquity of that mound and the greater mildness of the climate enjoyed by the people who reared it, the remains of whose feasts it forms a record.

In going to the Wee Cumbrae in small boats we pass the Allans—rocks in Millport Bay—on one of which there is an old building said to have been put up by the Government of the day, and 'manned" by Excise officers, who were to keep a look-out on smugglers; but one of the former having had his hand cut off in attempting to "board a smuggler," the "Government were defeated," and the excisemen were obliged to leave the isle and the position to the smugglers.

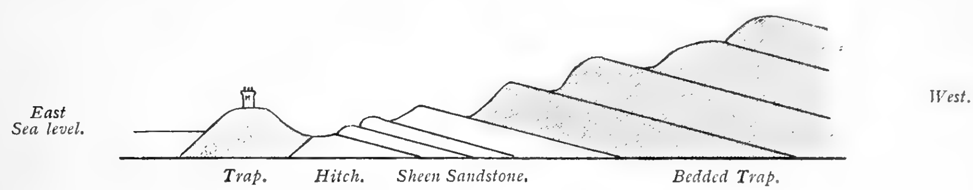
As we approach Wee Cumbrae, the terraced appearance of the island becomes conspicuous. This is owing to the successive outcrops of the bedded trap which dips towards the north-east, a direction the opposite to what it does in the hills of the Ayrshire coast adjoining. Different also is the dip from that at the south end of Bute, showing that the rocks of this district, Bute to Dalry, had at one time been thrown into a series of large folds by lateral pressure, causing a doubling up of the "crust."

We land at the northern or Shanniwilly Point and are immediately in the presence of Haco's Tombs, situated on a small platform a short distance above sea level. These are large cairns of stones said to have been erected over the bodies of some of the northern warriors who fell at the battle of Largs in 1263. Some sixty years ago two of them are said to have been opened, when, with human bones, remains of plated brass armour "resembling fish scales," swords, etc., were got, as well as, at a lower level in the cairns, more ancient urns filled with calcined bones; showing that this spot, probably historically sacred, had been used as a place of sepulture by different races of people separated from each other by many centuries of time, and living under very different states of civilization. Not far from the Tombs is what may turn out to be a shell mound, formed at a period when the inhabitants of the country were in a very primitive state.

After examining the rocks of the north end of the island, which are mostly amygdaloidal, some of the cavities being filled with very pure specimens of Iceland spar; we took to our boats again, and rowed along the east coast as far as the castle. The rocks forming the shore all along this tract are trappean, with a rudely columnar structure, and at parts the old sea cliffs form prominent features. Having arrived at the castle which is built on a small island or trap, we walk southward along the shore and examine a small outcrop of sandstone. It is the only bit of sandstone, or even of sedimentary rock, on the island; has been very much indurated by heat, dips under the trap at the same angle as the latter, and is only separated from it by a few inches of ash. I have called it sheen sandstone, as when it is broken and the fractured surface held at a certain angle to the light, it is seen to glitter. This peculiar quality is caused by innumerable planes which cut through it, forming what quarrymen and masons call "glessbans." No doubt the cracks were given to it when it was overflowed by the trap; subsequent infiltration of the joints having produced the glass-bands. If it is not actually converted into quartzite the particles are exceedingly well bound together and break across when a chip is knocked off. As I have said, the sandstone dips under the trap at the same angle as the latter, but if produced—as seen on the exposed part of the shore at least—it would overlay the trap of the island on which the castle is built; but as the sandstone on the coast of Ayrshire opposite always underlies this quality of trap, these appearances are probably brought about by a hitch, thus:

ducks, but strange to say these sounds proceed from a number of peregrine falcons who have their eiries amongst the jutting ledges of the highest cliffs. The clamour they make is evidently got up to distract our attention from their young, and we are convinced in this surmise from seeing a young one sitting well up on the rocks in an almost motionless position, a slight movement of the head being now and then visible. So well does this youngster simulate an amygdaloidal cavity in the trap that it took half-an-hour's argument to convince some of the party that it was not just part and parcel of the rock. No doubt this faculty of remaining still in the presence of danger will be of great service to the young peregrines. In the days of old, the hunters of Hunterston, on the shore opposite, were the king's falconers, and it was from the Wee Cumbrae cliffs that they obtained their supply of falcons, which were tamed and used in hawking.

At Gull Point there is a "flying buttress" of rock, where the trap has been cut out by the waves of a former sea, leaving a natural arch.




GEOLOGICAL SECTION IN WEE CUMBRAE.

There are several caves on the east side of the island which run into the trap-rock for perhaps more than sixty feet, and were formed during the last depression of the land. We go into one of them and find the entrance both small and downhill for a short distance; still there is no accumulation of water on the floor, which shows that it must have free passages through the debris which almost blocks up the entrance. A few bones are lying about, but they have all belonged to sheep and may have been recently introduced, but on a former visit to the island I picked up in one of the caves, a split bone which had belonged to a much larger animal. Forsyth, in his "Beauties of Scotland," says that there are seven caves in the Wee Cumbrae. We count four, and if certain shallow shelters in the rock are to be taken for caves, there will probably be seven, if not more.

At the south-east corner we go through Balaam's Pass, a narrow fissure cut in the rock by the waves of the twenty-five feet beach, and, turning Gull Point, are immediately in one of the most interesting parts of the island, geologically speaking, the cliffs rising sheer up from the old beach-line to a considerable height. We hear strange noises and conclude we are in the vicinity of a number of wild

At this part, on the lower face of the cliff, numerous specimens of hulendite are to be obtained. They occur in joints of the rock, never very thick, perhaps a quarter of an inch being the greatest thickness seen. We are indebted to Mr. James Neilson, leader of the geological part of the excursion, who is well acquainted with the geology of the island, for pointing out this, and other mineral treasures. The amygdaloidal cavities here, as well as cracks or joints, are filled with white quartz. Sometimes the quartz is bånded and of various colours for a bit, especially that deposited in cavities, the banded part being next the wall of the cavity. In some instances the quartz does not completely fill the cavities, and the interior hollows are bristling with quartz crystals. At this part also, on the shore, is a patch of very amygdaloidal trap, a number of the cavities being filled with pale-pink radiated cluthalite. Many of the cavities at this part are seen to be gathered into clusters. A few white stilbites and agates are got here and there in the Wee Cumbrae trap, but the prevailing mineral is calcite. This sometimes, as is already stated, is in the form of Iceland spar, very pure and giving the double refraction when set over a dot or a line, which shows that the trap of this island contains a considerable proportion of lime. Barite, generally tinged red, is occasionally to be obtained. At places the amygdaloidal cavities are either empty, or contain one or two small crystals of some substance; and sometimes they are seen to be drawn or lengthened out by the semi-liquid trap, having moved a little after their formation.

Parts of the island, especially along the east coast, are seen to be intensely glaciated, and the finest striæ are on the island on which the Castle is situated. Especially is this so near the large split boulder, where the striæ, running parallel with the shore, are still very sharp, extending in long lines on a smooth polished surface. Smith, of Jordanhill, has figured the above split boulder in his "Newer Pliocene," and accounts for its breaking up by having fallen from an iceberg; but the block is not a far-travelled one, and probably never was much higher than it is at present. It belongs to the traps of the island, almost sharp at the angles, and very likely was not carried more than a few hundred yards. The frost, which has split it, will evidently break it up still further.

A few bits of West Highland schist were noted at several places, and a small boulder, apparently of Arran granite, was seen on the west side of the island lying amongst the gravel of the old beach. This beach is at several parts well marked, the pebbles lying as the waves left them many centuries ago, and is the finest illustration of an ancient pebble-beach we have ever seen. At no place was any boulder clay observed.

The view from the summit of the island, 409 feet above tide, near the old lighthouse, is somewhat extensive. Ailsa is visible away down channel, and many of the Highland peaks are to be observed in an opposite direction. Towards the west are Bute and Arran; and the Ayrshire coast with the cliffs of Goldenberry Head — the finest of the raised beach cliffs on the Clyde—are towards the east.

The higher parts of the Wee Cumbrae are covered with rough pasture on which a considerable flock of sheep and a few cattle are fed, rabbits being numerous all over. Several whaups and lapwings break the stillness of the moorland with their cries, and numerous oyster-catchers, gulls and wild ducks are seen away down on the shores.

Of butterflies, we observed three species, the small-heath, meadow-brown, and red-admiral; the last one being represented by a single specimen. There are a considerable number of plants on the island, the bourtree growing freely along the eastern side under the shadow of the old sea-cliffs. The English stone-crop appears to be the prevailing plant, and we find it in flower all over. The zostera grows to a greater length in the little bay to the north of the Castle, than I have seen it anywhere else. The mullen, the horned-poppy, and marine spleenwort, are still to be found, but are evidently destined to extinction.

Springtails were numerous, leaping about on the rocks near the shore. The scales with which some of the species are covered are highly interesting, and used as test objects for the microscope.

On a former occasion, when approaching the island in a small boat, the water being still and the sun shining strongly, a jelly-fish was seen floating at the surface of the water, its stinging threads being extended all round about it, each to the length of six feet. On their being touched by the end of an oar, it withdrew its threads towards it with a rapid but jerky motion. This faculty of extending its stinging threads all round it will no doubt be of great use in defending it from its enemies. Whether, or not, any of the threads hung down in the water I did not observe, those I saw seemed to float on the water, radiating out from it like the slim spokes of a bicycle.

Except in the garden at the cottage nothing is done by way of cultivating any part of the island. There has been an enclosure on the higher part, near the old lighthouse, and at the south base of the platform on which the old lighthouse stands there is a row of large boulders, as if they had formed part of an ancient fortification.

The Tan is situated at the western edge of the channel which divides the Big from the Wee Cumbrae, and is capital dredging ground, the beautiful swimming shell, *Lima hians*, being common at this spot, reposing in its self-spun silken nest, which is well fortified by a rough covering of melobesia, etc.

*Monkredding, Kilwinning; February*, 1895.

## CURIOUS DEATH OF RABBIT.

THE following incident occurred last month, and may be worth recording. A maple-tree arrived at a timber-yard situated close to the Midland Station at Stamford, from a park in the neighbourhood, and the following day was sawn up by a circular steam saw. On reaching a hollow part of the tree the saw passed through the body of a live rabbit, and at the same time a second rabbit bolted out of the hollow trunk and escaped into the timber stacks, where it was eventually caught and killed by the workmen. As the timber yard in question is a most unlikely place for rabbits to be found in, it is only reasonable to conclude that the rabbits travelled to Stamford inside the tree, and remained there till they met their death as described. VERNON B. CROWTHER-BEYNON.

*The Grange, Edith Weston, Stamford; March 13th*, 1895.

## NOTES OF A HOME-NATURALIST.

By Mrs. Emily J. Climenson.

THE cold weather has caused a great mortality amongst the birds here at Shiplake, despite of all who could afford it throwing food to them, as they eagerly crowded towards the houses. During the intense cold, I used to walk every day round a bank which lies at the bottom of our terraced garden, looking south, and which, having a fringe of shrubs and brushwood, afforded a greater degree of shelter than other places. Daily I found birds dead or dying! They consisted of thrushes, blackbirds, wood-pigeons, starlings, and once I found a dead fieldfare. I brought several blackbirds and thrushes into the house, and placed them in cages, but, after a temporary recovery—and, in one case, a thrush lived three days—they all died. They were either too far gone, or else, as in latter case, I believe ate too much after inanition, and died from repletion. Prolonged thirst may be the cause of many deaths, as suggested by Miss F. Winstone, last month (*ante*, page 20). I noticed several times a little jenny wren entering a burrow in the bank. A friend, who had a bone tied up for the tits to peck at, noticed a nut-hatch which came daily to peck too. Our schoolmaster fed the birds, and two rooks took to coming in a shy, wary way to feed as well, and though the frost has ceased, these birds still come, and I saw the pair settle, one after another, in a tiny apple-tree in his garden, the other day, waiting for food. I heard of a little auk being caught near Sonning, and another near Reading, also a snowy owl (*Strix nyctea*) being shot near Reading. On Saturday, March 9th, our man-servant saw a white wild duck, which had been caught at Sonning, in a bird-stuffer's shop at Reading. My daughters saw a very large flock of wild ducks on the flooding, soon after the thaw set in, accompanied by two larger birds, that they considered to be geese, from their general appearance.

The glass jam-bottle I described in the March number of Science-Gossip (*ante*, page 4) is becoming almost overcrowded with weed. One brown seed has germinated, and produced one leaf on a stalk, and another leaf can now be seen through a sort of filmy transparent hammock. I have removed the seed, to watch the development, to another glass, and think the plant will prove to be frogbit (*Hydrocharsis morsus-ranæ*). The odd-looking nematode (if such it be), like barley-sugar, has grown much, and now looks like a miniature tabby cat's tail, with regular bars round it. The head, when looked at through a magnifying glass, seems like a round, transparent hood, with two black segments, each divided into two divisions, like double ears, set up in it. The creature evidently has a large sucker at its tail by which it clings to the weed *Anarcharis* in preference to other. It either coils round the edge of leaf, when it looks like a portion of a discoloured leaf, or else it clings by sucker to leaf, and moves backwards and forwards, apparently trying to catch the daphnia and cyclops which dash past it. I saw it make a dart at a large daphnia the other day, which quickly beat a retreat; and as there are fewer water-fleas in the bottle, I conclude it must eat some. I should like to know its name, as it is different from any nematode I ever saw, though on the few occasions that I have seen it adhere to the glass it progresses with that curious doubling up and then stretching again, like ordinary nematodes. There are several young white leeches born since I wrote; all the rest of the family are well, except *Limnophilus rhombicus*, who, for some unexplained reason, divested himself of his cadis dress, and, though supplied with barley-stalks, etc., refused to re-clothe himself, and died. All my family are self-supporting; neither fresh water nor food have been supplied since they were caught in the second week of December last.

Plant life is very backward here, but *Arum maculatum*, or "lords and ladies," is at last showing, and I found to-day (March 10th) some plants of wild garlic, some inches tall. Snowdrops and aconites are in flower, but very stunted with frost. My servant found a fine specimen of fossil sea-urchin, belonging to cretaceous period, in a gravel-pit we have been digging lately here. We are on a mixture of drift gravel with chalk, a strip of London clay running through the parish in one narrow segment.

*Shiplake Vicarage, Oxon; March, 1895.*

## THE GINGER-BEER PLANT.

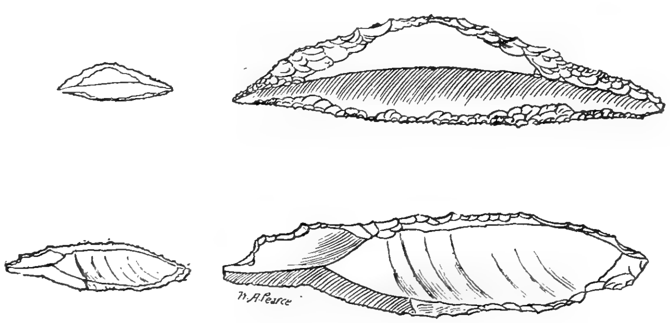
YOUR correspondent, Mr. Fielding, will find this growth (Science-Gossip, vol. i., N.S., page 284, and vol. ii. *ante*, page 26) forms the subject of an illustrated paper by Mr. G. E. Davis, in the Annual Report of the Manchester Microscopical Society for 1883-4, in which the author says: "To sum up, the ginger-beer plant is a very impure yeast or leaven of a different character to ordinary brewer's yeast or German barm. It consists of many varieties of cells, oval, round, and some extremely elongated; the whole are bound together by myceloid filaments, which increase as the air has free access to it. The smaller or bacteroid cells I have not had sufficient time to work out, but my impression is that they induce the peculiar flavour found in the liquid. Certain it is that by cultivation these can be considerably reduced in quantity, and the flavour then alters very materially." G. H. Bryan.

*Thornlea, Cambridge; March 11th, 1895.*

# PIGMY FLINTS.

By the Rev. Reginald A. Gatty.

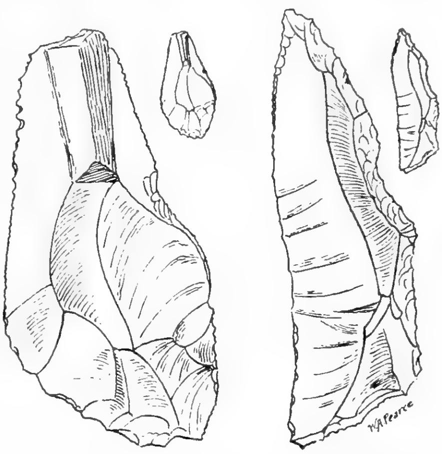
I WILL not venture to enter on the question of how long ago it was that the primitive inhabitant of Britain used flint, because he was ignorant of the existence of bronze or iron. This must be left for future determination. At present we are much in the dark, and what is wanted is some better classification of flint implements. I have styled this paper pigmy flints because I propose leaving the beaten track of ordinary flint weapons, and entering upon what is almost a novel phase. For some years past I have carefully preserved all specimens of flint implements I came across, both small and great. It was easy work to put out in drawers the arrowheads, some barbed, some leaf-shaped, some broad-tipped; and in another drawer to range the knives and scrapers in their order. When it came to minute specimens; to flint implements carefully and perfectly made, no bigger than half-an-inch, and many much less, I am bound to say I was completely puzzled. The first question which arose was: Are these genuine? Is there not some mistake? They might be accidental chippings, struck off at random when the ancient flint worker was framing his tools. A closer inspection with a magnifying glass proved that this was impossible. Whoever the people were who made these implements, they spent an enormous amount of skill and patience in their construction. They designed them with a purpose, and the flints must in some way have supplied a requisite want. I will take one specimen, which I will call a crescent-shaped knife, for examination. To show the size of this perfect tool it exactly covers in length the word "examination" as printed on this page, and its breadth is a trifle broader than the printing. I am led to give it the name of crescent because it has that form, and also in a pamphlet written by Dr. H. Colley March, of Rochdale, entitled, "The early neolithic floor of East Lancashire," I find reference to similar implements discovered in India. He says: "In the Colonial Exhibition, at South Kensington, there were shown, last year, as the work of Bushmen, Hottentots, and Kaffirs, some diminutive tools of flint, labelled 'drills.' Similar flint implements have been met with in Egypt; in the Exeter Museum are some slender points of worked flint that were discovered beneath a submerged forest near Westward Ho! and small worked crescents of flint and agate have been found in caves of the Vindhya Hills of India. But all these are far surpassed, as regards minuteness and delicacy of workmanship, by the implements of the East Lancashire floor. Indeed, in some of them, the secondary flaking is so fine that it cannot well be seen without a magnifying glass. Roughly speaking these minute implements are divisible into two classes, and are probably borers or gravers."



Pigmy Flints, Natural Size and Enlarged.
*(The Upper Specimen is the "Crescent-Shaped Flint.")*

The peculiarity of these discoveries of Dr. Colley March is, that they were made at a depth of six feet under peat, and at an altitude of thirteen hundred feet above sea level. The weapons found by myself were all taken from the ploughed fields, none of which exceeded two hundred feet above sea level. I must except a few which I found on the moors quite one thousand feet above the sea. It is very difficult to classify the pigmy flints, or to assign them a definite use. Many are like tiny knife blades, and I have also many borers. They differ considerably in shape: some are oval, some squared at the edges, but all show working of such a delicate character, that it requires a magnifying glass to detect the flakings on the edges. I tried to count the flakings on the crescent-shaped knife above alluded to, and I found there must have been above a hundred along the edges. The quantity of pigmy flints obtained is surprising, and I have a collection of some hundreds. You may be tempted to throw aside small fragments when you pick them up in the fields, but this is never wise to do, until you have washed your flint, and then subjected it to careful examination under a strong magnifying glass. When you have got what I may term a "worked" flint, it is quite unmistakable

No process of nature can ever imitate the delicate flakings by which the edge, say of a flint knife, has been brought to perfection. The work is no doubt due to pressure. A hard body is pressed against the side which it is intended to sharpen, and fragments fly off leaving a scar behind in the form of a slight indentation. This is readily observed on a flint some inches in length, but when you get down to very minute sizes, to little well-formed flints less than a quarter of an inch, you need a magnifying glass to discover the workmanship. What hands, what eyes, these pre-historic flint-flakers must have had to frame such delicate tools! I often look in amazement at a drawer of these pigmy flints. Perhaps sixty or seventy knives and borers will make one row, and when seen together, row after row, you realise that these flints were fabricated with a design and purpose, and whoever the people were who made them, dwarfs or fairies, they certainly were handicraftsmen of no mean order. It is very difficult to give any idea of the various forms which these flints take. I think the pervading notion seems to have been to use them fixed in some sort of handle. In fact, without such aid, they could do nothing with the fingers. It would be possible, I think, to arrive at some solution of this difficulty if we could place the pigmy flints before a tribe of savages, such as the Bushmen of Africa. Perhaps in time to come, when more is known on this subject, such may be done.



PIGMY FLINTS, NATURAL SIZE AND ENLARGED.

Collections are wanted from all parts of the world. By comparing notes, by steadily accumulating evidences, much might be brought to light. The migration of man from one part of the world to another could be traced, and the pre-historic story of our race might have considerable light thrown upon it. I have alluded to the pamphlet, by Dr. Colley March, on the early neolithic floor of East Lancashire, in which he states that small crescent-shaped knives have been found in the Vindhya caves of India, similar to those of Lancashire, and similar again to those which I have found on the ploughed fields. There is an immense distance to be covered between India and England, but vast as the space may be, to what lengths of time must we go to date the formation of the peat 1,300 feet above sea-level, *under which* such knives have been found? And these are pigmy flints we are dealing with, not the big palæolithic weapons of the drift. In these substantial implements there is something tangible and reasonable. We can imagine a savage breaking a hole in the ice to let down his fishing line, or raising it aloft to hit his enemy on the head. But a crescent knife has no such ostensible use. It faintly resembles the crescent of a new moon, and may have been copied from that luminary. It is worked, or rather flaked all round, giving a cutting edge every way, and its horns are very sharp. That this should be found in India and England, and, more than all, below a peat stratum, is certainly a most remarkable fact.

*Hooton Roberts Rectory, Rotherham; February, 1895.*

## NOTES ON LEPIDOPTERA IN 1894.

By R. M. PRIDEAUX.

IN contrast to the miserable season that followed, and was experienced everywhere throughout Britain, a few warm sunny days at the end of April and early in May brought the spring butterflies out, in Surrey, in abundance, and well up to date. On April 29th were observed, in one locality near Dorking, *Euchlöe cardamines*, *Argynnis euphrosyne*, *Pararge egeria*, *Cœnonympha pamphillus*, *Nemeobius lucina*, *Thecla rubi*, *Polyommatus phlæas*, *Lycæna argiolus*, *Nisoniades tages*, and *Syrichthus malvæ*. Shortly afterwards, the weather became cold, wet and unsettled, moths scarce everywhere, but especially at light, even the commonest species being absent. Larvæ, on the other hand, began to appear in great profusion. About the 19th of May, the oak woods near Oxshott began to lose their recently-acquired verdant appearance, and by the 26th had a miserably blighted aspect—not a whole oak-leaf to be seen anywhere. There had been pretty severe east winds for a day or two previously, and the west side of the tree trunks presented a curious sight, being draped and festooned with dense webs and ladders of silk threads, these being covered with countless numbers of larvæ, having been dislodged by the wind, and which were endeavouring to reach the higher branches, where a few green leaves remained, before succumbing to starvation. It was evident that many had perished *en route*. The species comprised, consisted chiefly of the geometrid genus *Hybernia*, together with *Cheimatobia brumata*, *Oporabia dilutata* and *Phigalia pedaria* (*pilosaria*). Among Noctuid larvæ, *Tæniocampa stabilis* was present, and an unusual number of *T. munda*. The following day, it was observed that the young beech, near Dorking, was showing signs of being severely attacked by *C. brumata*.

On May 27th, a cold windy morning, I visited some localities for *Lycæna bellargus (adonis)*. They were just emerging in profusion, being littered all over the patches of *Hippocrepis comosa*, but owing to the violence of the wind, many were unable to dry their wings properly, several cripples resulting. Among species bred this month, may be noticed a few *Coremia quadrifasciaria*, from ova laid by a female captured at Grays, Essex, the larvæ having been hibernated on dead-nettle. Also a few *Drepana harpagula* (*sicula*) from larvæ obtained the previous autumn at Bristol. One of these emerged from the pupa, but was unable to force an exit through the cocoon.

Early in June the effects of the bitter weather on young tree vegetation became everywhere visible. This was specially in evidence in a wood a mile south of Claygate, where there were acres of young ash trees, all the recent shoots hanging limp and blackened.

On June 8th *Nemeobius lucina* was still to be seen in its favoured localities. Towards the end of the month a visit to South Devon showed things in a better light. The cliff vegetation near Salcombe, apt at this time of year to be parched and brown, was in unusual luxuriance. The butterflies by this time were conspicuously late in appearance. *Argynnis selene* was just appearing on the 26th, when *Thecla rubi* was still abundant. The most abundant species by far was *Vanessa cardui*, hibernated specimens of which were everywhere. It was difficult to find a thistle on the coast, which, on searching, did not reveal the presence of ova of this species. *Eupithecia venosata* and *Acidalia subsericeata* were met with at dusk, and *Dianthœcia nana (conspersa)* came to light, while *Arctia villica* might be seen dashing about among the bracken on the coast in the sunshine. Among larvæ, a specimen of *Argynnis paphia* was found, sunning itself on a stone, *Bombyx quercus* was common everywhere, and a few *B. trifolii* were met with. On June 30th, *Lycæna ægon* was just appearing on the cliffs near Exmouth.

On returning to Surrey in July, lepidoptera generally were found more abundant. In a chalk pit, well-known to me for producing unexpected species, *Toxocampa pastinum* and *Aventia flexula* were met with, the latter having been taken in the same spot five years previously. *Vanessa io* seems to have been remarkably scarce everywhere this year. No larvæ were noticed by myself, and only two imagines, one near Betchworth (Surrey) in August, and one here (Isle of Wight) on the 30th of September. On August 11th, a specimen of *Lycæna argiolus* was observed to alight on an ivy spray, about ten feet from the ground, and presently fly off. On reaching down and examining the spray, an egg was found to have been laid towards the centre of the immature flower umbel, on the side of one of the buds. This egg unfortunately proved infertile, nor would the insect (subsequently captured) be persuaded to deposit any more, when confined over the plant.

About August 26th, *Plusia gamma* began to be much in evidence, and, during the remainder of the season, which was spent by me in the Isle of Wight, continued to abound, by day and at dusk, till the middle of November. The cocoons I found commonly spun up amongst various leaves, principally nettle. *Colias edusa* was fairly common in the Isle of Wight; not conspicuously more so on the coast than in suitable inland localities. A fine male specimen was boxed off *Scabiosa succisa* as late as September 6th, and the last seen on September 29th. *Vanessa cardui* though common was not nearly so abundant as the prevalence of hibernated specimens earlier in the year would have led some to expect. *Vanessa atalanta* was an abundant species in all its stages last Autumn, the last specimen seen being on November 4th, on ivy-blossom. A curious freak of *Triphæna pronuba* was observed on September 12th, when a specimen was seen to fly to successive blossoms of hemp and agrimony and extract honey from them, at mid-day, in broad sunshine.

Larvæ of various species were late. A cluster of *Phalera bucephala* only half-an-inch long, were feeding on sallow near Cowes, on September 15th.

Sugaring proved vastly attractive here, during the first half of October, before the much-delayed ivy-blossom was in flower. About twenty species of common autumnal *Noctuæ* showed up in abundance, but nothing of any rarity was observed. One of the commonest species was *Anchocelis rufina*.

A very good plan for attracting specimens of the genus *Xanthia*, I found to be to gather up a handful of the taller grasses, and secure them—sheaf-fashion with a circle of wire—under the flowering portion, and then sugar them.

The bulk of moths had disappeared, or were much the worse for wear, by the time the ivy-blossom was at its best. To my surprise, a few full-grown larvæ of *Lobophora viretata* were beaten from the ivy late in October; they quickly spun up.

*Carisbrooke, Isle of Wight; January 22nd, 1895.*

# PLEISTOCENE MOLLUSCA OF CRAYFORD.

By A. Santer Kennard.

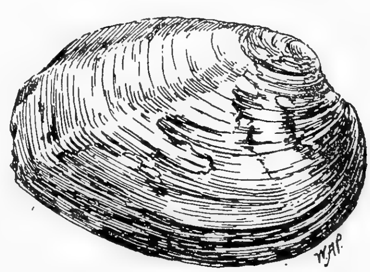
THERE are few, if any, pleistocene sections in England which are better known than the classic one at Stoneham's Pit, Crayford. It was first described by Professor J. Morris in 1838, and a list of thirteen species of mollusca given, including *Unio littoralis*, then first described as a British fossil. Since then it has been many times described and its fossils enumerated more or less accurately. In 1890, Mr. B. B. Woodward, after a careful examination of all existing material and records, extended the number of fossil mollusca to forty-six species, forty-two from existing specimens, three on the authority of Mr. A. Tylor, and one on that of Professor J. Morris. (Proc. Geol. Ass., August, 1890.)

During the past year I have been able to devote a little time to this deposit, and I am now able to add two new species, *Littorina rudis* and *Limax agrestis*, both represented by single examples, which I have presented to the Natural History Museum, South Kensington. *Limax agrestis* has already been recorded from the contemporary beds at Grays, Essex. The presence of *Littorina rudis* is, however, more noteworthy. It is a very dwarfed example, but after careful comparison with some brackish water-forms from Tilbury, Essex, I referred it to that species. I endeavoured to get the identification confirmed, but no one would venture an opinion until lately, when Mr. E. R. Sykes, F.Z.S., concurred in referring it to *Littorina rudis*. The presence of this species together with *Paludestrina ventrosa*, already known from these beds, undoubtedly points to the proximity of estuarine conditions. Both examples were obtained from the bed numbered 5, page 438, vol. i., "Geology of London."

Limnea palustris.
Sphærium corneum.

In Science-Gossip (1890, page 4), Mr. T. D. A. Cockerell figured an example of *Pisidium amnicum* from Crayford, showing constriction of the valve, which he says is common in the Crayford Pisidia and Sphæria. Further on he refers to "the constriction of the valve which is so frequently seen in the fossil examples of *Pisidium* and *Sphærium* from Crayford. Why a character, apparently monstral, should occur so commonly among these shells is more than I can tell." This mended fracture is found in both valves, and varies somewhat in size and shape. In one example in my collection it resembles the letter T, the top fracture being in the middle of the valve. In another example, two fracture lines start from the centre of the shell at right angles to each other, but do not reach the margin. In those examples where the fracture extends to the margin, the angle varies, sometimes being forty-five degrees, more often seventy-five and occasionally ninety degrees. So far as I know, this feature has not been found elsewhere. As to the cause, Mr. Cockerell has suggested a parasite, while Mr. B. B. Woodward is of opinion that it was caused by mechanical means such as pressure from without, and with this latter opinion I agree.

I must, however, strongly object to the terms "common" and "frequent" as the following figures will show. Out of 572 valves of *Pisidium fontinale*, 2 are fractured; of 3,722 of *Pamnicum* 18 are fractured; while of 82 of *P. pusillum* and 422 of *Sphærium corneum* all are of the normal form. That is a total of 20 out of 4,798; a proportion which can scarcely be characterized as common. I may add that I possess a valve of *Unio littoralis* which possesses this fracture, a fact which is certainly at variance with the parasite theory. Of the forty-six species enumerated by Mr. Woodward I have found no less than thirty-seven. Of the remainder there are four species—*Hyalinia radiatula*, *H. crystallina*, *H. nitida*, and *Carychium minimum*—of which there are no known examples. *Cochlicopa lubrica*, *Clausilia rugosa*, and *Helix arbustorum* are represented by unique examples in the Natural History Museum, while *Paludestrina ventrosa* and *Paludina contecta* are nearly as rare. *Helix pulchella* is the commonest *Helix*, while *H. hispida* is the rarest. The examples of *H. caperata* are much smaller than living examples, and retain traces of colouring. *Helix nemoralis* is usually represented by fragments, though there are two fine perfect examples at South Kensington, *Pupa muscorum* is



Unio littoralis, from Crayford.

the commonest land mollusc; I have found over two hundred examples of this species. *Succinea putris*, *S. elegans*, and *S. oblonga* are rare and usually in a fragmentary condition. *Ancylus fluviatilis* and *A. lacustris* are also rare. I have only found two examples of each species, and they were all found together. *Limnea peregra*, as is to be expected, is abundant, though the examples are small; but its closely allied form, *L. auricularia*, is rare. *Limnea stagnalis* is only known from small portions of the apex. *L. truncatula* is common, while *L. palustris* is scarce. Of the existing species of *Planorbis* there are only two missing—*P. carinatus* and *P, fontanus*. *P. lineatus* is, however, extremely rare. *Bythinia tentaculata* is very abundant, and its operculum is equally common. *Valvata piscinalis* is the most abundant shell in these beds. Examples are occasionally to be found of var. *antiqua*. The remaining species do not call for any special notice.

I intend during the ensuing summer to endeavour to obtain the exact proportion of the various species, but the following figures may be of interest. These shells were obtained by washing about twenty pounds of clay from Slades Green Pit; *Pupa muscorum*, one; *Limnea palustris*, four; *L. peregra*, three; *L. truncatula*, eight; *Planorbis marginatus*, seven; *P. vortex*, two; *P. corneus*, six; *Bythinia tentaculata*, twenty-three; *Corbicula fluminalis*, three valves; *Sphærium corneum*, seventy-three valves; *Pisidium fontinale*, seven valves; *P. amnicum*, forty-six valves; *Valvata piscinalis*, twenty-three. Two fragments of a large *Helix*, probably *H. nemoralis*, and two teeth of the Northern Vole (*Microtus ratticips*) were also obtained from this washing.

*Cranbrook, Ravenscroft Road, Beckenham, Kent; February*, 1895.

## DRAGON-FLIES IN 1894.

By W. J. Lucas, B.A.

POPULAR superstitions, at any rate with regard to insects, die hard, and though naturalists will not share the fear that prompts the countryman to bestow on dragon-flies such opprobrious titles as "horse-stingers" and "devil's needles," yet their evil repute may possibly be one cause of the undoubted fact that the Odonata have been treated with neglect—a neglect which they for many reasons do not deserve. Those members, then, of the "gentle craft" to borrow Isaac Walton's well-worn phrase, who find the preserves of the Lepidoptera and even of the Coleoptera too full of workers, and are searching for "fresh fields and pastures new" cannot do better than turn their attention to the Odonata, in the study of which group they will find abundance of material, whereon to feast the eye and employ the pencil to good purpose. That much may be done in a single year is, I think, amply proved, when I say that my captures during last season, in some respects a poor one by the way, totalled no less than eighteen species out of a possible thirty-nine or thereabout. The following is the list.

*Platetrum depressum*, Linn. (Depressed dragon-fly). Whether this species was scarcer than usual last season, or whether by chance it seldom crossed my path, I cannot say, but certainly my captures were few. The first specimen that came under my notice was flying in a Surrey wood on May 14th, a rather later date than usual for *P. depressum*, which is one of the earliest of dragon-flies to appear on the wing. This insect has the habit of haunting a particular spot, and, though suspicious of one's near approach, is not easily scared from its chosen haunt, returning again and again often to the same identical spray. A knowledge of this propensity, together with the exercise of a fair amount of patience, usually brings about a capture. Collectors should look with particular favour on this insect and the next, for, if eviscerating and drying are performed with care, their beauties, which are of no mean order, will be but little impaired by the process.

*Libellula quadrimaculata*, Linn. (Four-spotted dragon-fly), is even an earlier insect than the last, my first specimen last season being secured on April 25th. It had evidently but just emerged, for its colours were undeveloped and it seemed out of place without companions. By the 29th it was fairly common, and good numbers were on the wing as late as August 7th. I have only taken this handsome dragon-fly at the Black Pond, near Esher, in Surrey, where, however, it is very plentiful. Unlike its predecessor and close relative, it seems seldom to leave the proximity of the water in which its youthful days were passed.

*Orthetrum cærulescens*, Fabr. A single specimen of this insect fell to my lot on open heath land near Beaulieu, in the New Forest, on August 13th. As it was a female and was flying with *Sympetrum vulgatum*, which it closely resembles, I at first set it down as a specimen of the latter, though the number of anteculital nervures should at once have pointed out the difference. This insect and the next, unfortunately, do not preserve well.

*Sympetrum vulgatum*, Linn. (*S. striolatum*, Chap.). My acquaintance with this dragon-fly last season continued from about August 10th till September

19th, and I met with it in the New Forest, at the Black Pond, and at the Hut Pond, near Wisley. A gorgeous insect is the living male in its coat of crimson, and a fine show it would make in the cabinet were it not that after death its colours disappear almost as suddenly as does the insect itself when you approach it with a net.

*Sympetrum scoticum*, Don., is a common insect round the two Surrey ponds mentioned above, and was on the wing last season from about July 25th till August 19th. A very different appearance has the earlier yellow-backed female from the sombre male, and they might easily be taken for separate species. Being slow and weak of flight their capture is very easy. The males preserve well, and the females fairly so.

*Anax formosus*, Linn. (Imperial dragon-fly). This is the largest of British dragon-flies. The male is of a clear opaque cerulean blue, the female of an equally beautiful emerald green. This species fell to my lot this season for the first time at the Black Pond, though I made a long but futile attempt to secure what I believe was a female on Whit-Monday of 1893. Half-a-dozen specimens were taken in all from July 25th to August 10th, but their value was enhanced by the excitement of the chase and the great difficulty of the capture, about two hours on an average of patient waiting being the price of each specimen taken. The fact that they only fly when the sun is shining, and then usually keep well out over the pond swinging backwards and forwards along the edge of the reed-beds well out of reach of the net, add to the difficulties of the hunter and to the value of his captures. Unfortunately the colours, so strikingly beautiful in the living insects, are extremely fugitive, perhaps more so than in any species except the little blue Agrion.

*Brachytron pratense*, Müll. This early dragon-fly I did not meet with in the perfect form last season. I, however, bred two specimens (as related in SCIENCE-GOSSIP last month), on May 19th and 24th, from larva-nymphs taken from the Basingstoke Canal, near Byfleet, on March 23rd. This insect keeps its colours fairly well.

*Æschna mixta*, Latr. Of this species I took but one specimen, which was flying with *Æ. juncea* at the Black Pond, on September 10th. Others may have been present, though I do not think there were many; but they can with difficulty be distinguished from *Æ. juncea*, except by their smaller size. This insect when eviscerated retained its colours fairly well, and is on that account, as well as its scarcity, an acquisition to the cabinet.

*Æschna juncea*, Linn. From August 28th till September 19th, at least at the Black Pond, near Esher, and the Hut Pond, at Wisley, *Æ. juncea* was fairly plentiful last season, although it is usually considered a northern insect, replacing *Æ. cyanea*, which is more southern in its range. Both were, however, secured on the same day, August 31st, at the Black Pond. On the wing both dragon-flies bear a close resemblance to one another, but at close quarters *Æ. juncea* is found to be much the handsomer insect, its markings being far more decided than those of its congener, from which it may be distinguished by the spot on segment 9 being divided into two by a black mid-dorsal line, and by the costa of the wings being yellow, instead of black. I have found that specimens keep their colour fairly well.

*Æschna cyanea*, Müll. It is by chance, no doubt, that I did not, last season, notice many specimens of *Æ. cyanea*, Those I did see, however, were in widely distributed localities. Like *Æ. juncea*, it appears late in the season, my earliest specimen being taken at Chertsey, on July 15th, and my last received on September 18th, both being females. This dragon-fly is often, possibly oftenest, seen far away from water, hawking up and down a country lane, where, though strong of flight, on account of its persistently clinging to a particular spot, it is easily taken by a patient pursuer. As far as my experience goes, the males preserve but poorly, while the females keep their colours very well indeed.

*Æschna grandis*, Linn. This is no doubt the commonest of the larger dragon-flies. I made its acquaintance about August 7th, and kept it till September 19th. It was particularly common, at the end of August, near Oxford, where on the 29th I saw a dragon-fly, which I took to belong to this species, on the wing, and apparently hunting, at seven o'clock in the evening. The capture of this insect is not an easy matter, and females appear not to be commonly seen. The brown ground-colour of the body preserves well, but the small yellow and blue markings do not.

*Calopteryx virgo*, Linn. I came across a few specimens of this splendid insect about the middle of August in the New Forest. Their period was over, but the few that were still to be seen enabled one to faintly imagine what Lymington River must have been like when they were on the wing in numbers, the males rivaling in colour the king-fishers that accompanied them. The two species of *Calopteryx* make a fine show in the cabinet, for the colour of their body, being metallic-green or blue, preserves perfectly. The wings of the females vary greatly in tint.

*Lestes sponsa*, Hans. This species I met with only in one corner of the Hut Pond, at Wisley, on August 28th and September 11th, flying low over the water. Its colours fade but little after death.

*Enallagma cyathigerum*, Charp. As early as May 14th, *E. cyathigerum* was on the wing at the Black Pond, but I did not notice it after June 23rd. When living, a noticeable feature is the glossy surface of its wings; otherwise it is not a striking insect, and what beauties it has are lost in drying.

*Agrion pulchellum*, Linn., was taken occasionally at the Black Pond, with the more plentiful *A. puella*, from June 3rd till September. It was not common, however, and being dark in appearance was easily passed over. The bronze colour of its abdomen, of course, does not fade.

*Agrion puella*, Linn. It was far from as common last season as sometimes. My records spread over a period extending from June 3rd till September 19th. In 1893 it reached from May 14th till September 24th. When living, this is one of the most delicately beautiful of our dragon-flies; but with death, unfortunately, all its beauties entirely disappear.

*Pyrrhosoma minium*, Har., was out in large numbers at the Black Pond on April 29th, and was on the wing from that time till about the end of June, while I bred one on May 4th from a nymph taken from the same pond. This and its congener, *P. tenellum*, make a pretty contrast to their companion, *Agrion puella*. The crimson and bronze colouring of both species of this genus are fairly persistent after death.

*Pyrrhosoma tenellum*, De Vill. From June 23rd till August 7th this elegant little dragon-fly was plentiful at the Black Pond, and seemed to take the place of its somewhat larger and more robust congener when that disappeared.

*Gordon Road, Kingston-on-Thames; February, 1895.*

The Geologists' Association.—The Easter excursion of the Geologists' Association this year, is to the Isle of Wight, under the direction of Messrs. R. S. Herries, F.G.S., and H. W. Monckton, F.G.S., leaving London on April 11th, and returning on the 16th. There are four excursions arranged for different days, the localities being—(1) walk to Whitecliff Bay, (2) Alum Bay, (3) Totland Bay, (4) Coast from Seaview to Ryde. Full particulars may be obtained from Thos. Leighton, Esq., Lindisfarne, St. Julian's Farm Road, West Norwood, S.E.

## STATIONS OF PLANTS AND BUOYANCY SEEDS.

By H. H. Guppy, M.B.

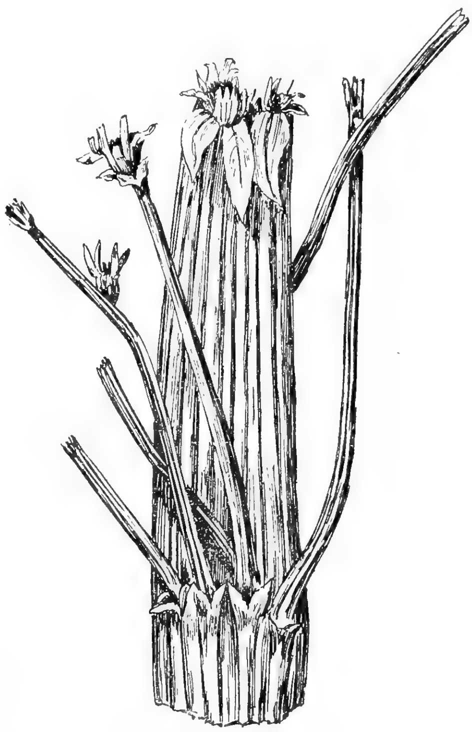
By following up the path of inquiry that is concerned with the flotation of seeds and seed-vessels, we are guided into other fields of research that give promise of interesting discoveries in connection with plant-life. We are led, in the first place, to consider the question of utility, and to ask whether the buoyancy of the seed or fruit has been a matter of moment in the history of the species. Nature is ever engaged in telling off the plants to their various stations. She places the yellow iris at the river's side, and assigns to the blue iris its home in a shady wood. Under her direction the common alder thrives at the water's edge, whilst its fellow species live on the mountain slope. These and similar operations are carried out daily around us, and we know but little of the wherefore and the how. We are induced, therefore, to inquire whether by pursuing the line of investigation above indicated we may be able to get a glimpse at the methods adopted by nature in selecting stations for plants.

Daisy.—*Bellis perennis*. Mons.
Fig. 1. (*See* p. 44.)

I possess the results of buoyancy experiments on the seeds of about 273 British plants. Of these about 230 plants are included in my own results, whilst the data for the remainder have been obtained mostly from the writings of Kolpin Ravn, Thuret and Darwin. The term "seed" is here used in its general sense, and it should be added that the greater density of sea-water as compared with fresh-water makes, as a rule, little or no difference in the experiments. Of the total number of species the seeds of 210, or seventy-seven per cent., sank at once or within a week; in thirty-five species, or thirteen per cent., the seeds floated in numbers after six months in water, the remainder floating for periods usually of two or three months. No doubt, if the grasses had been better represented, the proportion of those that sink at once or within a week would not have been under ninety per cent. That seeds as a rule possess but little buoyancy was a sound conclusion of Darwin, and one, as he remarked, that is in accordance with the common experience of gardeners. Thuret, in fact, after experimenting on the buoyancy in sea-water of the seeds of about 250 species of plants, belonging to seventy-seven families and to various regions, found that not over two per cent. had any powers of flotation, all the rest sinking at once or in a few days ("Archir. des Sci. Phys. et Nat." tome 47, 1873). Upon the seeds of the great majority of plants that I experimented on, prolonged drying had but a slight influence. Seeds that sink at once, in the mature and fresh condition, rarely gain much buoyancy after drying for a year.

The 273 species examined comprise 208 dicotyledons belonging to fifty families, and sixty-five monocotyledons belonging to twelve families. Of the 210 species, where sinking took place at once or in a week, in 104 cases, that is in fifty per cent., the plants had dry indehiscent fruits; whilst in seventy instances, or thirty-three per cent., the plants had small seeds, such as we find in the cruciferæ, caryophyllaceæ, and juncaceæ. Plants with large seeds, such as *Convolvulus arvensis* and *Nuphar luteum*, made up seven per cent. of the total, the remaining ten per cent. including plants with berries and other miscellaneous fruits. Of the thirty-five species, where the period of flotation extended over six months and considerably beyond, thirty species, or eighty-five per cent., possessed dry indehiscent fruits; the small-seeded plants with dehiscent fruits not being represented, but only those with large seeds such as *Convolvulus sepium* and *Iris pseudacorus*.

In so far, then, as Nature has employed the agency of water in the dispersion of our plants, she has for the most part ignored the small seeds; and if she has availed herself of this agency at all she has confined its operation almost entirely to the dry indehiscent fruits. M. Kolpin Ravn has recently been investigating the minute structure of the coverings of such fruits with the object of determining the causes of their flotation. ("Særtryk af Botanisk Tidsskrift," 19 Bind, 2 Hefte, Copenhagen, 1894.) Aided by the previous labours of others, he enables us to assign a function to certain of their structural peculiarities. Meanwhile, accepting the fact of their buoyancy, we will endeavour, if possible, to ascertain if Nature has made any very evident use of it. In the first place we turn to the possible means of transportal by the ocean currents. Except in the case of the littoral plants, it is difficult to determine to what extent our plants could have been aided by this mode of dispersal. That this agency is not essential is evidenced in the great areas of distribution belonging to such plants as *Prunella vulgaris* and *Luzula campestris*, where the fruits or seeds have no floating powers. Birds take such an active part in carrying seeds over the globe that the intervention of the ocean current seems almost superfluous. They transport the seeds from station to station, and in this respect alone possess a great advantage over the currents as seed-distributors; and in many other ways the current as an agent in distributing plants is inferior to the bird.



CORN BLUEBOTTLE.—*Centaurea cyanus*. Mons.
Fig. 2 (*See* p. 44.)

It is possible, however, that the effects of buoyancy in dry indehiscent fruits may show themselves more clearly in other ways. I have arranged in two groups the species with fruits of this character. The first group contains fifty-two species that live at the edges of rivers and ponds, and of these more than half possess fruits that are able to float for a long time, usually for several months. The second group contains seventy-one species, frequenting drier situations, and here only five species possess fruits with any floating powers. Some typical examples of these groups will be given in next number.

*6, Fairfield West, Kingston-on-Thames; February, 1895.*

## BOTANICAL MONSTROSITIES.

If the readers of Science-Gossip who are interested in Lieut.-Col. Blathwayt's article in last month's issue (*ante* page 6), will watch the asparagus beds in their neighbourhood during and after the period of cutting, they will, I think, frequently find stems distorted in almost, if not quite the same manner as his ash-plant there figured. We may probably conclude that the cause of these abnormal forms is the use of the knife in cutting, which damages some of the buds under the soil, and thus influences in some way the growth of the shoot. As Colonel Blathwayt says that his ash-stem was grown on the base of a tree which had been cut down, we may fairly conclude also, that it may have been produced from the same cause. I have frequently seen stems of asparagus in shape like a crozier, and even some which were coiled very much after the fashion of some of the coiled pods of the Leguminosæ, but of course on a very much larger scale, the stems being over half-an-inch wide.

I have a specimen daisy (*Bellis perennis*) with peduncle over half-an-inch wide, having the appearance of several flowers fused together (fig. 1, p. 42); this was found growing on the short turf of a cricket-ground, and would again point to a probable injury by a roller or lawn-mower.

Another monstrosity in my possession is a plant of the hedge mustard (*Sisymbrium officinale*), which, as all will remember, has usually a tall stem with closely appressed leaves and blossoms. This was found in the gateway of a footpath, and the result of its position was the suppression of the stem so that the blossoms were in a bunch surrounded by the leaves, somewhat similar to the leaf arrangement of a cauliflower. These two cases seem to furnish instances of monstrosities arising from injury. If my memory serves, some authors attribute these mal-formations to excessive nutrition, and if this be the case, possibly a specimen of the cornflower (*Centaurea cyanus*), which is also in my collection, may serve as an illustration (fig. 2, p. 43), having been found in a chase near a large manure-heap, from which it received a liberal amount of liquid, and its stems, of which there were four, were over an inch in width. I have drawn (fig. 3.) a stem of *Picris hieracioides*, from a plant having two, which grew on the railway embankment, but whether it had been subjected to injury or an excessive food supply I was unable to determine.

Fig. 3. Picris.—*Picris hieracioides*. Mons.

This by no means exhausts the specimens of monstrosities in my collection; but those already mentioned may possibly lead other botanists, who are interested in such remarkable deviations from the type in plants, to give us the result of their experience in some other localities. These should be accompanied with details and probable cause.

Edwin E. Turner,
*Coggeshall, Essex.*

## GIRAFFE AT THE ZOO.

The Zoological Society of London is to be congratulated on the acquisition of a fine young giraffe *(Giraffa camelopardis)*, after a three years' absence of this species from its gardens at Regent's Park. The specimen came from South Africa, and differs in markings and form, though not in species, from those hitherto exhibited in England, which have been from North-Eastern Central Africa. We hope that a mate may be obtained for this animal during the next year. Camelopards are becoming very rare, and may possibly be extinct animals in a few years.

## MARINE BIOLOGY AT PLYMOUTH.

THE new number of the "Journal of the Marine Biological Association of the United Kingdom" (No. 4, vol. iii., new series, 1895) is just issued. As usual its contents are of the highest value as contributions to our knowledge of marine life. Mr. J. T. Cunningham, the naturalist attached to the Plymouth marine laboratory, has an interesting paper on the discovery, by the Italian naturalists, Professor Grassi and Dr. Calandruccis, of the larva of the eel. Until last year the breeding and development of the common eels had remained a baffling mystery to naturalists. Nothing was known of the history of these animals between the disappearance of the parent eels in their migration into the sea and the appearance of the elvers in early spring. As might have been expected, one of the numerous larval forms of the sea, named Leptocephali, is the larva of the common eel. This form has long been known under the scientific name *Leptocephalus brevirostris*, but no one seems to have suspected that it was an immature eel, though another species of the genus, *L. morrisii*, was known to develop into the conger. Mr. Cunningham, in his paper, discusses the Leptocephalidæ. Although often taken in the Straits of Messina, between Italy and Sicily, these larval forms are rarely seen in British waters, probably because of their supposed habit of hiding themselves in the bottom of the sea, possibly actually burrowing in the sand or mud.

We regret to find, that on account of failing health, Mr. Holt, the other naturalist attached to the Biological Association, is unable to continue his investigations of the North Sea, and that it has been found necessary to transfer Mr. Cunningham from Plymouth to continue Mr. Holt's work from Grimbsy. No doubt Mr. Cunningham will be equally useful in his new sphere, but he has been so successful in laboratory work, that the change may interrupt some of his investigations.

The article on "Experiments and Observations made at the Plymouth Laboratory," by Mr. Cunningham, is largely devtoed to flat fishes, that subject occupying about twenty-four pages, including remarks on diagnostic characters, development of the eggs, and on a piebald plaice. The very rare nudibranchiate mollusc, *Coryphella smaragdina* is recorded by Mr. J. C. Sumner as having been dredged near the Asia buoy off Plymouth. This small Eolid was described by Alder and Hancock from a single specimen found off the Northumbrian coast. It is also found in the Mediterranean. In size it is only about half-an-inch long, and is of pure white colour, the fine transverse bands of branchiæ being of vivid green.

Mr. W. L. Holt publishes some notes on "Supposed Hybrids between the Turbot and the Brill."

## SALE OF BRITISH LEPIDOPTERA.

THE first portion of the well-known collection of British butterflies and moths formed by the late William Machin, who was a compositor in a London printing firm, was sold by auction on February 26th, at the rooms of Mr. J. C. Stevens, King Street, Covent Garden. The collection, formed during a period of fifty-eight years, was chiefly rich in a long series of rare and now extinct British species. The specimens were thoroughly authenticated as British, and as there was a large attendance of buyers, the prices generally were higher than the usual average, varieties especially fetching high rates. Among the earlier lots of butterflies, four specimens of *Pieris daplidice*, taken in Kent, reached 16*s.* to 18*s.* each. A bred variety of *Argynnis paphia*, with confluent spots on the under side, sold, with seventeen other specimens, for £2 2*s.* A variety of *Vanessa cardui*, taken on Hackney Marshes, fetched £3 10*s.* A fine variety of the purple-emperor (*Apatura iris*), with yellow under wings, £3 5*s.* Six specimens of *Polyomniatus dispar*, "from Mr. Henry Doubleday," fetched from £2 to £5 5*s.* each, according to size and condition, the latter price being for females, the finest males only fetched £4 8*s.* Sixty-three typical "blues," including a specimen of small copper butterfly (*P. phlaeas*), with the blue spots on the hind wings larger than usual, reached £3 10*s.* *Lycæna acis*, £2 for a pair, and £2 10*s.* for three specimens. Among the moths a specimen of *Sphinx pinastri*, from the late Mr. F. Bond, went, with nine *Chaerocampa elpenor*, for £1 10*s.* Two *Sesia scoliæformis*, a yellow-banded variety of *S. culiciformis*, and eleven others, sold for £2 2*s.* Four *S. sphegiformis*, labelled "from Tilgate Forest," with six *S. chrysidiformis*, fetched £2 5*s.* Varieties of the common garden tiger, *Arctia caia*, were not specially fine, the highest price being £2 2*s.* for three. *Laelia cœnosa* sold in pairs, at £1 7*s.* 6*d.* to £2 2*s.* Seven specimens of *Bombyx trifolii*, one being a fine variety bred by the late Mr. Machin, fetched £3 10*s.* A fine series of eight specimens of *Lasiocampa ilicifolia*, taken at Cannock Chase, £2 5*s.* to £4 5*s.* a pair. A fine female *Noctua Subrosea* sold for £4 10*s.*, the six other specimens fetching £4, £4 5*s.* and £5 5*s.* per pair. *Cleora viduaria*, which has become valuable during the last few years, £1 15*s.* to £3 5*s.* a pair. The thirty-eight drawer mahogany cabinet that contained the collection, sold for nineteen guineas. The total amount realised for the collection of macro-lepidoptera, or butterflies and larger moths, being £363. We understand that Mr. Machin's still more celebrated collection of British macro-lepidoptera has been purchased as a whole by a well-known London amateur naturalist. OLIVER J. JANSON.

*Great Russell Street, London, W.C.*

# MICROSCOPY

MOUNTING DELICATE MICRO-ORGANISMS. — In reply to the enquiry (*ante* page 21) on this subject, the process for mounting Rotatoria, practised with great success by Mr. Charles Rousselet, F.R.M.S., and given in full in the "Journal of the Quekett Microscopical Club" (vol. v., 1892-94, page 205), would probably meet the requirements of Miss C. M. Gibbings. The paper will not bear abridgment. —*W. T. Suffolk, Treasurer R.M.S.*, 143, *Beulah Hill, Norwood, S.E.*; *March 7th*, 1895.

MOUNTING DELICATE MICRO-ORGANISMS. — A very good way to mount Cyclops, and indeed almost any small insect (*ante* page 21), is as follows: The specimen should be killed in diluted spirit and allowed to remain in it for some hours, it should then be gently washed if requisite. Pour off the spirit and rinse with water two or three times, and soak in glycerine much diluted with water, leave it in this for a day or two; the water will evaporate gradually and should be replaced with pure glycerine, the whole process being more effectual if done slowly. Mount in glycerine jelly. The jelly as usually sold is too strong, it should be thinned with a little pure glycerine to avoid shrivelling delicate specimens. Methylated spirit, as now sold for burning, does not answer for preparing and preserving specimens, it turns thick and milky in contact with water. Spirits of wine (about 60° over proof) should be got from a good chemist, but is rather expensive. As a substitute common gin or whisky answers for many purposes, but is very much weaker.—*Jas. Burton*, 90, *Theobald's Road, London, W.C.*

MOUNTING MICRO-ORGANISMS. — Replying to Miss Gibbing's inquiry, such large micro-organisms as Cyclops, Daphnia, insect larvæ, etc., and even small fish and tadpoles can readily be preserved by placing them in ten per cent. formalin, and mounting in the same fluid on a slip with a hollow-ground cell. In some cases it is advantageous, before placing in formation, to kill and fix the animals with very weak $\frac{1}{4}$ to $\frac{1}{8}$ per cent. osmic acid, for one half to two minutes, not longer; and wash out at once in several changes of water. The cover-glass is fastened with Miller's Coutchouc Cement after the superfluous fluid round the edge has been taken up with blotting-paper. Formalin is very cheap, and is obtained in commerce as a forty per cent solution. Of course, by diluting with three times its volume of distilled water, one obtains a ten per cent. solution, which keeps well for any length of time.—*C. F. Rousselet*, 27, *Gt. Castle Street, Regent Street, London, W.*

VEGETABLE SECTIONS.—J. Stephenson will find Strasburger's "Handbook of Practical Botany" (Swan, Sonnenschein and Co., price about 7s.) gives excellent and complete directions for preparing and mounting vegetable sections and general botanical work.—*James Burton, London, W.C.*

VEGETABLE SECTIONS AND MOUNTING MICRO-ORGANISMS.—"Section Cutting," by Dr. Marsh, will probably be useful to Mr. J. Stephenson. For mounting Entomostraca and small aquatic larvæ, I have found the following to give good results: Fix with bichloride of mercury, thoroughly wash and mount in No. 2. No. 2. salicylic vinegar—pyroligneous acid, 100 parts; salicylic acid, 1 part. No. 2, salicylic vinegar (as above), 1 vol.; dilute glycerine (glycerine 1 vol., water 4 vols.), 10 vols.; Farrant's medium, 11 vols. The foregoing was given in a number of SCIENCE-GOSSIP for 1885, I think, and I have found it exceedingly useful. For transferring the specimens from one fluid to another, I find the glass fillers supplied with fountain pens extremely handy.—*C. W. Maw, Bradford, Yorks.*

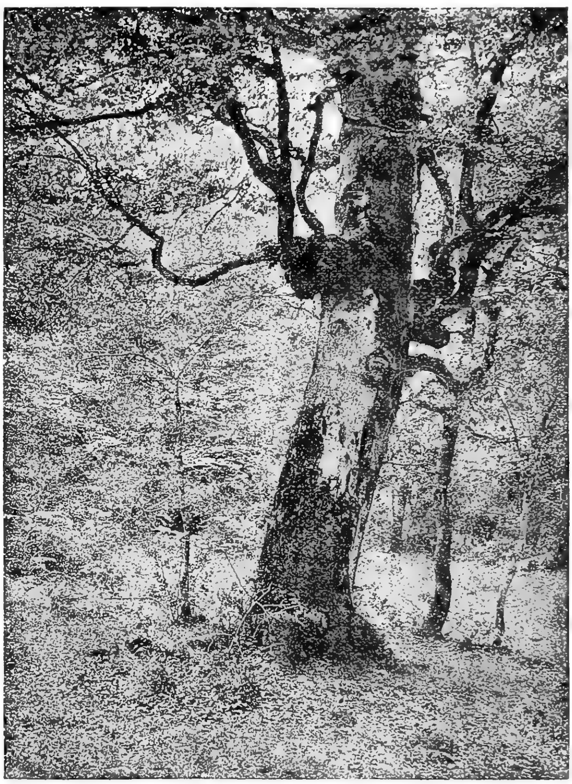
VEGETABLE SECTIONS.—The best book at present published is "Botanical Microtechnique," by D. A. Zimmerman, translated from the German by James Ellis Humphrey (Henry Holt and Co., New York, 1893). Some account of the preparation of vegetable tissues is given in "Bower's Practical Botany" (Macmillan and Co.). "Lee's Microtomists' Vade-Mecum (Churchill) is full of valuable information, but seems to ignore the existence of plants altogether. The processes used in animal histology need considerable modification when employed in botanical researches. The best results are obtained generally by using alcoholic processes, and working as simply as the case in hand permits; do not use four processes if three will do, and so on. Vegetable tissues are very delicate and frequently resent rough treatment. Only soft tissues can be cut with the best microtomes; harder substances, as stems, which offer more resistance than the longitudinal section of soft fir-wood or lime, are best embedded in a bit of soft wood such as lime, willow, etc., and then cut with an American metal plane. First wrap the prepared stem in tinfoil, fill the cavity with melted paraffin and force the substance to be cut into the cavity, set the plane very fine, keep the iron very sharp, and the work wet with alcohol. Place the sections in alcohol at once, and keep them in spirit till they are wanted for staining and mounting, do not use a piece of wood for embedding shorter than four or five inches. otherwise the plane will not cut well.—*W. T. Suffolk, Treasurer R.M.S.*, 143, *Beulah Hill, Norwood, S.E.*

"XANTHIDIA" IN FLINT.—Some time ago, I circulated round the Postal Microscopical Society, a set of slides of chippings of ordinary road flints, and from the interest with which they were received, I gather that many microscopists are unaware how easy it is to prepare these objects for the microscope. Xanthidiæ, or, as they have been more recently termed, Spiniferites, can most readily be obtained from any road which has been newly laid with chalk flints, where some of the flints have been crushed by cart wheels passing over them. In such a crushed flint there will, generally, be found a number of thin flakes of sufficient transparency to allow of their being mounted for the microscope without further grinding down. On returning home, these can be examined one by one in a drop of water or turpentine on a glass slip under a cover-glass, and those containing good Xanthidiæ, remains of foraminifera, or spicules, can be set aside and subsequently mounted in balsam. It is well to mount several chips on a slide, because the cover-glass will thus be better supported, and it is advisable to attach them to the slide with very thin gum before applying the balsam, otherwise they will slip out of place. There is a delightful uncertainty about hunting for these objects, a number of flakes may contain nothing, and then one may be found which is full of organic remains. In one such "lucky flint" I have discovered nearly forty different objects, including half-a-dozen species of Xanthidia, an almost perfect cast of the interior of a Rotalia, several other foraminifera with the shell silicified so as to make them very transparent, and a beautiful little birobulate spicule. For the systematic examination of such objects a "Maltwood's Finder" is of the greatest value, and they are best seen under a low-angled $\frac{1}{2}$ or $\frac{1}{4}$-inch object-glass with exactly the opposite illumination to that required for resolving diatoms, viz., diaphragm removed so that the full glare of diffused daylight reflected from the mirror may obliterate any irregularities of structure in the surrounding flint. An interesting short account of these Xanthidiæ is given in Quekett's "Lectures on Histology." From it we learn that Xanthidiæ were first discovered in flint by the Rev. J. B. Reade, in 1838. When discovered they "created a great sensation among microscopists; and such was the anxiety to obtain specimens, that from first to last several tons of flints were broken up, or cut, in order to find them." According to Professor Quekett, Xanthidiæ from flint are described by Mr. Reade in the "Annals of Natural History" for 1838, and by Mr. H. H. White in the first volume of the "Transactions of the Microscopical Society," while the casts of foraminifera, also found in flints, are figured and described by the late Dr. Mantell in the "Philosophical Transactions" for 1846. I send the present note in the interest of beginners rather than of experienced microscopists, many of whom are, of course, familiar with these fascinating little objects.—*G. H. Bryan, Thornlea, Cambridge.*

MICROSCOPY IN "SCIENCE-GOSSIP."—In reply to frequent demands for more microscopy, we are pleased to state that arrangements are in progress for an authority on the subject to take charge of the department, which will be enlarged. We trust our readers will support him with articles and notes.—[*Ed.* S.-G.]

## PHOTOGRAPHY

THE CAMERA IN THE FOREST.—A systematic study of forest trees and their characteristic growth is one which opens a wide field for most pleasant investigation with the aid of the camera. With practice a beautiful collection of such pictures may be made, as is instanced by that of Mr. Frederick H. Evans, of London, one of our best amateur photographers. We are enabled to give some idea of the beauty of these pictures from the accompanying view in the New Forest, Hampshire, by the kindness of the Editor of the "Photogram," who had this block prepared from the photograph by Mr. Evans.



A BEECH TREE IN THE NEW FOREST.

*(From a Photograph by Mr. Fred. H. Evans.)*

As would not be unnatural, we expect our friends who are photographers first, and worshippers of nature secondly, prefer artistic surroundings and the arrangement of a picture, rather than botanical types. Still, with judgment, both these desirable points may be obtained. Mr. Evans is an artist born, and in his series of some hundreds of tree photographs, there is not a bad picture among them. That we illustrate, although well reproduced, has lost in the process much of its real beauty by reduction, and loss of tint and texture.

EXHIBITION OF PHOTOGRAPHY.—The Executive Council of the Imperial Institute has arranged to open at South Kensington, from the middle of May to the middle of August next, as already announced, an exhibition of everything appertaining to photography. There are seven divisions for exhibitors, which are most comprehensive. Full information may be obtained from the Photographic Secretary, Exhibition, Imperial Institute, London, S.W.

## SCIENCE GOSSIP

A SPECIAL index, arranged according to species, has been compiled by Messrs. G. B. Routledge, F.E.S., and G. A. Lewcock, for the volume for 1894 of the "Entomologists' Record." It is to be obtained from Mr. Albert J. Hodges, 2, Highbury Place, London.

THE report of the detailed work, undertaken for the United States Fish Commission, in investigating the biology of the lobsters of the Maine Coast, is now in the press. The work is illustrated with fifty-four full-page plates, many being coloured; there are to be also forty figures in the text.

AT a meeting, held February 11th, of the Microscopical Society of Calcutta, Mr. S. J. Leslie successfully demonstrated photo-micrography by a new and simple invention of his, costing, in addition to an ordinary microscope, only a few shillings. The results are stated to have been exceptionally good.

MESSRS. APPLETON AND Co., the great American publishers, announce a new series of "Useful Stories." The series will include "The Story of the Earth," by Prof. H. G. Seeley, F.R.S.; the "Story of the Primitive Man," by Edward Clodd; the "Story of the Solar System," by G. F. Chambers. This ought to become a popular series.

A BILL has been introduced into the Washington House of Representatives to establish "The University of America," in which each state, territory, and congressional division shall be entitled to an equal number of students, to be chosen by open competitive examinations. The government of the University is to be vested in a board of twenty regents.

M. S. A. ANDRÉE, a Swedish engineer, has determined to make an effort to reach the North Pole in a balloon during the summer of 1896. M. Elkholm, of the Stockholm Meteorological Bureau, who headed the Swedish expedition to Spitzbergen in 1892, to watch the transit of Venus, will accompany M. Andrée. It is said that M. Elkholm has devised a system of determining the velocity of the upper currents of air by observations of the clouds.

DR. R. F. SCHARFF contributes to the March number of the "Irish Naturalist" some interesting notes on the Irish Caves, following those of Mr. Carpenter on the same subject in the previous month. The remarkable results of the exploration of the Mitchelstown Cave, shows how necessary is a thorough examination of all our British caves. Dr. Scharff indicates, with the aid of a map, no less than twenty-three important caves in Ireland.

PROFESSOR F. CHESHIRE delivered an address recently before the Camera Club on "The correlation of the mouths of insects to the mouths of flowers." His lecture opened up very great possibilities in the employment of photography for the purpose of showing, by means of the lantern, the fertilization of plants by insects. Professor Cheshire has taken a large number of photographs of insects in the act of fertilizing various flowers. At another meeting of the Club, Dr. C. S. Patterson showed that photography might throw light on another subject, namely, the teeth of fishes in relation to their food.

THE Seventh Annual Report of the Microscopical Society of Calcutta is to hand. The membership is eighty-one, including some native gentlemen, the meetings being held at the Asiatic Society's rooms, and the Honorary Secretary is Mr. W. J. Simmons. Among the papers read in 1894, are some of evident interest, several having been published in the society's monthly "Bulletin."

Is it too much to hope that in a few years we shall be able to explore unknown regions in navigable balloons? Mr. W. J. Bastard, of Islington, and M. Victor Gentil, of Paris, have both latety put forward designs for machines for aerial navigation, claiming that they shall be under man's control. Unfortunately a very large sum of money is required before these balloons can be tried.

THE Belfast Art and Industrial Exhibition for 1895 will open on April 10th, and will contain a department for natural history and geology. Among the more important exhibits expected, will be a collection of photographs by Mr. R. Welch, the well-known photographer of Belfast, illustrating "Mountain Climbing in the Mournes." The Mourne mountains are wild and exceedingly interesting, as well as little known to English Naturalists.

IN a recent interview Miss May Yohe, the actress, stated that she was unable to sing when in the near neighbourhood of flowers of strong scent. Some months ago M. Joal published in France a book called "Le Danger des Fleurs." According to this author, soldiers have been known to faint when passing gardens where grew the simple peony; brides have fainted at the altar because of the orange blossoms adorning their costumes. Why is it that certain flowers affect certain people? This interesting question requires investigation.

WE find from the Report of the Meteorological Council to the Royal Society, for the year ending March 31st, 1894, recently issued, that the Meteorological Office, in Victoria Street, London, is steadily improving the accuracy of the daily published forecasts. It is stated that the average, for the ten years 1884-93, of more or less successful forecasts reached eighty-two per cent., while in the year with which the recent report deals, eighty-four per cent. of successes were achieved. The analysis of these show fifty-nine per cent. complete successes, twenty-five per cent. partial successes, eleven per cent. partial failures, and five per cent. total failures. It is well that naturalists who propose collecting-trips should be reminded that by telegraphing, Meteorological Office, Victoria Street, S.W., they may receive, for a fee of one shilling, a private forecast of the probable weather advancing.

GILBERT WHITE's house at Selborne ("The Wakes") is in the market. Cannot the Selborne Society or any other society prevent the charming old house from being pulled down or altered "to suit the requirements of a tenant"? Would it not be a fitting thing for Englishmen to purchase the house where the author of those ever-delightful volumes, "The Natural History of Selborne," lived, and use it as a museum or something of the kind? Every year many pilgrims, both from the British Isles and from America, make their way down to sleepy Selborne. Surely these would subscribe a mite towards this purpose. We also hear that White's autograph manuscript of "The Natural History of Selborne" will be offered for sale by auction by Sotherby and Co., during the coming season. Portions of the letters contained in this lot have never been published.

## SCIENCE ABROAD

Science. (New York, March 8th.)—In *Current Notes on Anthropology*, Mr. D. G. Brinton draws attention, among many other subjects, to Dr. Eugene R. Corson's essay upon the relative mortality of the white and black races in the Southern States of North America. From his own observations at Savannah and elsewhere, and from the census statistics, he concludes that pure blacks have a decidedly higher mortality than whites. More die in childbirth; they are more susceptible to disease, and they succumb more quickly. They are prone to bacillar diseases, and their alleged exemption from malaria is not generally true. Hybrids between the races are less fertile and less viable than either. In a paper reported, read before the American Society of Naturalists at Baltimore on December 28th last, entitled, *Laboratory Teaching of Large Classes*, by Hermon C. Bumpus, of the Brown University, the author points out the large and increasing attendance at science classes in America. He protests against the classes being frequently too large for individuals to gain sufficient attention from the teacher. "To crowd a score or more of katabolic youths into a small room and compel them to breathe the fumes of stale alcohol for two or three hours is to invite failure. Each student should have a table to himself, where there is good light and where he feels a certain amount of proprietorship," He should "not be tempted to carry on a clandestine parasitism, or even a symbiotic existence with his neighbours." *Notes on the Biology of the Lobster*, by Francis H. Herrick, is an article full of interest. "Lobsters become mature when measuring from seven and a half to twelve inches in length. Very few under nine inches long ever lay eggs, but a few have reached ten and a half inches long before doing so. Anatomical evidence shows that the period at which lobsters become mature is a variable one, extending over several years. The adult lobster is not an annual spawner, but produces eggs once in two years. In a catch of 2,657 lobsters . . . the sexes were very nearly equally divided, and about one-fifth of the mature females carried eggs." Lobsters are found to grow slowly, a ten-inch specimen being estimated at four to five years old.

La Nature (Paris, March 16th, 1895). The last number of this journal received contains several articles of interest. Notice is taken of an excessively rare little volume published as a souvenir of the severe winter of 1784, and a quaint illustration is reproduced of a snow-pyramid erected in honour of Louis XVI. in Paris. The *Metalization of Aluminium* is treated by Mons. A. M. Villon. An important article on the *Fossil Insects of the Coal Period* will be found very useful, especially to neuropterists. An illustrated account is given of *An Excursion to Saint Mihiel*, a pretty little town in North-eastern France, on the Meuse. A photograph of the Devil's Table, a large rock in shape not unlike a huge stone fungus of the genus *Boletus*, is reproduced; as are also the "Seven Rocks" of Capucins at Saint Mihiel.

## ASTRONOMY

| | | *Rises.* | *Sets.* | *Position at Noon.* | |
|---|---|---|---|---|---|
| | | *h.m.* | *h.m.* | *R.A.* | *Dec.* |
| | 1895. | A.M. | P.M | *h.m.* | |
| *Sun* ... | April 1 ... | 5.38 ... | 6.30 ... | 0·42 ... | 4° 33′ N. |
| | „ 11 ... | 5.16 ... | 6.47 ... | 1.19 ... | 8° 20′ |
| | „ 21 ... | 4.54 ... | 7.3 ... | 1.56 ... | 11° 52′ |
| | | *Souths.* | *Sets.* | | |
| | | P.M. | A.M. | | |
| *Moon* ... | „ 1 ... | 5.5 ... | 2.15 | | |
| | „ 8 ... | 11.29 ... | 4 59 | | |
| | | *Rises.* | *Souths.* | | |
| | | A.M. | A.M. | | |
| | „ 15 ... | 2.21 ... | 5.44 | | |
| | „ 22 ... | 4.7 ... | 10.45 | | |
| | | A.M. | A.M. | | |
| *Mercury*... | „ 1 ... | 5.8 ... | 10.31 ... | 23.9 ... | 7° 53′ S. |
| | „ 11 ... | 4.55 ... | 10.47 ... | 0.3 ... | 2° 28′ |
| | „ 21 ... | 4.43 ... | 11.11 ... | 1.5 ... | 4° 45′ N. |
| | | *Souths.* | *Sets.* | | |
| | | P M. | P.M. | | |
| *Venus* ... | „ 1 ... | 1.53 ... | 9.17 ... | 2.31 ... | 15° 7′ N. |
| | „ 11 ... | 2.2 ... | 9.48 ... | 3.19 ... | 19° 4′ |
| | „ 21 ... | 2.12 ... | 10.19 ... | 4.9 ... | 22° 13′ |
| *Mars* ... | „ 1 ... | 4.27 ... | 12.51 ... | 5.6 ... | 24° 25′ N. |
| | „ 11 ... | 4.14 ... | 12.41 ... | 5.32 ... | 24° 49′ |
| | „ 21 ... | 4.1 ... | 12.29 ... | 5.58 ... | 24° 57′ |
| | | P.M. | A.M. | | |
| *Jupiter* ... | „ 2 ... | 5.12 ... | 1.33 ... | 5.55 ... | 23° 28′ N. |
| | | | P.M. | | |
| | „ 11 ... | 4.42 ... | 12.59 ... | 6.0 ... | 23° 29′ |
| | „ 23 ... | 4.3 ... | 12.24 ... | 6.8 ... | 23° 29′ |
| | | *Rises.* | *Souths.* | | |
| | | P.M. | A.M. | | |
| *Saturn* ... | „ 2 ... | 8.24 ... | 1.36 ... | 14.17 ... | 10° 49′ S. |
| | | P.M. | P.M. | | |
| | „ 11 ... | 7.43 ... | 12.54 ... | 14.14 ... | 10° 36′ |
| | „ 23 ... | 6.52 ... | 12 8 ... | 14.11 ... | 10° 18′ |
| | | P.M. | A.M. | | |
| *Uranus* ... | „ 1 ... | 9.54 ... | 2.27 ... | 15.8 ... | 17° 14′ S. |
| | | *Souths.* | *Sets.* | | |
| | | P.M. | P.M. | | |
| *Neptune* ... | „ 1 ... | 4.10 ... | 12.10 ... | 4.49 ... | 20° 59′ N. |

### Moon's Phases.

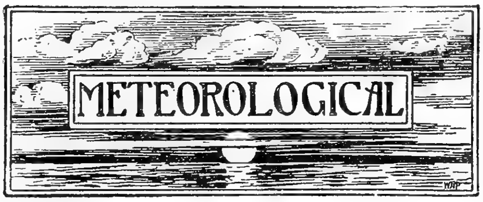
*1st Qr.* ... Apr. 2 ... 9.28 p.m. *Full* ... Apr. 9 ... 1.43 p.m.
*Last Qr.*... „ 16 ... 11.22 p.m. *New* ... „ 24 ... 1.11 a.m.

Meteors.—There will be a large shower of meteors on the 20th of April, which will be well worth watching if the weather is favourable. The radiant point is $\alpha$ 270° $\delta + 33°$.

Venus is very well situated for observation. She is an evening star, and towards the end of the month does not set until more than three hours later than the Sun. Her diameter is increasing, and also her north declination.

Saturn will be coming well into view this month, as he is in opposition to the Sun on the 24th. His declination is considerably south, so observations should be made as near the meridian as possible. The ring system is opening out.

At most stations the weather was very favourable for observing the total eclipse of the Moon in the early hours of the morning of Monday, March 11th. The occultation of a large number of small stars was visible, and the Moon itself was clearly to be seen throughout the totality. The coppery tinge of the Moon's surface was very pronounced, but several observers noted that the copper colour was much less marked when seen through a powerful telescope than when viewed with the naked eye or with only a field-glass.




OFTTIMES during February there are a few mild days when the soft breeze and welcome sun give a pleasant foretaste of spring, causing the leaf-buds of the garden shrubs to swell almost to bursting, and throwing the whole bird-world into fluttering excitement. This year, however, we had no such delusive interval; though there was much sunshine, the keen air and ice-bound earth never let us forget that we were still in a winter month. In many parts of the country the mean temperature for the twenty-eight days did not exceed thirty degrees, whilst even in London on only six nights was there an absence of frost. The soil at Berkhampstead was frozen to a depth of twenty inches, and the share that frost takes in aiding the ceaseless work of sub-aerial denudation was strikingly shown by the frequent fall of portions of the cliff between St. Margaret's and Dover.

For a considerable portion of the month, an anticyclone spread over our islands and North Europe generally, its centre for several days being over Ireland, and it was to its continuance that the prolonged cold was due, it causing a comparative absence of cloud, which, under cyclonic conditions, would have been present, and kept the earth warm by checking its radiation. It is remarkable that when the thaw did set in, it was not accompanied in England either by cyclonic systems, southerly wind or rain.

In spite of the oft-quoted phrase "February fill dyke," which Leader's beautiful picture has firmly impressed on the popular mind, February is, in fact, one of the most dry months, and this year was exceptionally so, the rainfall not having been so slight since the February of 1891, when at some stations the drought continued throughout the month. The amount of rain actually experienced was: Paris, 0·05 inch (1·25 inches less than mean for month); London, 0·16 inch (1·57 inches less); Leith, 0·36 (1·09 inches less); Parsonstown, 0·60 (1·60 inches less). When it is borne in mind that on an average about twenty-four inches of rain fall in London annually, it is evident that if we are to attain our usual record, we must look for a much higher proportion during the ensuing months.

Exceptional amounts of sunshine were recorded at many of the meteorological stations; the duration in London on February 16th was about six hours, that result being obtained by taking the average of the registers of three instruments, one being at Kew, another at Westminster, and a third at Bunhill Row, Finsbury. As much as nine hours' sunshine was experienced at Scilly during one day, but for the total amount of sunshine Jersey heads the list with a record more than treble that of London.

The subjoined list gives some of the most interesting of the sunshine comparisons, the means for every week being computed from the observations taken during the ten years, 1881 to 1890. The figures represent hours, an asterisk (*) indicates "hours more than mean," and † "hours less than mean.

Week ending February 9th—Jersey, 41, *21; Cirencester, 39, *24; Brighton, 31, (no mean available); Oxford, 31, *18; York, 22, *11; London, 10, *1.

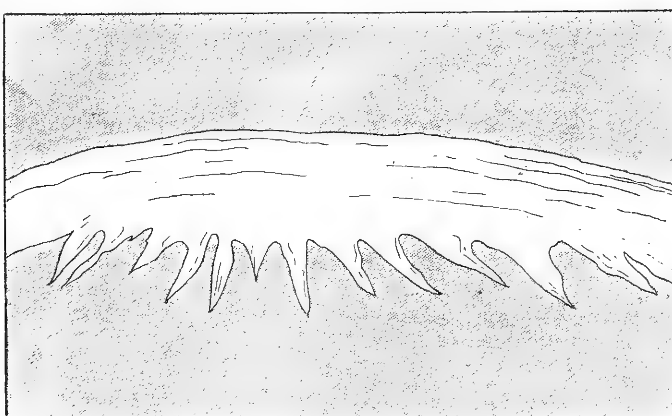
Week ending February 16th—Durham, 39, *24; York, 36, *23; Cirencester, 34, *16; Jersey, 32, *10; Brighton, 26, (no mean available); Oxford, 20, *4; London, 14, *4.

Week ending February 23rd—Valencia, 40, *19; Jersey, 32, *7; Dublin, 23, *4; Brighton, 15, (no mean available); London, 3, †8.

Week ending March 2nd—Scilly, 40, (no mean available); Falmouth, 44, *19; Jersey, 39, *12; Glasgow, 35, *20; York, 33, *16; Brighton, (no mean available); London, 13, †1.

A solar halo was observed at Oxford, and lightning was reported from Holyhead, but no aerial phenomena occurred at all worthy of being compared with the brilliant display during the memorable storm of January 23rd.

March opened with a thaw, which for several



AURORA DISPLAY OF 13th MARCH, 1895, IN NORTH OF ENGLAND.

days remained very gradual and undecided, a minimum of 16 degrees being registered at Llandovery, and several frosts occurring in London at night, though the day temperatures reached from 40° to 50°. Towards the middle of the month a warm spell set in, 60° being recorded at Cambridge and York, and 61° at Loughborough and London. In most districts the rainfall still remains considerably below the mean, half an inch of rain, however, was registered in twenty-four hours at Prawle Point, and nearly two and a half inches fell at Lisbon in five days, giving rise to serious floods.

Lightning was reported from Biarritz on the 9th. In connection with lightning it is interesting to note that although for generations it had been depicted by artists and illustrators as a series of marvellous zigzags, in the pictures of Turner and Nasmyth it is represented as taking a wavy, sinuous course, and the fine instantaneous photographs of lightning taken recently, add yet another proof of the freedom from conventionality and fidelity to nature of those great masters.


OAK TREE SPLIT BY FROST.

The proverbial March winds have so far been absent, even on the coast the force having rarely exceeded that of a strong breeze.

Solar and lunar halos have been frequently observed at many of the meteorological stations, especially at Jersey, Wick, Oxford and Stornoway. They are often caused by a thin sheet of cirro-velum or veil-cloud having spread over the sky, and the cirro-velum being in winter generally followed by a nimbus or rain-cloud, halos have been honoured with a prominent place among the popular signs of bad weather. Much interest has been shown in the bright aurora observed on March 13th.—*E. D. Anderson and A. E. Mansford, London; March 20th*, 1895.

TREES SPLIT BY FROST.—During the severe frost of February last, many trees in various parts of the country were split. We have received several reports on this exceptional occurrence. Mr. E. H. Farr, of Uckfield, has kindly had photographs taken for us, from one of which the accompanying drawing has been made. Mr. Farr states that many trees were split in the neighbourhood of Uckfield, in Sussex. "Only the trunks of the trees are affected so far as I have seen, the boughs having escaped. The girth of these trees—which are apparently all oaks, no other species having been found injured by frosts—vary from forty inches to sixty inches at the part fissured. Since the frost left the fissures have partly closed. The tree photographed was to my certain knowledge intact early in January. As will be seen from the drawing there are four cracks, the longest measuring about three feet, being five inches in depth."

AURORA BOREALIS.—It is over forty years since the writer witnessed an isolated auroral belt of equal brilliancy with that of March 13th last. On that former occasion the band of light, about the same width as on the recent appearance, was very definitely jagged and angular in form, much more so than on this recent occurrence. On Wednesday, March 13th, 1895, the auroral light was visible in the North of England, at about 8.30. the colour whitish and not much movement. At about 10 p.m. the great belt of the aurora formed and spanned the heavens, passing within about seven degrees of the zenith, on the south side; it had a gradually widening form, increasing from horizon to zenith. The western limb sprang from a point near the arm of Orion. The line was continuous, and the light strongest in the upper part. It was not a symmetrical arc like the bands of the great dome-like converging auroras, but presented an angular divergence, small certainly, but distinct. The two most curious features of this rare appearance were the feathering or "herring-bone" processes of light which formed upon *one side* of it, almost entirely on the northern side, and the balls of light which travelled rapidly along its course. I think it is important to note, as bearing on the hypothesis of connection with clouds, that these balls of light travelled definitely along the line of the band without passing off its sides. The wind, in the upper sky, was apparently from the west, so the singular spectacle was observed of dark patches, evidently some form of hazy cloud, travelling along the belt in a direction exactly opposite to the balls of light. I believe that these balls of light had a greater elevation than the band itself. They were not waves as in the great auroras of 1868 and 1869. The feathering processes had a relation of radiation to a point near the summit of the arc. They moved visibly, lifting from the sides of the band as if approaching a parallel. It is well known that in the great dome-shaped auroras, the belts, which widen towards the horizon, meet at a point not far from the zenith. Several forms of cirrus cloud were represented in this last aurora, notably the small patches lying nearly parallel and popularly termed "hen-scarts." This recent manifestation has evoked some amusing and curious folk-lore comments among country people, and sailors of Maryport termed it "Sailor's Belt," forecasting storms in consequence. The colour of this belt was chiefly a creamy white; the edges, which showed linear strips as well as radiating processes, being marked by a strong red in certain parts. I enclose sketch (*see* page 50) of processes.—(*Rev.*) *Samuel Barber, West Newton Aspatria; March 14th*, 1895.

# ZOOLOGY

Erebia epiphron, var. Cassiope, in Ireland.—After forty years this mountain butterfly has again been taken in Ireland. The lucky captor was the Rev. R. A. M'Clean, who found it at Rockwood, near Sligo, during the summer of 1894. As this locality is about fifty miles from where the late Edwin Birchall took a fine series in 1854, it seems as though the butterfly only needed working for to be fully established again in the Irish fauna.

Early Butterflies.—Last week (February 28th) I saw a common white butterfly flying about in this district (Bangor, co. Down). The day was by no means warm, and the snow had melted away only a day or two previously. A gentleman also informed me he saw one flying about near the end of January. What with early records of flowers out in bloom and insects on flight, which have of late years been recorded fairly often, it appears to me that both animals and plants are gradually accommodating themselves to live in a climate which has, during the past years, become so changeable as our British one, and that we may expect each year still more marked progress in the same direction.—*J. H. Barbour, Queen's College, Belfast; March*, 1895.

Rare Lepidoptera in South Essex.—In consequence of reading a paper upon the entomology of the Essex side of the Estuary of the Thames, by Mr. John T. Carrington, in his series of "Localities for Beginners," published some years ago in the "Entomologist," when he was Editor of that magazine, I have paid some attention to the district. The result has been most satisfactory, for I have been enabled to add to my collection many rare or local species of lepidoptera, such as *Hesperia lineola*, our new skipper butterfly, being among its first captors; *Bombyx castrensis; Phorodesma smaragdaria*, so long one of our greatest rarities; the scarce *Epichnopteryx reticella*, which is one of the most elegant but difficult moths to capture; the new *Gelechia suædella* and many other species of interest.—*F. G. Whittle*, 3, *Marine Avenue, Southend-on-Sea; March 6th*, 1895.

Warning Colours and Mimicry.—Professor Felix Plateau, in the most recently issued part of the "Mémoires de la Société Zoologique de France," gives the results of his experiments to ascertain whether the Magpie moth is really, as has often been stated, an example of what is termed "warning colour." This daring Professor actually himself ate a number of caterpillars and found that the flavour was very pleasant, reminding him of almonds. It would indeed be well if all the examples of "warning colouration" were subjected to as careful an examination. Equally cautious also should naturalists be before accepting examples of "mimicry" among animals and plants. In some cases the so-called "advantageous mimicry" falls to the ground, for the insect which is supposed to imitate one of its fellows appears at quite a different time of year from it.—*H. C. Fyfe, Kensington.*

Planorbis nautileus in Surrey.—I can add another locality for *P. nautileus* in Surrey (*vide* Science - Gossip, Vol. i. N.S., p. 45). I have specimens which were found in one of the smaller ponds in Richmond Park.—*W. J. Lucas, Gordon Road, Kingston-on-Thames.*

Mortality of Mollusca by Frost.—The long and continuous severe weather of the past winter months has been very destructive to the terrestrial mollusca of the district around Folkestone. *Helix aspersa* and *Cyclostoma elegans* being, so far as I have noticed, the greatest sufferers. Of the former, whole colonies, numbering scores of individuals each, have been totally destroyed by the frost, and the number of broken shells in the hedge banks demonstrate the vast destruction caused amongst this species by hunger-driven birds. Of *Cyclostoma* I dug up hundreds on Saturday, 16th of March, and fully ninety per cent. were dead. Whilst searching for the last-named species I came across many colonies of hibernating *Zonites nitidulus*, clustered together as is the custom with *H. aspersa*. They were at least two inches below the surface. On the same date several tortoise-shell butterflies and honey - bees were noticed feeding on the newly expanded celandine blossoms.—*Captain W. J. Farrer*, 86, *Coolinge Road, Folkestone; March 18th*, 1895.

Aquaria and Frost.—I lost the contents of my aquarium from frost three times, during comparatively mild winters; so I had it bricked round and under the zinc tank, forming a hollow cell 3-ft. × 2-ft. × 1-ft. 3-in., into which I inserted a small lamp, costing 1s. 3d., through a sliding panel in the room, and put a thick rug round the outside. The window faces NN.W., an extremely cold aspect. The last has been one of the severest winters on record, but my aquarium has only been frozen over one night; the following morning I increased the size of the flame a little, which had the desired effect of thawing. At the present time, my animals and water-plants are quite healthy, and I have an abundant supply of micro-organisms for this time of the year. Last summer I frequently found *Volvox globator* and *Hydra viridis* in it, and the stickleback nursery was a source of great interest; unfortunately, I broke the glass that I transferred the young ones to when they were about three months old, and consequently they were lost.—*F. Harrisson, Holly Grove, Cheadle, Stoke-on-Trent: March*, 1895.

Gulls in London.—On a small wharf just above Blackfriars Bridge, on February 11th, there was a number of large gulls; they were about the size of a small goose. I made them out to be the herring gull, *Larus argentatus*. It was noticeable that none of the smaller species were with them, probably because the larger gulls are of a predatory disposition, and apt to steal food from any of their smaller relations who may be unable to resist; but just beyond, in a piece of clear water, there were immense numbers of the smaller kind—*Larus ridibundus*, I think,—besides many flying about and perched on the ice. There was a more than liberal supply of food, which lay about and floated on the water in all directions, and yet, it was singular to observe that, if a gull seized anything freshly-thrown, it was immediately surrounded by a crowd of others who fought with it and each other, and attempted to take the piece away. This was quite unnecessary because of the quantity all round to be had for picking up, and was probably a habit acquired owing to the scarcity of provisions under their normal conditions, when food has to be sought and fought for. The birds varied considerably in their plumage, perhaps through differences of age, but, so far as I could judge, were only of the two species mentioned. At a later date, when the weather was milder, I saw only the smaller kind, the others having all disappeared.—*Jas. Burton*, 90, *Theobalds Road, London, W.C.*

THE COURTING OF ANIMALS.—This subject seems to prove attractive to many naturalists. In vol. x. of the "Transactions of the Wisconsin Academy of Sciences," there is a highly interesting paper by Mr. and Mrs. Peckham on the "Courtship of Certain Spiders." It seems to be the case that the sharpness of vision in spiders is accentuated by love. A male of *Satis pulex* was put into a box in which was a female of the same species twelve inches away, and the male "perceived her at once, lifting his head with an alert and excited expression, and went bounding towards her." By experiments it was proved that this recognition was really due to sight. These results are interesting because some have affirmed that spiders cannot see nearly as far as twelve inches. Further experiments seem to show that spiders can differentiate colour. M. Racovitra, a Roumanian naturalist, has been studying the courting and marriage customs of the octopus, and in a recent number of the "Archives de Zoologie Expérimentale," he gives us some of his observations. It is satisfactory to know that the octopus does not, as some have thought, behave brutally in its love affairs. M. Racovitza assures us that "there is nothing more than a courteous flirtation," and "that the male behaves with a certain delicacy towards his companion."

LOCUSTS IN LONDON.—Two locusts have been discovered in cauliflowers imported from Italy, on the premises of Messrs. Mash and Sons, at Brixton, on March 9th. The insects are precisely similar to that found under identical circumstances in February last year, of which a paragraph notice was printed in the March number of SCIENCE-GOSSIP, 1894. They are fine-looking, strong insects, the wings opening to five inches across, and the body being as thick as a lead pencil, the vigour of their jump is only comparable with the force of a stone from a catapult. One specimen, still alive, was exhibited at the South London Entomological Society's meeting on Thursday, March 14th, but although leaves of cauliflower have been placed in their boxes, they do not appear to nibble at them. The species was identified last year to be *Œdipoda tartarica*. There is a keel along the centre of the thorax and sundry longitudinal ridges on each compound eye, the under edge of the tibid is a lively red and the extended wing shows a large, smoky lunar shading. Each was found on turning back the enveloping green leaves of the vegetable, closely wrapped in and thus thoroughly protected from the weather, which has been exceptionally wintry, even on the shores of the Mediterranean. Those who know La Fontaine's fable of the Ant and the Grasshopper, on which the pretty opera, "La Cigale" was founded, and the sad fate of the grasshopper, which had spent the summer hours with music and frolic and provided no shelter against the snows of winter, unlike the laborious and provident ant, will appreciate the manner in which three individuals of the grasshopper family have improvised a winter harbour, which their instincts do not teach them to provide.—*H. A. Sauzé*, 4, *Mount Villas, Sydenham Hill Road.*

## NOTES & QUERIES

COLEOPTERA OF GLOUCESTERSHIRE.—Can any of your readers help me in the study of the Coleoptera of Gloucestershire? I should be glad to get specimens of beetles found in the county, and to know if a county list has appeared. For any help or advice I should be most grateful.—*C. Percival Wiseman, Painswick, Gloucestershire.*

EXCHANGING BIRDS IN FLESH.—Allow me to protest against an exchange which has appeared in this month's SCIENCE-GOSSIP. I refer to the exchange, headed "Birds in Flesh—wanted terns, gulls, etc." It is now the close season for the birds by Act of Parliament. This is encouraging an offence against the law, and also causing the destruction of some of our most valued birds, which have suffered quite enough diminution in numbers from the late frost, without a further premium being put upon their dead bodies by such an advertisement as this. I trust such an "Exchange" will never appear again in SCIENCE-GOSSIP, which has heretofore done much for the protection of our bird life. —*John R. B. Marefield, Rosehill, Cheadle, Staffordshire; March 8th*, 1895.

PSEUDO-ALBINO SPARROWS.—Is it possible that great terror and suffering may sometimes have caused the loss of colour in the feathers of sparrows and other birds? I can relate a fact which may, perhaps, be thought to bear on this subject. Many years ago a clergyman, well-known to me, had in his poultry-yard a cock entirely black. This cock one day invaded the trough of a pig, with thievish intentions. The pig seized the thief and nearly killed him. Their owner noticed, some months afterwards, that this black cock had become black and white. The following year the bird was entirely white. He moulted again; and the new feathers grew up, some black, some white. It was hoped that the fourth year might show the black plumage quite restored; but, unfortunately, before the moulting season came round again, the cock was dead.—*Mrs. Dickson, The College, Ely; March 7th*, 1895.

PSEUDO-ALBINO SPARROWS.—Mr. K. Hurlstone Jones, under this heading, asks (*ante* page 9) the question, "If pseudo-albino varieties have changed at some time in their existence later than their fledging, how did they get rid of the melanin granules from their feathers?" This last question is complicated by the fact that there is no circulation in the plumules of the feather or in the shaft. But is this so? I am inclined to a different opinion, for the following reason. Many years ago, at the Cape of Good Hope, a hunter, wishing to discharge his muzzle-loading "Roer," charged with buckshot, fired wantonly at a "Caffir-fink" (*Loxia capensis*) in his full breeding livery of velvety black, with yellow satin rump and shoulders. One shot alone struck the unlucky bird, entirely cutting off the half of the wing. Finding the bird otherwise uninjured, we called it "Nelson" from its one-armed condition, and placed it in my "table-aviary," a large cage built on a table, and kept in my dining-room, so under constant observation. He soon became perfectly tame, and was very amusing. When the winter came on, I remarked that though "Nelson" was assuming the grey sparrow-like plumage of that season, there were no black feathers about the cage. Examination showed that he got rid of the melanin granules from his feathers in some way unknown to me, I concluded from want of vital power. When spring returned, he moulted, but not all his feathers, and we distinctly saw the change in his plumage, to be more precise, in his feathers, from the brown, to the black of the nuptial garment. I attributed this to an access of vitality, which then came on with the breeding season. Surely this indicated blood circulation in the feathers. I have at this moment a great pet, a little common red-pole linnet, taken from the nest. He has been with me for two breeding-seasons, and yet for want of the excitement of the presence of a female of his own species, the breeding force has not been developed, and he has never assumed the brilliant plumage of the season. Surely the assumption of the breeding-plumage shows that there must be some circulation. "Nelson" lived with me several years, and we always noticed the gradual change in coloration of the feathers each year. Poor fellow! His fate was a singular one. In the same aviary with him, among other birds, was a pair of the hanging-nest-builders (*Hyphantornis capensis*)—the birds that weave the wonderful retort-shaped nests from the outer fibres of the aloe leaves. To amuse them we gave them bits of thread, etc., which they wove into the bars of one end of the cage, making an impenetrable, unpickable mass. One unlucky day they got hold of a very long thread, which they fastened by the two ends to the roof of the cage, just over a perch, thus forming a loop into which poor "Nelson" got his head, and, struggling to extricate himself, twisted it tight round his neck, and I found him in the morning strangled.—*E. L. Layard, Otterbourne, Budleigh Salterton.*

Reptiles in Captivity.—My fernery may almost be considered a vivarium for reptiles of various kinds. I have no surer harbinger of Spring than the yellow bespangled and much-abused salamander. Several of these have made their appearance during the past week from the holes and crannies in the rockery work, whilst now the Grecian firefrog the Italian green-tree frog, the natterjacks and toads, have made their appearance, and with the continuance of the warm and genial sunshine, the whole fernery will soon re-echo with the musical love-notes of these various reptiles. I have sometimes kept the tree-frog in large numbers, and during the breeding season (although they have never bred with me as yet), their cheerful chirrup has been so loud as to be heard a long way off, and many that have escaped from captivity have disclosed their whereabouts by their voices. Owing to the heating apparatus being out of order I had several degrees of frost in my fernery during the winter, and I am much afraid many of my scarcer reptiles will have succumbed to the cold. One warm day in February a large and savage African lizard came out of its hiding-place in a semi torpid condition, and advantage was taken of its torpidity to capture it and send it away, as I found when too late last year, that these larger reptiles devoured the smaller ones with a most ravenous appetite, and by the rapidity of their movements no ordinary frog or toad or newt had a chance of escape. I hope this season to take special note of the breeding of the salamander, and if I have anything new to report, I will at once write to you.—*Henry J. Barber, Brighouse, Halifax.*

# TRANSACTIONS

Royal Meteorological Society.—At the Meeting of this Society on March 20th, Mr. W. N. Shaw, F.R.S., delivered a lecture on "The Motion of Clouds considered with reference to their mode of formation," which was illustrated by experiments. The question proposed for consideration was how far the apparent motion of cloud was a satisfactory indication of the motion of the air in which the cloud is formed. The mountain cloud-cap was cited as an instance of a stationary cloud formed in air moving sometimes with great rapidity; ground fog, thunderclouds, and cumulus clouds were also referred to in this connection. The two causes of formation of cloud were next considered, viz. (1) the mixing of masses of air at different temperatures, and (2) the dynamical cooling of air by the reduction of its pressure without supplying heat from the outside. The two methods of formation were illustrated by experiments. A sketch of the supposed motion of air near the centre of a cyclone, showed the probability of the clouds formed by the mixing of air being carried along with the air after they were formed, while when cloud is being formed by expansion, circumstances connected with the formation of drops of water on the nuclei to be found in the air, such as dust and smoke, and the maintenance of the particles in a state of suspension, make it probable that the apparent motion of such a cloud is a bad indication of the motion of the air. After describing some special cases, Mr. Shaw referred to the meteorological effects of the thermal disturbance which must be introduced by the condensation of water vapour, and he attributed the violent atmospheric disturbances accompanying tropical rains to this cause. The difference in the character of nuclei for the deposit of water-drops was also pointed out and illustrated by the exhibition of coloured halos formed under special conditions when the drops were sufficiently uniform in size.

City of London Entomological and Natural History Society.—At the Meeting of March 5th, 1895, it was announced that the Coleoptera section of the "London Fauna List," which this Society has undertaken to draw up, has been compiled by Mr. H. Hensler in a masterly manner, and is now in the Society's library in manuscript form. Its magnitude may be estimated when it is known that it contains records of more than half the total number of species of British beetles, with particulars as to localities and methods of capture. Its only weakness is the absence of records of the groups of beetles inhabiting ants'-nests. Notes as to any authentic captures of any of these species will, therefore, be gladly received and duly acknowledged by the secretary of the Society, London Institution, Finsbury Circus, E.C. Exhibits: Mr. Bell, a female specimen of *Argynnis adippe*, from the New Forest, having a portion of the right upper wing somewhat bleached, but otherwise perfect. Mr. Clark, a short series of *Cucullia graphalii* from the collection of the late Wm. Machin, who himself bred them from larvæ obtained at Sevenoaks. Mr. Southey, a specimen of *Smerinthus populi* having the right hind wing of a light cream colour. Mr. A. Bacot read an exhaustive and instructive paper on "The Genus *Smerinthus*."—Tuesday, February 19th, 1895. Mr. Clark exhibited a sooty black specimen of *Dicranura vinula*, which he had purchased at a recent sale at Stevens's. Mr. May, *Catocala nupta* from Tooting Bec Common, which had been relaxed slightly with damp sand and then with wood naphtha; one of the specimens had an unusually pale central blotch on each fore-wing, thus closely resembling its congeners, *C. promissa* and *C. sponsa*. Mr. Bacot; a bred specimen of *Nyssia hispidaria* having male head and thorax and a female body. On behalf of Dr. Knaggs, Mr. Clark exhibited a sample of a preparation of linoleum, which, on account of the closeness of its substance, is superior to cork for setting boards, etc.; also samples of the new "nickel pins" by Messrs. Deyrolle, of Paris. Some of these had been exposed to the vapour of butyric acid and were covered with a greenish coating akin to, and resembling verdigris. This showed that there was a good deal of copper in the so-called "nickel pins," the green substance being butyrate of copper. Dr. Knaggs also sent for distribution some of his own "sulphuretted" pins, which are the ordinary white ones dipped first into a nitrate bath and then into hydrosulphate of ammonia. These pins are considerably hardened by the process and are not liable to verdigris.—*C. Nicholson, A. N. Battley (Hon. Secs.)*

The South London Entomological and Natural History Society.—February 28th, 1895. Mr. T. W. Hall, F.E.S., President, in the Chair. Mr. Beauman, 18, Victoria Road, S.W., was elected a member. Mr. Edwards exhibited larvæ of the Dipteron *Eristalis tenax*, L., found in some water in the stump of an old apple-tree. Mr. Adkin exhibited a series of *Crambus ericellus*, from Sutherland. It was stated that this species differed from *C. pascuellus*, in always having the silvery stripe narrow and even. Mr. Mansbridge, the skin and rattle of a rattlesnake from the Indian Territory, U.S.A., and referred to the habit of these reptiles of swimming the Mississippi, and hibernating in the "cluffs" on the eastern shore. Mr. Tutt, continental specimens of *Xanthia ocellaris*, and pointed out the features distinguishing it from *X. gilvago*, viz.—(1) the lower part of the reniform stigma was white, (2) the nervures were well dotted with white scales, (3) the apex of the wing was different. Mr. Tutt also read a paper, entitled "*Lithosia lutarella*, L., and its varieties," illustrating it by a magnificent series from Deal and the Alps. —March 14th, 1895. T. W. Hall, Esq., F.E.S., President, in the Chair. Mr. B. G. Rye, of Fulham, was elected a member. Mr. Frohawk exhibited a magnificent and long bred series of *Vanessa c-album*, showing both light and dark forms of male and female from one batch of ova. A discussion ensued in which it was suggested that the pale form was the one which produced a second brood, while the dark form went early into hibernation. Mr. Adkin, a series of *Melanippe hastata*, from Sutherland, intermediate in colouration between the usual southern and northern forms. Mr. Sauzé, a specimen of a south European locust, *Ædipoda tartarica*, taken among imported garden produce at Brixton. Mr. A. Hall, a Pierine butterfly, *Ithomia patilla*, with Danaine mimic *Dismorhpia fortunata*, from Nicaragua. Mr. Edwards four varieties of the female of *Papilio memnon*, *P. segonax*, *P. westwoodii*, two *P. epycides*, two *P. anticrates*, and *P. pammon* var. *javernana*. Mr. Adkin, on behalf of Mr. South, read a paper on "Nettles." It was announced that on May 9th, Mr. Mansbridge will read a paper entitled "Prairie Insects." May 18th, Field Meeting at Bookham and Ranmore, conducted by Messrs. Carpenter and Henry J. Turner. Whit Monday, Field Meeting at New Forest (an endeavour is being made to have a three days' excursion). June 29th, Field Meeting at Oxshott and Esher, conducted by Mr. Adkin.—*Hy. J. Turner (Hon. Report. Sec.).*

Norfolk and Norwich Naturalists' Society.—A meeting was held on February 25th, at the Castle Museum, Mr. T. Southwell, F.Z.S., in the Chair. The Chairman reported that the sub-committee appointed to consider the resolution submitted to the society from the Wild Birds Committee of the County Council had met and drawn up a report, which he read to the meeting, recommending that the whole of the foreshore from Wolferton Creek to the eastern boundary of the parish of Stiffkey should be scheduled under the Wild Birds Protection Act of 1894, thereby rendering it illegal to take or destroy the eggs of any wild birds nesting in that area; they also recommended that certain named species, on account of their usefulness to man or increasing rarity, should likewise be protected by name. This report, the chairman said, he had presented to the Committee of the County Council on the 23rd inst. He had also presented a memorial from the owners and residents in the neighbourhood of Hickling, Somerton, Martham, Horsey, Ormesby, Rollesby, and Filby Broads, and the lowlands adjacent, praying that an application might be made to the Secretary of State for an Order prohibiting the taking or destroying of the eggs of any wild birds nesting in those districts between the 1st day of May and the 1st of August in any year, Both these reports, he said, had been favourably received by the committee, and he had reason to believe that their adoption would be recommended to the County Council. Mr. J. H. Gurney read a paper on the recent abundance of the Little Auk (*Mergulus alle*) in Norfolk, in the course of which he said that from various sources he had received reliable information of 277 of these dapper little sea-birds being picked up dead or alive, and, in a few cases, shot. Two of them were sent to the Zoological Gardens, by Col. Feilden and Mr. le Strange, but soon died there. The strange places in which these most involuntary migrants were found, included the roof of a stable, farm premises, a rector's kitchen, St. Stephen's Street (in Norwich), and Chapelfield. The Rev. Mr. C. H. Bird sent a "Note on the Water-rail" (*Rallus aquaticus*), in which the great difference of size between individual specimens of this bird was noticed. Axillary feathers of the two birds were shown, for comparison. The feathers on the forehead of each were, apparently, interspersed with little, black, horny processes. The microscope showed that the terminal points of these feathers were not those of ordinary feathers, abraded by constant contact with vegetation, but that the rachis was gradually enlarged from where the rami ended, and then again contracted so as to present the appearance of semi-transparent Indian club-shaped vessels. Measurements of two of the birds were given. A letter from the President, Dr. Plowright, on luminosity in decaying wood, was read by the Hon. Secretary. Mr. W. A. Nicholson (Hon. Secretary) read a short paper advocating the establishment of a freshwater biological station on the Norfolk waters. The freshwater fauna and flora of Norfolk offer a wide field for biological study, waiting to be opened up.

# NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

SUBSCRIPTIONS.—Subscriptions to SCIENCE-GOSSIP, at the rate of 6*s.* 6*d.* for twelve months (including postage), are now due.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid.* Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

ALL communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to JOHN T. CARRINGTON, 1, Northumberland Avenue, London, W.C.

## CORRESPONDENCE.

FRANCIS HOLT (Accrington).—Uva grass is *Gynerium jubatum.*

CHARLES THOMAS (Birmingham).—(1) *Mamestra brassicæ;* (2) *Boarmia gemmaria (rhomboidaria);* (3) *Gonoptera libatrix;* (4) *Odontopera bidentata;* (5) *Triphæsa dubitata;* (6) *Acidalia aversata;* (7) *Apamea didyma.* Try to find some one in your district to help you and collect with.

FRANK BROWNLOW (Bournemouth).—The case is of the larva of the moth *Psyche villosella*, a local species frequently found near Bournemouth among heather, but feeds on lichens. We could not find any other larvæ in tin.

T. H. BARBOUR (Belfast).—*Alisma plantago* and "Calvary clover" (*Medicago echinus*).

A. LOYDELL.—A list of land and freshwater mollusca of East Sussex may be obtained from the author, J. H. A. Lewis, Esq., 4, East Street, Lewes; price about sixpence, to cover printing, postage, etc.

## EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

WANTED, foreign land and freshwater shells in exchange for same; correspondence invited, and lists sent on application.—E. L. Layard, Budleigh Salterton.

WANTED, SCIENCE-GOSSIP, No. 169 (January, 1879) or No. 301 (January, 1890) in exchange for No. 242 (February, 1885) with plate; also wanted to purchase, volumes of same for any of the years 1874, 1875, 1883, 1884, 1893 and 1894, unbound preferred.—J. G. Brass, Barnard Castle.

MICROSCOPIC cabinet, mahogany, dust-proof, lock and key, brass handle, 9 partitioned drawers, each to contain 12 slides, cost last year £2 10s.; price £1 5s., or exchange for Cathcart's improved freezing and embedding microtome.—C. Lance, Brislington House, Bristol.

TERTIARY and other fossils offered for other fossils or recent shells.—Rev. John Hawell, Ingleby Greenhow Vicarage, Middlesbrough.

OFFERED, Purbeck and other fossils. Wanted, rare British or foreign recent shells.—J. E. Cooper, 93, Southwood Lane, Highgate, N.

NUMBER of species Achatinella from Hawaiian Islands for other species foreign land shells not in collection, and set of Clausilia bidentata var. Cravenensis (Taylor) for any good specimen foreign land shell.—T. Rogers, 27, Oldham Road, Manchester.

WANTED, Natural History and scientific books or electrical apparatus. Offered, "Strand Magazine," vol. 4 (rare), in splendid condition, with case for binding.—R. F. McConnell, 19, Ash Grove, Cricklewood, London, N.W.

DUPLICATES.—Actaeon, adonis, ægon, edusa, semele, galathea, sibylla, Paphia adippe; desiderata, blandina, cassiope, w-album, hyale, athalia, c.-album, alsus. Date and locality of capture required.—S. Humphreys, 5, Regent's Terrace, Bournemouth.

SCIENCE-GOSSIP, 300-313; "Amateur Naturalist," vol. ii., 13-18; "Field Club," vol. iii., 1-7; "The Garner," 59-68. What offers, or books on photography.—B. T. Bonser, 29, Highbury New Park, London, N.

WANTED, Newman's "British Moths," Staveley's "British Insects," "English Ants" by Rev. W. Gould (pub. 1747).—G. H. Kenyon, Oak Bank House, Eccles, near Manchester.

WANTED, live adders, smooth snakes and foreign reptiles, also preserved larvæ and dead pupæ; exchange birds' eggs, butterflies, books and pigeons.—J. Nicholson, 38, Brighton Terrace, Brixton.

OFFERED, tooth of Elephas primigenius and other fossils, which were dredged from the North Sea, purchased of Lowestoft fishermen. Wanted, coloured illustrated work on British wild flowers.—E. A. Mart n, Ravenswood, Thornton Heath.

OFFERED, SCIENCE-GOSSIP for 1894, complete, 12 parts, in exchange for recent book on British Mollusca (suitable for identifying the species) or book on grasses.—C. Elliott, Giles Gate Moor, Durham.

BRITISH and foreign shells, minerals, fossils, polished geological specimens, micro. objects, slides, etc.; also to offer SCIENCE-GOSSIP, 1888-92, 60 numbers. Offers.—A. J. R. Sclater, Northumberland Place, Teignmouth.

OFFERED, "Young Man," 1894, unbound; "Romance of Natural History," first and second series. Wanted, butterfly-net, unbound volumes "Entomologist," SCIENCE-GOSSIP, or others.—A. Cockburn, jun., St. John's Cottages, Montrose.

CLUTCHES.—Osprey, red-shouldered buzzard, mottled owl, killdeer plover, Bartram's sandpiper, American bittern, American widgeon, downey and hairy woodpeckers, etc.—Robert Williams, Croase House, Kingsland, R.S.O.

OFFERED, 2 vols. SCIENCE-GOSSIP, with plates, bound, and a few well-mounted tooth sections. Wanted, Vol. 28 of SCIENCE-GOSSIP and specimens of Anodonta cygnea and U. margaritifera and other shells not in collection.—Jas. C. Blackshaw, 158, Penn Road, Wolverhampton.

WANTED, clean gatherings of freshwater or marine diatoms, must be in a healthy living condition; good exchange offered in selected or shewn slides of diatoms.—J. B. Bessell, F.R.M.S., 8, Elmgrove Road, Cotham, Bristol.

OFFERED, marine dredge frame, 18 inches by 6 inches, steel sides, brass ends, galvanised, new. Wanted, books on political economy or geology.—W. H. Johnson, 9, Wellington Terrace, Preston.

WANTED, British dragon-flies or Diptera (named) for micro. slides of rocks and minerals and micro. lantern slides.—John Mearns, 52, Jasmine Terrace, Aberdeen.

WANTED, British birds' eggs in exchange for 250 mixed foreign stamps and stamp album, containing small collection of stamps, suitable for beginner.—W. A. Nicholson, 39, Tower Street, Portobello, Scotland.

GEOLOGICAL MAPS.—Wanted, sheets 70, 83 and 84 of the Geological Survey, with or without descriptive memoirs.—John H. Cooke, 123, Monk's Road, Lincoln.

DUPLICATES.—Pictaria, Notata (a few), Castigata, Subnotata, Pulchellata, Debiliata, Geryon, Xerampelina, E. fulvago, Advena, Tincta; desiderata, Arion, Sphegiformis, Strigula, Fascelina, Degeneraria, Immorata, Virgaureata, Valerinata, Expallidata, Campanulata, Quadrifasciaria, Picata, Fluviata, Obliquaria, Nubiculosa, Ochroleuca, Lutulenta, Contigua, Genista, Asteris, Chamomillæ, Peltigera.—J. C. Moberley, 9, Rockstone Place, Southampton.

DUPLICATES.—Edusa, *C. album, Adonis, *Lonicerae, Tipuliformis, Prunaria, *Lunaria, *Illunaria, Zonaria, *Hirtaria, Punctulata, Taminata, Gilvaria, Boreata, Hexapterata, Juniperata, *Russata, *Spartiata, *Dromedarius (southern), *Dictæa, Nictitans, Australis, *Persicariæ, Valligera, Tritici, Populeti, Lunosa, Gilvago, Xerampelina, *Affinis, Pinetellus, Contaminellus (true), *Kuhniella, *Branderiana, Uncana, Monticolana, *Gigantana, etc. (* bred). Desiderata, Rubricata, Plumaria ♀, Ruberata, Chaonia, Unanimis, Occulta, Melanopa, and many others.—C. Fenn, Evenden House, Burnt Ash Hill, Lee, Kent.

DUPLICATES.—Clutches of thick-knee, nightjar, nightingale, redstart, tree-sparrow, tree-pipit, red-legged partridge, tern, crested grebe, etc.; desiderata—clutches of grouse, dunlin, sandpiper, dipper, swift, kingfisher, pied flycatcher, grey wagtail, quail, corncrake, sea-birds (except black-headed gull and tern).—F. Norgate, 98, Queen's Road, Bury St. Edmund's, Suffolk.

MICRO. SLIDES.—A few good slides for sale or exchange for other slides, on approval.—C. Lance, Brislington House, Bristol.

DUPLICATES.—Sybilla, Blandina, Antiopa, Io, Cardui, Galathea, Tages, Thumas, Monacha, Carpini, Autumnaria, Illustraria, Versicolora, Carpini, Philanthiformis; desiderata, Epiphron, H. Comma, or stamps.—A. H. Blake, High Street, Biggleswade, Beds.

DUPLICATES.—Aphelocheirus æstivalis, in spirit (Hemipteron), larvæ of Orichalcea, prehistoric stone implements; desiderata—rare and local Macro-Lepidoptera (British localities and black pins), Sicula, Cassinea, Nubiculosa, Versicolor, Fluctuosa, Cinerea, Depuncta, Sobrina, Alpina, Xerampelina, Albinacula, etc.—F. Norgate, 98, Queen's Road, Bury St. Edmund's, Suffolk.

# NOTE ON MELICERTA RINGENS.

By W. H. Dallinger, LL.D., F.R.S., F.R.M.S., etc.

THIS small and beautiful denizen of our ponds has become so familiar an object to the amateur, and has so long commanded the interest and close observation of the student, that it may fairly be supposed nothing short of prolonged and systematic study could tell us more concerning it, than from so many contributors is now known. Apart from the beautiful results obtained by the insight and patient researches of Gosse (1) confirmed and enriched by scores of subsequent observers, it may be doubted if anything more thorough could be done than that by Mr. Charles Cubitt (2) and Judge Bedwell (3), on the characteristic and really wonderful features of this rotifer, all of which has been carefully considered and analysed by the chief authority on this subject, Dr. C. T. Hudson (4).

Nor is there any claim in this note for the addition of any fact to our previous knowledge, it is simply a demonstration of the manner in which a detail familiarly known to be constantly carried out, is accomplished.

No greater perplexity presented itself to the earlier microscopists in the study of this and similar forms, than the extreme limits of space involved in the use of objectives of considerable magnifying power. These frequently rendered certain actions of the organism impossible, or only to be studied when a happy coincidence gave the patient enquirer the fortunate opportunity he could never arrange for himself. Or else, as not infrequently happened, led a vigorous animal under constrained conditions to perform partially or imperfectly a distinguishing habit.

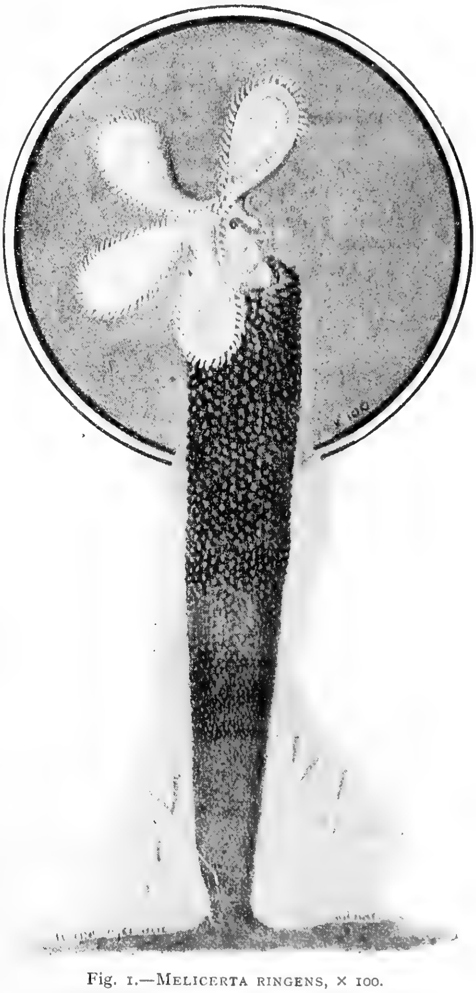


Fig. 1.—Melicerta ringens, × 100.
(*Drawn from nature by Dr. Dallinger.*)

We are relieved largely in this matter by the large advantages of the apochromatic system of objectives and their accompanying compensation eye-pieces, a system which, as is now well known, provides such perfect chromatic and spherical correction that the aerial image may with constantly improved revealing power, be magnified to a limit never before attainable by the eye-piece. The result is that we can obtain increasing power while we leave the focal distance unaffected.

It is well-known that beyond the axial portion of the visual "field" certain colour defects are inevitable; they arise from the chromatic difference of the magnification, and this may be the case although the centre of the field may be perfectly achromatised. The differently coloured images produced by refraction, and which unite to form the one visual image, are differently magnified, that is of different dimensions. The red image is the least, the blue image the greatest.

The apochromatic system corrects the primary and secondary spectra; there is, however, still chromatic error remaining, but the "apochromatic" system involves such a construction of the eye-pieces that they shall possess an equal error of the opposite kind. The image formed by the red rays is greater than that corresponding to the blue rays. In this way, perfect compensation is secured, and the image being unconfused by different foci may be (relatively) greatly magnified, and as the eye-pieces are so arranged that the lower focal point in every eye-piece lies in the same plane when they are in their places in the tube, no change of focus is involved, although we secure true and accurate increase of magnification.

Thus, if we use say a 24·0 mm. objective—what we have so long called a one-inch power—its initial magnification will be 10·5. No. 1 compensation eye-piece will give that only without magnification. But the eye-pieces are arranged in series, and are marked with the number of times they magnify this initial magnification. Thus, if we use an initial magnification of 10·5 and an eye-piece numbered 4, it brings the magnification to forty-two diams.

Now we can, with quite satisfactory results, magnify by the eye-piece an inital power of 10·5 in the objective to 280 diams., and as this leaves the focus unaffected for practical purposes, it gives us a means of research on certain objects which we had not within our reach before.

For many years the habits and activities of *Melicerta ringens* have afforded me the keenest pleasure and interest, and to many of these I have applied with admirable results the advantageous properties of the apochromatic system; and there is one point in which it has yielded an interesting result.

In the summers of 1893 and 1894, I was fortunate enough to come upon an exceedingly abundant supply of these organisms, and they were not only very plentiful but extremely vigorous; moreover, many of them were evidently of greater age than those I had usually seen. This was manifest in the great comparative length of some of their tubes, and the remarkably graduated sizes the pellets presented from the base to the top edge; also in the confluence or "weathering" of these in the lower and middle rings, and in the numerous growths of algæ, diatoms, conferva, and other things upon the tubes.

An average one drawn from life is shown in fig. 1. The intense and rapid action of the cilia arrested even an eye familiar with the object; and the lobes assumed a great variety of soft and beautiful curves, not unusual but never so frequently seen before. A very common one of these is shown in the illustration.

It is not too much to assume that the readers of this journal are familiar with all the actions of this beautiful rotifer as a brick-maker and a tube builder. It is familiar to all that by the cilia about the edge and upon the bosom of her petal-like lobes she obtains a vertical stream of particles which are with wonderful delicacy separated into material serving for food and material serving for the manufacture of the pellets, which are afterwards used as "bricks" to build her tube in a succession of rings. We may perhaps be pardoned none the less for borrowing a figure from Dr. Hudson (fig. 2) which shows the cilicated lobes, the "chin" (CH), the pellet in its mold or cup (PM), and the antennæ (AN).

Mr. P. H. Gosse says: "Below the larger petals (that is, on the ventral side) there is a projecting angular chin (CH, fig. 2) which is ciliated; and immediately below this is the little cup-like organ . . . . a small hemispherical cavity. . . . . On my mixing carmine with the water the course of the ciliary current was readily traced, and formed a fine spectacle. The particles are hurled round the margin of the disc until they pass off in front through a great sinus between the larger petals. . . . . If the atoms be few, we see them swiftly glide along the facial surface, following the irregularities of outline with beautiful precision, dash round the projecting chin (CH, fig. 2) like a fleet of boats doubling a bold headland, and lodge themselves one after another in the little cup-shaped receptacle beneath (PM, fig. 2). . . . . The contents of the cup are whirled round with great rapidity" (5), and become the bricks or pellets with which the tube is built.

Now the fact that these pellets or "bricks" were deposited in rings, constituting the familiar tube, is a mere common-place of the natural history of minute life. In his first and most original paper, Mr. Gosse, having seen the brick produced, says: "I now watched the animal with eager expectation, and presently had the satisfaction of seeing it bend forward its head, as I had expected, and after a second or two raise it again, when I saw that the little cup had lost its contents. . . . . This process I saw repeated many times in succession, until a goodly array of pellets were laid . . . . but very irregularly" (6).

Again, in regard to a young melicertan, "A pellet was quickly formed and instantly deposited at the foot; the same operation was repeated with energy and industry, so that in a few minutes a row of pellets were seen forming a portion of a circle around its foot-base" (7).

Again, the pellet having been formed, "Suddenly now we see the animal bend itself forward, till the cup is brought into contact with the upper edge of the case, it remains so bent for an instant, and then as quickly resumes its upright position. *The cup, however, is now empty; for the consolidated pellet . . . . has been left on the edge of the case*" (8).

In the same way that most careful and acute observer, Judge Bedwell, tells us in regard to the deposit of the "brick," that "It does it so quickly, that before you have got over the agitation and surprise which its unexpected and rapid change of position causes you, the act, like a conjuring-trick, is over, and the animal is in its old position again, with an empty pellet organ hard at work at a new brick" (9).

It will of course be clear, and is fully known to every observer, that it must be a matter of difficulty to see distinctly what are the *details* of this bricklaying, effected, as it is, so rapidly. The prime elements of success are sharpness of definition, with sufficient magnification, and ample room for the activities of the rotifer.

With plenty of vigorous specimens in full activity, and by happy incidence, one well-placed and building, taking a 24·0 mm. objective, we may commence with the initial magnification of the lens (10·5 times), and we may go on to 250 or more diameters without change of focus or disturbance of the object; and by patience and repeated observation, we may at last observe all the simple details of the placing of the brick.

Fig. 2.—M. RINGENS, showing the ciliated lobes, the chin (CH), the pellet in its mold (PM) and antennæ (AN).
(*Copied by Dr. Dallinger from figure by Dr. Hudson.*)

Judge Bedwell made the observation that a small pimple-like protuberance armed with setæ and lying between two hooks, on the opposite side of the cup in which the brick is made, possibly determine the *place* in which the brick is to be deposited; for "when the pellet is ready the animal *turns round* and deposits it at the spot with which this pimple . . . was in contact at the moment before the animal began to turn" (10).


Fig. 3.—M. RINGENS, in act of placing pellet, × 210.
(*Drawn from nature by Dr. Dallinger.*)

This is undoubtedly true; in the cases observed by him it may have been always true, but in the many observations made through two summers I found that it was never so with the first brick of a *new* ring, but with the exception of three instances was always the case with every other pellet of the ring. What happened is shown in fig. 3. The brick was ready, being always formed in from three to four minutes, then the rotifer twisted swiftly round about half the circumference of her tube, pressed the side of her body against the side of the tube she had just turned herself from, arched her body over, laid her antennæ parallel with each other and near enough to each other to form a sort of double rail or frame, down which the pellet could roll or slide, and guiding it to the exact spot to which it was destined to go. Then with the end of her "chin" she pressed it into position, much as, with a finger, we may press an electric knob, and then instantly rose, mostly turned rapidly to its former position, and again proceeded to the construction of another pellet.

When we remember that the dot of an "i" in this type will probably more than represent the superficial area occupied by the organism, all these refinements of operation must surely awake interest in the mind, and cause the least thoughtful to perceive that siz is merely a finite mental concept and in no way affects the perfection of the adaptations with which a living organism is endowed.

REFERENCES TO WORKS QUOTED IN THIS ARTICLE. —(1) Trans. Micros. Soc., vol. iii., 1852, p. 58; Quart. Journ. Micros. Soc., vol. i., 1853, p. 71; Pop. Sci. Rev., vol. i., 1862. p. 474. (2) Month. Micro. Journ., vol. iii., pp. 240–1; ibid, vol. v., 1871, p. 205; ibid, vol. viii., 1872, p. 8. (3) Month. Micro. Journ., vol. xviii., 1877, p. 214; J. R. M Soc., vol. i., p. 245. (4) J. R. M. Soc., vol. ii., 1879, p. 6; "The Rotifera," by C. T. Hudson and P. H. Gosse, two vols., 1886. (5) Tenby, pp. 314–315. (6) Trans. Micros. Soc., vol. iii., 1852, p. 62. (7) Quart. Journ. Micros. Sci., vol. i., 1853, p. 75. (8) Popular Sci. Rev., vol. i., 1862, p. 485. (9) Month. Micros. Journ., vol. xviii., 1877, p, 221. (10) Month. Micros. Journ., vol. xviii., 1877, p. 221.

*Ingleside, Lee, S E.; March 28th, 1895.*

# NOTES ON ARGON.

By J ALFRED WANKLYN and W. J. COOPER.

THE article on Argon in the March number of SCIENCE-GOSSIP is specially interesting to chemists who like ourselves have devoted many years and much labour to air and gas analysis.

The difficulties which beset this branch of scientific investigation are very great, and the number of experts who have attained eminence sufficient to give work of this kind the stamp of authority is extremely limited.

The scientific importance of the whispered discovery at the Oxford meeting of the British Association attracted us to the Chemical Section, and we were disappointed that the subject was not brought forward in the usual way for discussion, as several eminent foreign chemists were present, well-known authorities whose opinions would have carried much weight. We recognised especially Friedel from Paris, and Beilstein from St. Petersburg, also Caro from Mannheim.

Ample details have since been published, and these details together with Berthelot's experiments made upon Ramsay's Argon, enable us to criticise and examine the value of the work put forward. After a careful investigation we have arrived at the conclusion that the nature of the alleged new constituent of the atmosphere is far from being established, and that it is apparent that the atmosphere does not contain the one per cent. of Argon which was more particularly claimed by Lord Rayleigh.

One of the chief if not the chief result set forth by Rayleigh and Ramsay is a quantitative one. The new element, Argon, was declared to be present in atmospheric nitrogen to the extent of one per cent. by volume. Not a minute fraction such as the fraction of atmospheric carbonic acid, but a comparatively large fraction like the water in the atmosphere. Such Rayleigh and Ramsay say is the occurrence of Argon in the air.

When, however, we ask where is the experimental proof, we find only one solitary experiment which is of the most doubtful kind and has the further interesting peculiarity of proving too much.

The experiment to which we allude is Lord Rayleigh's, in which 6·3 litres of atmospheric nitrogen gave sixty-five cubic centimetres of gaseous residue left unabsorbed in the large flask in which the experiment was carried out. This volume of unabsorbed gas is about one per cent. of the quantity of atmospheric nitrogen taken for the investigation, and so far the result appears to be favourable. But when we reflect that the true yield of Argon is not only the volume of unabsorbed gas, but also comprises the gas held in solution by the large volume of liquid contained by the flask, the result appears in a very different light. Argon, we have been told, dissolves in water to the extent of about four per cent. Abundance of time was occupied by the experiment in order to permit of the Argon entering into aqueous solution. There is indeed a fair probability there was as much Argon held in aqueous solution in the flask as there was in the shape of gaseous residue. Thus it becomes manifest that the one solitary apparently favourable experiment proves too much.

Nothing else presents even the semblance of indicating a yield of anything like one per cent. of the new substance.

The so-called Argon, separated by the magnesium method, as will be seen on turning to the paper, is a very small fraction of the atmospheric nitrogen. In fine the experimental results negative the statement that there is anything like one per cent. of a new substance in atmospheric nitrogen. The interesting *quantitative* result announced by Rayleigh and Ramsay is therefore not maintained, and we pass on to ask how far is there support for the assertion that there is a minute proportion—say about the same proportion as that of carbonic acid—in the atmosphere.

The researches of the eminent French chemist, Berthelot, appear to be decisive, and to negative the statement that the gaseous residues to which the name Argon has been given are elementary substances.

In Berthelot's hands these residues have yielded a volatile alkali which (unless we adopt a very farfetched hypothesis) can be nothing else than ammonia. Argon—so far as it exists at all—is a compound of nitrogen, and, when properly treated, gives ammonia.

Quite in harmony with Berthelot's observation are the remarkable spectroscopic phenomena described in SCIENCE-GOSSIP in March. The change of spectrum from red to blue when the temperature is raised is as much an indication of decomposition as of mixture, and bears out the observation of the eminent French chemist as to the compound nature of the so-called Argon. In this connection, inasmuch as the spectroscope has played a very prominent part in this investigation, it may be well to recall the pre-eminent service which that admirable instrument has rendered to chemical science during the past thirty-five years. The alkali metals, coesium and rubidium, discovered by Bunsen about the year 1860, and the metal thallium, which was made known to us by Mr. Crookes a little later, were the first trophies of the spectroscope. But for the aid of that marvellous instrument these metals, and also others of more recent date, would have remained buried in the unknown. The spectroscope, however, by reason of its powers in certain directions—its supreme sensitiveness for instance—is utterly unquantitative. To use it aright is a work of art and requires genius. We call to mind two instances where the spectroscope has been misused with disastrous results, and we are glad to see that the great experience of Mr. Lockyer has led him to abstain from any hasty pronouncement on Helium, the most recent of the spectroscopic achievements.

In years gone by the metal of common lime was mistaken for something new by an operator, and later on two other very eminent men of science discovered the apocryphal metal, Jargonium.

*New Malden, Surrey; April 15th, 1895.*

## GEOLOGY OF THE ISLE OF WIGHT.

By THOS. LEIGHTON, F.G.S.

PROBABLY no area within the three kingdoms, of such limited extent as the Isle of Wight, exhibits so many formations worthy of the attention of the geological student. It may be said, with almost equal truth, that no district receives less attention at the present day; this in spite of the fact that almost all the beds of the island yield fossils, whilst the sections are almost entirely along the coast, and therefore accessible to everybody. It must not be supposed from the comparative neglect of an interesting district that previous observers have so exhausted the subject that there remain no attractions to the original worker. In spite of the careful observations of the past, unrecorded fossils and new fossil horizons are not difficult to discover, and those who know the island best, look upon it as a promising field for future work. The publication, in 1889, by the Geological Survey, of a revised edition of Bristow's "Geology of the Isle of Wight," by Clement Reid and Aubrey Strahan, has placed in the hands of students a careful and exact statement of all that was then known of the geology of the island, together with lists of all fossils recorded from the different formations, and a complete bibliography. The chief service that such official publications render to geology is that they provide observers with a sure foundation for future work.

The rocks of the Isle of Wight consist of secondary, tertiary and quarternary deposits, and the following table exhibits their several divisions, as generally accepted, in descending order:

| | |
|---|---|
| Quarternary, | Gravels, etc. |
| Tertiary, Oligocene, | Hempstead Beds. |
| | Bembridge Marls. |
| | ,, Limestone. |
| | Osborne Beds. |
| | Headon Beds. |
| Tertiary, Eocene (Upper), | Headon Hill Sands. |
| | Barton Clay. |
| | Bracklesham Beds. |
| | Bournemouth Freshwater Beds. |
| | Lower Bagshot Sands. |
| (Lower), | London Clay. |
| | Woolwich and Reading Series. |
| Secondary, Cretaceous (Upper), | Upper Chalk (with flints). |
| | Middle Chalk. |
| | Lower Chalk. |
| | Chloritic Marl. |
| | Upper Greensand. |
| | Gault. |
| (Lower or Neocomian), | Lower Greensand. |
| | Wealden. |

The relations between the scenery of a district and the geological phenomena there developed have not infrequently been pointed out. Nowhere is this relationship more clearly shown than in the Isle of Wight. The beds enumerated in the foregoing table strike generally east and west across the island, and the great folding of the rocks of the south-east of England which took place during the Miocene period has thrown them into a series of curves. At the south of the island between Bonchurch and Blackgang the cretaceous rocks are seen dipping south, whilst in the central hills from Culver Cliff to the Needles the same beds dip to the north. North of the central hills the tertiary area is spread out, lying in a sincline striking approximately from Brading to Yarmouth. A broad valley stretches east and west between the chalk hills from Sandown Bay to Brixton Bay, from which the upper cretaceous rocks have been denuded—a similar condition of things to that seen in the Weald of Kent, Surrey and Sussex. This valley marks the line approximately of the Isle of Wight anticline. The dip of the rocks affected by the folds of the Island is remarkable; in common with the similar folds on the mainland to the north, the dip on the northern side of the anticline is much in excess of that on the southern side. This is well seen at Alum Bay in the west and at Whitecliff Bay in the east, where the Chalk and Eocene Beds are nearly vertical, the Oligocenes which follow on to the north, although all affected by the folding, very rapidly assume a low dip, that is, they become very nearly horizontal. The distinctive characters of the coast scenery at Culver Cliff, Alum Bay and Freshwater Gate, are entirely due to these conditions, which, it may be mentioned in passing, are continued on the mainland about Ballard Down in Dorsetshire. A striking feature of the scenery on the south side of the island, between Luccomb and Blackgang, is the series of landslips, due to well-recognised geological agents. The rocks along the coast referred to, if free from débris, would show Gault clay followed above by Upper Greensand, both dipping south. Clays are at all times unstable, and liable to collapse when surmounted by hard rocks pervious to water, but in the present instance the insecurity is vastly increased by the dip of the beds towards the sea. The result is seen in the Ventnor and Blackgang Undercliff on a scale probably of unequalled grandeur. The series of landslips which formed the present Undercliff, occurred at the beginning of this century, and although, from the amount of fallen débris, the ground is at present fairly secure, and may remain so for a century or two, nevertheless, with the existing geological conditions, similar landslips may be expected to recur from time to time. It is rather startling to the geologist, accordingly, to notice boards near Ventnor and Blackgang, offering land upon building leases for a term of 999 years.

The lowest beds which are exposed in the Isle of Wight belong to the Wealden Series. They may be examined between Compton Bay and Atherfield in the west, and in Sandown Bay in the east. In both localities the anticlinal dips may be studied in the cliffs. The Wealden is a freshwater formation and consists of clays, with "paper shales," bands of shelly limestone, and beds of sandstone. The series can be most conveniently examined at and near Brook Point in the western outcrop. Here occurs the so-called "Pine raft," which consists of a number of drifted trunks of coniferous trees lying prostrate in a bed of grey sandstone. It is quite a local occurrence—the fossil trees cannot be traced away from Brook Point on this horizon. The Wealden Beds of the island do not yield many fossils to the collector. Cyprids may be obtained in abundance in the "paper shales" at both ends of the outcrop, whilst *Cyrena*, *Paludina* and *Unio* occur in compressed masses in the limestone bands. Teeth, scales and pieces of bone of fishes, and reptiles occur on certain horizons.

Above the Wealden follows the Lower Greensand, a series of vast importance in the island. The base of this formation is marked by the Perna Bed, which forms the dangerous reef at Atherfield Point, upon which the North German Lloyd S.S. "Eider" was lost a few years ago. The Lower Greensand of the Isle of Wight is divided as follows, in descending order:

Carstone.—Iron sandy grit. Thickness: 6 feet in Compton Bay, 12 feet at Niton, 34 feet in Monk's Bay, 73 feet at Redcliff. Possibly equivalent to the *Ammonites mammilaris* zone of the mainland, *i.e.* the Gault, Lower Greensand junction bed.

Sand-rock Series.—Slightly coherent white and buff quartz sand. Thickness: 81 feet in Compton Bay, 184 feet to the west of the Undercliff, 113 feet at Luccomb, 93 feet at Redcliff. Equivalent to the Folkestone Beds of the mainland.

Ferruginous Sands.—Dark sands, brown and green, with grit, clayey grit, sandy clay and beds of clay. Thickness: 251 feet in Compton Bay, over 500 feet in Chale Bay, not measured between Shanklin and Sandown, 367 feet at Redcliff. Equivalent to the Sandgate and Hythe Beds of the mainland.

Atherfield Clay.—Pale blue clay with hard argillaceous limestone at base, known as the Perna Bed. Thickness: 60 feet in Compton Bay, 90 feet at Atherfield, obscured by buildings at Sandown, 83 feet at Redcliff (the Perna Bed varies from 2 to 6 feet in thickness and is included in these figures). Equivalent to the Atherfield clay of the mainland, where, however, the Perna Bed has not been recognised.

The Lower Greensand is sharply defined from the Wealden below, but the different divisions mentioned above pass upwards into one another.

although there is evidence of a break below the Carstone, which again appears always to pass up into the Gault. The total thickness of the Lower Greensand, as shown above (about 800 feet in Chale Bay and 600 feet in Sandown Bay), when compared with that of the equivalents on the mainland (in Surrey about 300 feet), shows a sea opening to the south, that being further indicated by the lithological character of the deposits and by the fossils. In this the Lower Greensand sea differs considerably from the succeeding Gault, *cum* Upper Greensand sea (for which we require a distinctive name), since the latter had certainly an easterly aspect, probably a north-easterly one. As the one sea followed the other in time, some slight mingling of the two faunas was to be expected, at the same time it will be found that these are, on the whole, just as distinct as the different conditions would suggest. The flora of the adjoining land, however, does not appear to have undergone material change. The Lower Greensand of the Isle of Wight is best exposed in Chale Bay; the accompanying section (fig. 1) will be found of great assistance in identifying the different horizons. The beds are generally fossiliferous, and good specimens may be obtained without difficulty. To the south of Shanklin, also, fossils occur plentifully, but at Redcliff and Sandown they are extremely scarce. There are a large number of species recorded, perhaps the following may be considered the more typical: *Pseudodiadema Fittoni, Meyeria vectensis, Rhynchonella Gibbsiana, R. depressa, Terebratula sella, Exogyra sinuata, Gervillia anceps, Pecten orbicularis, Perna Mulleti, Panopœa plicata, Thetis Sowerbii, Aporrhais Fittoni, Ammonites Deshayesii, Am. Hambrovii*, and *Crioceras Bowerbankii.*

The Gault is not usually fossiliferous in the Isle of Wight, although the whole of it would appear to be present, since *Ammonites interruptus*, typical of the lowest zone, has been recorded. The thickness is given at 139 feet in Compton Bay, 146 feet at Blackgang, and 120 feet south of Redcliff, at all of which places the beds may be seen.

The Upper Greensand belongs really to the same series as the Gault; the two sets of beds contain the same fossils, only the strong conservative instincts of modern geologists maintain the confusion caused by the continued use of the two names. On the mainland sandy conditions chiefly obtain to the west, showing the direction in which the land of the period

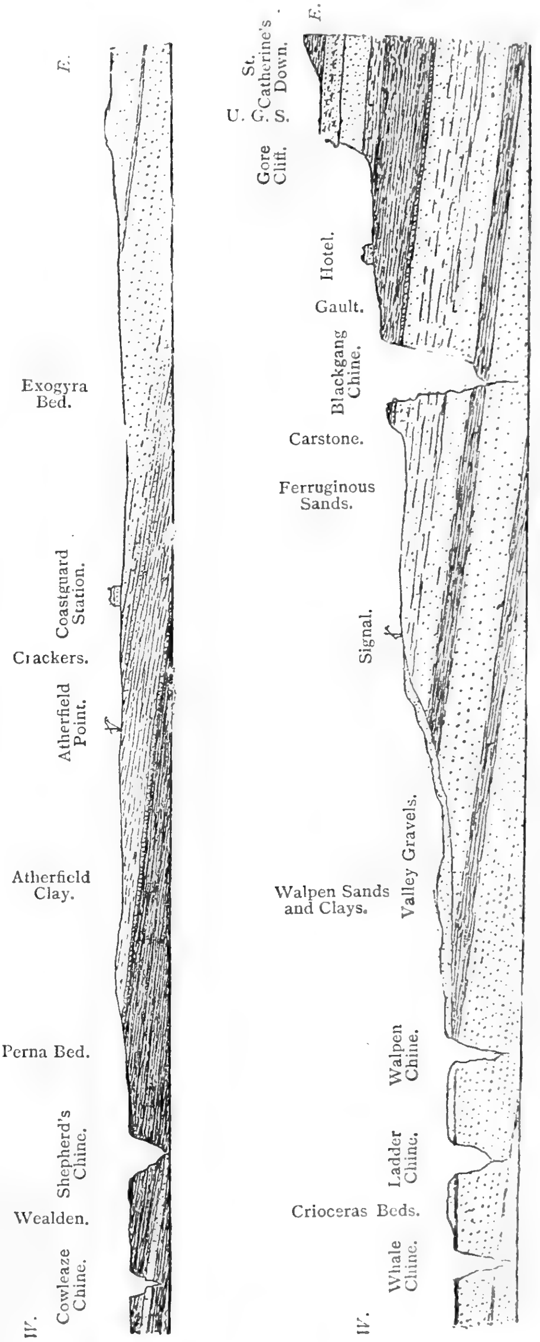



Fig. 1.—Section of Lower Greensand Beds from Atherfield to Blackgang.—*After A. Strahan.*
(*Reprinted from Proc. Geol. Assoc., vol. xii., page 165.*)

lay, whilst clayey conditions preponderate to the east. In the Isle of Wight the Chert Beds, which form the picturesque crags overhanging the Undercliff at Niton, and which have been shown by Dr. G. J. Hinde to consist entirely of sponge remains, are the most noticeable feature of the Upper Greensand, although less striking beds of similar origin occur about the same horizon at other places on the mainland. Below the Chert Beds is the Malm Rock, containing beds of freestone much used locally for building. The following thicknesses are given, and good exposures may be seen at each place named.

| | Compton Bay | Gore Cliff | Culver Cliff |
|---|---|---|---|
| Chert Beds .. | 13 feet | 27 feet | 80 feet |
| Malm Rock .. | 73 feet | 94 feet | |

The fallen material of the Undercliff consists almost entirely of Upper Greensand; the Gault, except at Blackgang, is entirely concealed by it. At Culver Cliff beds of chert occur, but the passage from the Upper Greensand to the Chalk is there so complete that it is difficult to define the exact limits of the different beds as seen in the southern downs. *Exogyra conica, Inoceramus latus, Pecten asper, Plicatula pectinoides, Ammonites rostratus, and Am. varians* are the more typical fossils of the Isle of Wight Upper Greensand.

Immediately above the Chert Beds follows the highly fossiliferous Chloritic Marl, by some writers classed with the Upper Greensand, and by others with the Chalk. It is of no great thickness, varying from fifteen feet at Culver Cliff, where it is difficult to recognize, to seven feet at Gore Cliff, where it is very distinct. At the latter place it is simply crowded with fossils, easily collected in perfect condition. The more common are sponges: *Avicula gyphœoides, Exogyra conica, Inoceramus, latus, Pecten asper, Plicatula pectinoides, Pleurotomaria Moreausiana, P. Rhodani, Solarium ornatum, Turbo, Ammonites Coupei, Am. curvatus, Am. Mantelli, Am. varians* (many forms), *Nautilus, Turrilites Bergeri,* and *Tu. Morrisii.*

*(To be concluded next month.)*

## WHITENING OF HAIRS AND FEATHERS.

By John R. Lord and H. Meade-Briggs.

MY friend Mr. K. Hurlstone Jones's paper on "Pseudo-albino Sparrows" seems to have excited considerable interest, and it is in the hope that I might be able to throw some more light on the subject that I write this. The exact anatomy and physiology on the condition would be difficult to state, and there is no doubt that more observations will have to be made before a definite announcement can be made. I have carefully followed the structure and uses of both hairs and feathers, and seeing that one is the homologue of the other, I am of the opinion that the whitening of the hair and the disappearance of colour from feathers are homologous conditions. It would seem then that the causes which act in one may act in the other.

Of one thing there is no doubt: there is no circulation of blood in a feather (see Science-Gossip, O.S., 1893, page 54). We must therefore look elsewhere for our explanation. If we were to accept Mandl's idea as to the growth of hair, the disappearance of pigment would be easily explained; but since the hair grows at its root and not near its tip that theory falls to the ground. I am not convinced that heredity, in the sense of a relapse to a former condition, is the main cause in birds, and I am less convinced that the same holds good in mammals. In the first place I will take hairs. A hairy coat may whiten as a result of a normal or abnormal cause. At certain times of the year the hairs may be cast and a new coat of white hairs formed, *i.e.* hairs with less or without pigment. As a result of deficient nutrition or of lower vitality normal in old age, the hairs may be cast or continue to grow, but with a gradually diminishing amount of pigment in them. The hair may be bleached by long-continued exposure. In this case the tips of the hairs are first affected. These are some examples of a normal modification. A normal cause may become abnormal if the time at which it produces its effects is wrong. Again, any condition which deranges the trophic centres may affect the production of hair, such as overwork, mental anxiety, various diseases and neurotic conditions.

People are very fond of finding and dilating on the marvellous, and too much stress is certainly laid on a few isolated cases of the hair suddenly turning white which have been recorded. Even these cases have much doubt about them, and are so scarce that they hardly merit consideration. It is so common in fiction that the public will barely tolerate the idea that there are only a very few cases on record that have any reliable foundation.

Let us now look at the condition in birds. Is it not possible to think that there are similar causes here? Feathers are not dead structures, but bear nearly throughout them, a network of living cells quite capable of absorbing or of producing melanin pigment. Of course there are no trophic nerves in the feather, but there are in the vascular papilla, and there is abundant evidence elsewhere to show that probably all living cells are to a certain extent under the control of the nervous system. It is not necessary that a nerve should be closely related to a cell to modify its action.

Say, for example, that cell *a* is in close relation to a nerve, and cell *b* is away from the nerve but in close apposition to cell *a*. Probably there are bridges of protoplasm between the cells. If there is a change in the nerve it results not only in a modification of cell *a*, but of cell *b* also. To go back again to hair. If we are to believe that under strong mental excitement the hair suddenly turns white, then it could be explained in a similar manner to the above.

In conclusion, it seems to me that both the whitening of hairs and of feathers is the result of a change in the trophic centres, brought about in some cases by a normal condition, in some cases by normal cause acting at a wrong time, and in other cases by an abnormal condition.

*University Union, Edinburgh;*
*April, 6th,* 1895.

The interesting article on "Pseudo-albino Sparrows," by Mr. K. Hurlstone Jones, opens a large field for research and discussion, and although I feel myself completely incapable of dealing fully with the subject, there are a few remarks I should like to add in answer to the question "are pseudo-albinos born pseudo-albinos?" In some instances I should say yes, but not in every case. Last year I obtained in May a curious variety of a young rook, *Corvus frugilegus* (*vide* SCIENCE-GOSSIP, N. S., vol. i., page 106), having five white primary feathers in each wing, the base of the bill and the throat white, also white claws and partly white toes. Two others, with a suspicion of white about the throat and white claws, I also shot in the same rookery, and I should say were evidently birds of the same nest. How these extremities, for it was the extremities in every case, became white I am unable to say, but I am inclined to Mr. E. L. Layard's suggestion in your last issue of SCIENCE-GOSSIP, and put it down to impaired vitality.

Passing on to the question "If pseudo-albino varieties have changed at some period of their existence later than their fledging, how do they get rid of the melanin granules from their feathers?" Surely, it appears to me, either by the same process as the plumage of the immature gull changes, or else from the reason I suggest presently. No one seeing a herring gull (*Larus argentatus*) of the second year when it is "mottled brown" would imagine it would turn in the fifth year to the handsome grey and white bird it eventually does. It is some accident possibly that changes to white the typical feather of the sparrow, but I imagine the change takes place during the time the old feather falls out and the new one grows. There may be no circulation in the shaft of the feather. I take Mr. Hurlstone Jones's word for it that there is none, for I have not studied the question; but during the process of the feather developing in the quill-sheath there is always a store of blood at the root. You have only to pluck a growing feather from a bird and squeeze it to ascertain this fact. This being so, does it not seem possible that by some means or other, such as want of vitality or an accident, this well, if I may so term it, dries up, and therefore the result is the white plume. It is to be observed that often blackbirds get a few white feathers, more especially to the outer primary feathers, the primary and median coverts, and the bastard wing. I know of a tame blackbird that gets a few more white feathers every time it moults. It is an old bird, not far short of ten years, and I think it is highly probable its vitality is enfeebled and its blood-wells are drying up. Its legs are quite a curiosity and look as if they had never been "scaled." Sparrows, of course, one often sees with white feathers, sometimes with only one or two, and sometimes with many. One sparrow I got last autumn had been seen about all through the summer, but then had not as many white feathers as when shot about the end of its seasonal moult. There is another about the roads here now that boasts of one solitary white feather in its tail, and I am hoping it will be spared till next autumn to ascertain whether the white feather will have been replaced by a type form.

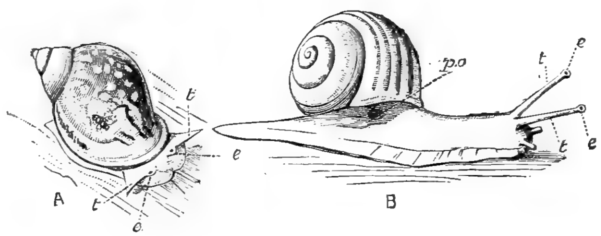
The tendency seems to be to increased albinism with each moult, but I see no reason for assuming that this should always be the case. In fact, the late Rev. F. O. Morris, in Vol. iii., page 83, of his "British Birds," mentions a blackbird that in the sixth year obtained white feathers in the wing, in the following year reverted back to the typical form again, and he also mentions (page 139) two robins which were white the first year, changing to normal colour the second season. It is possible that in every case of pseudo-albinism, the effect of the accident or injury or fright that has caused the blood-wells to become dry, is capable of being removed after a certain time and a normally healthy condition return, but it is hard to determine this in a state of nature, whilst captivity might have the opposite effect. It seems to me that it is obvious that the blood influence bears vastly upon the growing feathers. One has only to take the canary for example. Red pepper feeding before and at the time of moult will, as every canary fancier knows, produce orange-coloured birds. It is just the same with bullfinches—in order to keep up the colouring of the breast, artificial feeding has to be resorted to for show purposes, and the dark oily red-brown pepper paste is given to the little captive. Thus it would appear that blood influence, or rather no-blood influence, bears considerably upon the theory of pseudo-albinism.

37, *Nunnery Fields, Canterbury; April 3rd*, 1895.

# THE CAMBRIDGE NATURAL HISTORY.

IT has seldom been our pleasure to notice so important a series of scientific books as that announced by the publishers of "The Cambridge Natural History," the first volume issued being now before us. This series will be from several points of view unique. It is to extend to ten volumes, each to contain about 500 large octavo pages, with maps and copious illustrations as required by the various subjects. These volumes are to be edited and, for the most part, written by Cambridge men. Commencing with the lower forms of life, they will treat the various groups of living animals of the world in sequence, and also their fossil allies, in the simplest possible manner, though the plan is fully scientific in its conception. Thus, these books will be well within the range of any educated person, even of those who do not possess special scientific training, or familiarity with terms employed by modern writers of treatises or monographs on the subjects dealt with in "The Cambridge Natural History."

The following will probably be the titles of these ten volumes, and the writers to whom they are to be assigned. It will be observed that there may be more than one writer in a single volume, as the distinctive sections of the subject will be entrusted to specialists, with the object of getting the most trustworthy information. The whole series are under the guidance and editorial management of Mr. S. F. Harmer, M.A., Fellow of King's College, Cambridge, Superintendent of the University Museum of Zoology, and Mr. A. E. Shipley, M.A., Fellow of Christ's College, Cambridge, University Lecturer on the Morphology of Invertebrates.




SIGHT IN MOLLUSCS.
A, *Limnæa peregra* Müll—*ee*, eyes, *tt*, tentacles. B, *Helix nemoralis*, Müll—*ee*, eyes, *tt*, tentacles; *p.o*, pulmonary orifice.—*From Cooke's "Molluscs."*

Vol. I. will contain "Protozoa," by M. M. Hartog, M.A., Trinity Coll. (Prof. of Nat. Hist., Queen's Coll., Cork); "Sponges," by W. J. Sollas, Sc.D., F.R.S., St. John's Coll. (Prof. of Geology, Trinity Coll., Dublin); "Jelly-fish, Sea-Anemones, etc.," by S. J. Hickson, M.A., Downing Coll. (Beyer Prof. of Zoology, Owens Coll., Manchester); and "Starfish, Sea-Urchins, etc.," by E. W. MacBride, M.A., St. John's Coll.

Vol. II.—"Flat Worms, etc.," by F. W. Gamble, M.Sc. (Demonstrator and Assistant Lecturer in Zoology, Owens Coll., Manchester); "Nemertines," by Miss L. Sheldon, Newnham Coll.; "Threadworms, etc." by A. E. Shipley, M.A., Christ's Coll.; "Rotifers, etc.," by M. M. Hartog, M.A.; "Polychaet Worms," by W. B. Benham, D.Sc., Hon. M.A. Oxon. (Aldrichian Demonstrator of Comparative Anatomy, University of Oxford); "Earthworms and Leeches," by F. E. Beddard, M.A., F.R.S. (Prosector to the Zoological Society); "Gephyrea," by A. E. Shipley, M.A.; and "Polyzoa," by S. F. Harmer, M.A., King's Coll.

Vol. III.—"Molluscs," by A. H. Cooke, M.A., King's Coll.; "Recent Brachiopods," by A. E. Shipley, M.A.; "Fossil Brachiopods," by F. R. C. Reed, M.A., Trinity Coll.

Vol. IV.—"Spiders, Mites, etc.," by C. Warburton, M.A., Christ's Coll. (Zoologist to the Royal Agricultural Soc.); "Scorpions, Trilobites, etc.," by M. Laurie, B.A., King's Coll. (Prof. Zoology, St. Mungo's Coll, Glasgow); "Pycnogonids, etc.," by D'Arcy W. Thompson, M.A., Trinity Coll. (Prof. Zoology, University Coll., Dundee); "Crustacea," by W. F. R. Weldon, M.A., F.R.S., St. John's Coll. (Jodrell Prof. Zoology, University Coll., London).

Vol. V.—"Peripatus," by A. Sedgwick, M.A., F.R.S., Trinity Coll.; "Centipedes, etc.," by F. G. Sinclair, M.A., Trinity Coll.; "Insects," by D. Sharp, M.A., F.R.S.

Vol. VI.—"Insects," by D. Sharp, M.A., F.R.S.

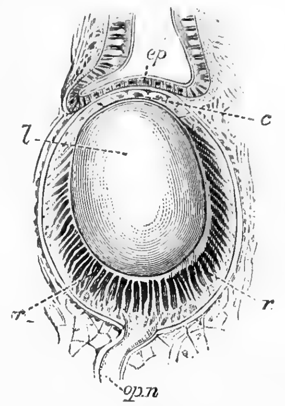
Vol. VII.—"Balanoglossus, etc.," by S. F. Harmer, M.A., King's Coll.; "Ascidians and Amphioxus," by W. A. Herdman, D.Sc., F.R.S. (Prof. Nat. Hist. in University Coll., Liverpool); "Fishes," by T. W. Bridge, M.A., Trinity Coll. (Prof. Zoology, Mason Coll., Birmingham).

Vol. VIII.—"Amphibia and Reptiles," by H. Gadow, M.A., F.R.S., King's Coll.

Vol. IX.—"Birds," by A. H. Evans, M.A., Clare Coll.

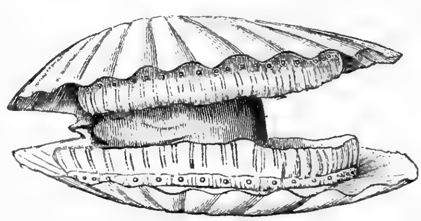
Vol. X.—"Mammals," by F. E. Beddard, F.R.S.

We trust that this adventure of the publishers of "The Cambridge Natural History"—Messrs. Macmillan & Co., of London and New York—will receive the support it deserves. Some months ago we took exception to the class of natural-science books purchased by many of the newly-established free libraries. This new series is to a large extent a solution of the difficulty. If a future beginner gets hold of one of these volumes, his first path to a knowledge of the subject will be made smooth indeed, in comparison with the tyros of twenty-five years ago. With sufficient support, Messrs. Macmillan may perhaps be induced to enlarge the number of the proposed ten volumes, so as to include others on plants, which are so much needed. We know of no general work on plants founded on the excellent plan of this new series on the animals, and feel sure such would be heartily welcomed.




SIGHT IN MOLLUSCS.
Eye of *Helix pomatia*, L., retracted within the tentacle; *c*, cornea; *ep*, epithelial layer; *l*, lens; *op.n*, optic nerve; *r*, retina. (After Simroth.)—*From Cooke's "Molluscs."*

As "The Cambridge Natural History" is fully planned out in manner of its publication, it matters little whether the volumes appear in exact sequence. The first issued is, in fact, Volume iii. being the Molluscs and Brachiopods, both recent and fossil. The Rev. A. H. Cooke occupies 459 pages in his section of mollusca, and has succeeded in placing this subject in an interesting manner before his readers. There are no less than 311 figures illustrating the first portion of this volume, three of which we reproduce as examples. The excellent system of side-headings in thicker type is adopted, giving titles to the paragraphs dealing with each subject. These are most varied, ranging from "Showers of Shells," or "Prices given for Shells," to "Larvæ of Unionidæ," or "The Septentrional Sub-Region" of the palæarctic region, in which our fauna is included; but, whatever the subject, it is fully explained in the simplest of language. In Mr. Cooke's section the opportunities for pleasant, chatty writing are numerous, and, although he has not failed to keep well to the front the scientific aspect of the work, he has fully availed himself of the lighter vein, thus making the book most readable. It is only natural that the reverend author should have dug out an anathema of the Church against molluscs, which is so quaint we cannot resist quoting it in full. He says: "Snails have occasionally fallen, with other noxious creatures, under the ban of the Church. In a prayer of the holy martyr Trypho of Lampsacus (about 10 cent. A.D.) there is a form of exorcism given which may be used as occasion requires. It runs as follows: 'O ye caterpillars, worms, beetles, locusts, grasshoppers, woolly-bears, wireworms, longlegs, ants, lice, bugs, skippers, canker-worms, palmer-worms, *snails*, earwigs, and all other creatures that cling to and wither the fruit of the grape and all other herbs, I charge you by the many-eyed Cherubim, and by the six-winged Seraphim, which fly round the throne, and by the holy angels and all the powers, etc., etc,, hurt not the vines, nor the land, nor the fruit of the trees, nor the vegetables of ——, the servant of the Lord, but depart into the wild mountains, into the unfruitful woods, in which God hath given you your daily food.'"



SIGHT IN MOLLUSCS.
*Pecten opercularis* L., showing the ocelli on the two edges of the mantle.—*From Cooke's "Molluscs."*

A large number of the figures are original, especially those illustrating comparative drawings in the stages of growth of some shells, or the development in various species, or of characteristic formation in the genus to which they belong. Again, interesting series are illustrated, showing how generic characters run from one to another, as in the case of the marginal slit in *Hemitoma*, increasing in *Emarginula* and *Macroschisma*, until it becomes enclosed by the margin in *Craniopsis* and *Puncturella*, finally becoming an apical hole in *Fissurella*.

Chapter x. on "The Geographical Distribution of the Land and Freshwater Mollusca" is most interesting and very exhaustive, figures of the characteristic shells of some of the regions being given, as well as four coloured maps of the regions.

The remaining sections of Vol. iii. are devoted to the Brachiopoda, and although occupying so much less space than Mr. Cooke's section, the authors, Messrs. Arthur E. Shipley and F. R. Cowper Reed, have succeeded in making their subjects entertaining and most instructive.

The price of Vol. iii. of "The Cambridge Natural History" is 17s. net. Messrs. Macmillan have executed their part in producing the book admirably, and we feel sure this series will become most popular.

J. T. C.

# STATIONS OF PLANTS AND BUOYANCY OF SEEDS.

By H. B. Guppy, M.B.

(*Concluded from page* 43.)

THE groups, of which some typical examples are given below, afford very significant indications, and we are thus enabled to advance another stage in our line of reasoning. Nature has, so far, taken advantage of the floating capacities of dry indehiscent fruits that she has located most of the plants in question at the river's side or at the pond's edge. Since it has been already shown that nearly all the plants that exhibited considerable floating powers in their fruits or seeds possessed fruits of this character, it would seem that there are gathered at the margins of rivers and ponds most of the British inland plants that could be assisted in their distribution by the agency of water.

The great sifting experiment has been a work of the ages, and we here get a glimpse at nature in the act of selecting a station. But the curious character of the sorting process becomes yet more evident when we find that the buoyancy of the fruits of different species of the same genus and of different genera of the same family may become a matter of station. Of three species of *Stachys* which have been experimented on, viz., *S. betonica*, *sylvatica* and *palustris*, the last alone possesses buoyant fruits. The fruits of *Galium palustre* float well, whilst those of *G. aparine* and of other species of the same genus display but little buoyancy. The achenes of *Potentilla comarum* float indefinitely, and in their integuments M. Kolpin Ravn has found the "tissu aérifère" of buoyant fruits. On the other hand, those of *P. tormentilla* have little or no floating powers. Of the following labiate plants, *Salvia verbenaca*, * *Lycopus europæus*, * *Mentha aquatica*, *Thymus* sp., *Calamintha officinatis*, *Nepeta glechoma*, *N. cataria*, *Prunella vulgaris*, * *Scutellaria galericulata*, *Stachys betonica*, *S. sylvatica*, * *S. palustris*, *Ballota nigra*, *Lamium purpureum*, *L. album*, *Teucrium scorodonia*, and *Ajuga reptans*, only the four species preceded by asterisks have fruits that can float a long time; in all the other species the fruits sink at once or in a few days. Amongst the composite plants below named, the two species of *Bidens* alone exhibit any buoyancy worth speaking of; their fruits often float for indefinite periods, and those of *B. tripartita* are provided with a covering layer of the "tissu aérifère." The species are *Aster tripolium*, *Bidens cernua*, *B. tripartita*, *Chrysanthemum leucanthemum*, *C. segetum*, *Matricaria inodora*, *M. chamomilla*, *Achillea millefolium*, *Tussilago farfara* (Darwin), *Senecio vulgaris*, *S. aquaticus*, *S. palustris* (Ravn), *Carduus nutans* (Thuret), *C. lanceolatus*, *C. palustris* (Ravn), *C. arvensis*, *Tragopogon pratensis*, *T. porrifolius* (Thuret), *Helminthia echioides*, *Leontodon autumnalis*, *Sonchus oleraceus* (Thuret and Guppy), *Taraxacum dens leonis*, *Crepis virens*, *Crepis* sp., and *Lapsana communis*. Amongst the *Umbelliferæ*, the following species exhibit in their fruits considerable floating powers, viz.: *Hydrocotyle vulgaris*, *Cicuta virosa* (Ravn), *Sium latifolium* (Ravn), *S. angustifolium* (Ravn), *Œnanthe crocata*, *Angelica sylvestris*, and *Peucedanum palustre* (Ravn). On the other hand, the fruits of *Æthusa cynapium*, *Pastinaca sativa*, *Chærophyllum sylvestre*, *C. sativum* (Thuret), and *Smyrnium olusatrum* display but little buoyancy. The fruits of *Apium nodiflorum* and *A. inundatum* do not conform to the principle illustrated by the other twelve species and soon sink in water. (In the instances where I have made use of the observations of others, the name of the observer is given in brackets.)

My object here has not been to label facts but to record indications; and it will be gathered from the foregoing remarks that this is eminently a subject for investigation. We desire, for instance, to know why the yellow iris and the alder frequent the riverside. The iris seeds and the alder fruits, are able in most cases to float for a long time, and it is suggested that those of their congeners away from the river soon sink. At all events, as recorded by M. Thuret, the seeds of *Iris chamæiris* and *I. unguicularis* possess no buoyancy. We may also ask whether, except in the case of littoral species, buoyancy in a fruit or seed has been a factor of much importance in the geographical distribution of plants. May it not be that in the station at the river's edge of most of our plants with buoyant fruits we have, to quote from a letter of M. Kolpin Ravn, "le plus grand effet de l'adaptation à la dissémination par l'eau."

As a postcript to this page I may mention with regard to the three British species of *Convolvus*, that the seeds of *C. arvensis*, whether fresh or dried, for months sink in fresh and sea-water. Of the fresh seeds of *C. sepium* and *C. soldanella* quite fifty per cent. float after six months in both waters. Further experiment with *C. sepium* showed that about half of the seeds floated after nine months in sea-water, and thirty per cent. after eighteen months in fresh water. For the results relating to *C. soldanella* I am entirely endebted to the courtesy of Mr. F. W. Millett, who conducted his experiments at Marazion. These matters will be considered more in detail when discussing the effect of buoyancy on the stations and distribution of the Convolvulaceæ generally.

6, *Fairfield West, Kingston-on-Thames; February*, 1895.

## GILBERT WHITE'S HOUSE.

By Edward A. Martin.

THE house in which the father of British popular naturalists lived and died, is situated in the village street of Selborne, in Hampshire, about a hundred yards beyond the "Plestor" or playground, which White has described in one of his early letters. As approach is made to the village from Alton, one crosses, at the entrance to the village, a little stream which, meandering down "The Lithe," joins the stream which crosses the other end of the village, known as the Bourne. The latter at its source is familiar to all lovers of Gilbert White as the "Well-Head," and from this the water-supplies of the village are still drawn. The church and vicarage stand on rising ground above the first-mentioned stream, on the left-hand side of the road as one enters the village, the "Plestor" touching the churchyard close to the yew-tree of ever-green memory.

"The Wakes," Gilbert White's house, stands on the opposite side of the road, a few paces beyond. The wall of the narrow front garden is flush with the village street. This low wall is not the same as the one so recently as Professor Bell's time. Professor Bell, so well known as the writer of "British Quadrupeds," "British Reptiles," "British Crustacea," etc., lived at "The Wakes" until his death, and exhibited the greatest care in retaining as far as possible the antique appearance of the house. A northern wing was, however, added to the building, otherwise the external appearance of the house is much as it was in White's days. It is fervently to be hoped that no further alterations will be made in it. Gilbert White's sun-dial is still standing at the back on the lawn. The clump of trees under which his summer-house was situated, is still there. The summer-house has gone, but all the way from the house is a narrow foot-path, four bricks wide, by which he used to reach the summer-house to make his observations in all weathers. The path at its termination curls round in the shape of a hook, showing distinctly where was formerly the entrance to the summer-house. It was carefully taken up and relaid in Bell's time.

To those who know Selborne, it would be a cause of infinite regret to find that the house had been, or was intended to be, rebuilt. Selborne without "The Wakes," would offer no rallying-point for pilgrims who indeed travel to it from all parts of the world. It might indeed be irksome to a tenant to be constantly showing the house to visitors. Now that opportunity offers, it might become the property of some wealthy society, as suggested by Science-Gossip last month, and placed in charge of a caretaker. A strong protest must be raised against any spoliation of such a national inheritance.

## THE VALUE OF SPECIMENS.

THERE was an important sale of birds' eggs and nests at Stevens' Auction Rooms, Covent Garden, London, on April the 22nd and 23rd, in which was included a skin and an egg of the great auk, from the collection of the late Sir William Milner, Bart. The skin had recently been re-stuffed, and was found to be in good condition and summer plumage. The earlier bidding was active, but at last the auctioneer announced, after 150 guineas, "that as the reserve has not been reached, I now make a bid of 360 guineas on behalf of Sir F. Milner," therefore the specimen was withdrawn. About eighty skins of the great auk are known to exist, twenty-four being in Britain. The great auk's egg sold for the comparatively low price of 180 guineas, and was purchased by an enterprising proprietor of a London tavern, for the purpose of gracing his bar and attracting customers. An egg of *Æpyornis maximus* sold for 36 guineas. Odd bones of the great auk went for £1 5s.; odd bones of the dodo, 12s.; some bones of the moa, £1 5s. The two days' sale was, with some few exceptions, devoted to the collection of Mr. Leopold Field, F.R.S.E., comprising many rare nests and eggs. The following are prices some of the lots of eggs reached:—Four American goshawks, £1 10s.; four goshawks, 10s.; two peregrines, 10s.; one kite, 13s.; three peregrines, £1 2s.; four ditto, £1 4s.; two honey buzzards (New Forest), £2 15s.; two ditto (New Forest), £3 15s.; two ditto (New Forest), £3; two ditto (Yorkshire), £1 4s.; one ditto (Silesia), a nearly white variety, £1 2s. The lots of twenty-two Egyptian vultures from Southern Spain sold at from 8s. to 10s. per egg. Fourteen eggs of golden eagle (including two from Spout Rock, Sutherland), £6; two from Argyleshire, £6; two from Blackford, Sutherland, £6 10s.; one Argyleshire, £2 10s.; one Arran, £2 15s.; three swallow-tailed kite's, £7 7s.; another specimen, £3. Osprey's sold at about 10s. per egg; one Sabine's gull, £1 12s. 6d.; one Pomatorhine skua, £1 10s.; one grey plover egg (taken with parents in Siberia, by Mr. Harvey-Brown), £6 6s.; eight picked varieties of red grouse, £5; nest and two eggs, swallow-tailed kite, £6 16s. 6d. The above prices are among the highest; the rank and file of the eggs and nests sold at about ordinary auction prices, which were not high, being in many cases about 3s. per nest and clutch of eggs, in glass-topped box.

Sale of Gilbert White's Selborne MS.—The author's autograph manuscript of Gilbert White's "Natural History and Antiquities of Selborne" was sold by auction in London on April 26th. It contains many passages not in the printed editions, and has never been out of the possession of the family. Bidding commenced at £210 and stopped at £294, at which price it became the property of Mr. Pearson, the underbidder being Mr. Snowden.

# ROOT-NODULES OF LEGUMINOUS PLANTS.

By Rudolf Beer, F.L.S.

If the roots of a bean, pea, clover or almost any other leguminous plant be examined, a number of curious nodules or tuberous swellings will be noticed upon them (fig. 1). These tuberosities have an intimate connection with a physiological process of great importance which takes place in the leguminous plant.

All vegetation, high or low, requires nitrogen as an item of its food-stuff. The form in which this nitrogen is available to the plant, whether in the free condition or combined with other elements, differs to some extent with the plant we are considering. For the present all we need know of this is that green plants, from the Algæ upwards, cannot utilise free nitrogen as a food material, and that it is only when this element is united with oxygen in a certain proportion, to form what is known to the chemist as a nitrate, that it is of nutritive value. From this it follows that the nitrogen of the air in which the plant grows is, so to speak, thrown away upon at least the greater part of the vegetation of the earth. This is a point which has been put beyond all doubt by the experiments of Boussingault, Lawes and Gilbert, Pugh and others.

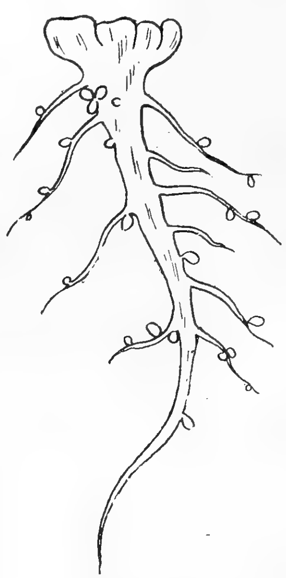


Fig. 1.—Root of red clover showing root-nodules.

The useful nitrates are evidently obtained by the plant from the soil, but since no great store of these is to be found here, a somewhat difficult problem was presented to the physiologist. The only reasonable explanation seemed to be that the nitrates should be re-formed as fast as they were taken up by the plants. But although this shuffled the difficulty off the shoulders of the biologist, it was only to place it all the more heavily upon those of the chemist. The formation of nitrates, either from the elements nitrogen and oxygen or from oxygen and ammonia (a compound of nitrogen and hydrogen), is, chemically speaking, a most difficult undertaking. Much fruitless speculation took place in explanation of this, but it was not till 1877 that the observations of two chemists, Schloesing and Müntz, gave quite a new aspect to this tangled question. They kept samples of soil under observation for many weeks; analysing each sample after the experiment, and knowing its constitution before, the result was that they found a noticeable nitrate-increase in every instance. If, on the other hand, they treated the soil at the commencement of their experiments with an antiseptic, or subjected it to great heat, the quantity of nitrates in it remained the same after as before the experiment. From these observations they inferred that the power of nitrate formation resided in the soil and was due to living organisms in it, probably bacteria. This hypothesis, as unexpected as it was strange, opened up an hitherto untraversed path of research, which was followed in the ensuing years by Winogradsky and Frankland. In 1890, both these investigators, almost simultaneously, succeeded in isolating these soil-bacteria which previously had only existed in theory.

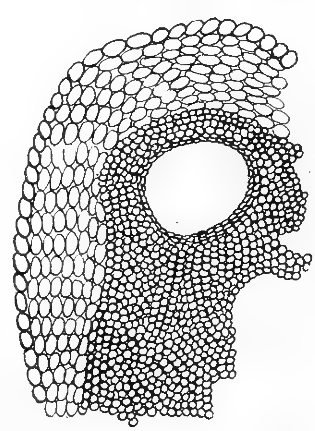


Fig 2.—Transverse section from root-nodule of scarlet-runner (*Phaseolus multiflorus*).

A little further observation showed, however, that only half the problem had been solved. What these isolated bacteria could effect was the partial oxidation of ammonia, which is abundantly present in the soil, to the intermediate stage of a nitrite. In order to furnish the nitrogen compound available to the plant it was necessary still further to oxidise this first-formed compound, so that instead of containing only two atoms of oxygen of the nitrite it contained the three of a nitrate. It was stated just now that only half the problem had been solved, but it was by far the most unaccountable half which was now cleared up.

Only the most powerful agents at the command of the chemist (such as ozone) were known to oxidise ammonia to a nitrite, $NH_3+O_3=HNO_2$

$+H_3O$. But once given a nitrite it is a matter of comparative ease to raise this to a nitrate, $HN O_2 + O = HNO_3$. Yet we still have to see how this second step takes place in nature. It was Winogradsky who again solved the difficulty; a short time after his former discovery he effected the isolation of a second bacterial form which was capable of bringing about the final process of oxidation. Thus the formation of nitrates in the soil must be regarded as a double act of fermentation, in which one bacterial form changes the ammonia of the soil into a nitrite and then a second micro-organism steps in and raises this to a still higher state of oxidation. During all the years in which these advances were being made a certain discontent was simmering against the theory which gave over the vast ocean of free, atmospheric nitrogen, as a perfectly useless source, to the plant. The first reasonable doubts, based upon observed facts, which were cast upon this hypothesis emanated from the famous experimental farm at Rothamsted. In growing certain leguminous plants under carefully watched conditions there was found to be a larger quantity of nitrogen in them after the lapse of some time than could be accounted for by the available sources in the soil. There was only one conclusion to be drawn from these facts and this was that, by some means not yet understood, these plants had assimilated the nitrogen of the air. In and about the year 1886, Hellriegel and Wilfarth in Germany, Marshall Ward and others in this country, carried on a series of experiments with leguminous plants which all gave similar results. If a plant, the quantity of nitrogen in which was known, was grown in a pot of carefully analysed soil it was found that there was a considerable increase in nitrogen within this system after several weeks, which could only be attributed to a "fixation" or abstraction of this element from the air. It is upon the researches of Laurent and Schloesing that we depend, however, more than upon any others, for placing this matter upon a sure basis. These investigators were able to show, by enclosing the plant and soil in a confined and analysed portion of air, that exactly in proportion as the plant gained in nitrogen did the surrounding air become poorer in this gas. It was found, moreover, that only particular plants, viz.: those belonging to the Leguminosæ and certain Algæ, could thus assimilate free nitrogen. The point in which leguminous plants, capable of nitrogen fixation, differ from others is in the possession of the curious nodules mentioned in the commencement of this article.

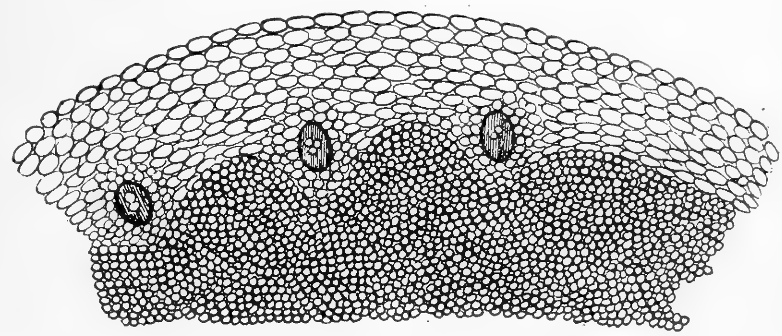


Fig. 3.—Transverse section, from root-nodule of scarlet-runner.

The German observers, Hellriegel and Wilfarth, were the first to notice this feature and point out the further facts that these tuberosities were crowded with minute organisms and were characterised besides, by containing the richest stores of nitrates in the whole plant. It was concluded, in consequence, that the Leguminosæ possessed the power of free nitrogen fixation through the presence of the nodules, and that the ultimate cause was to be found in the micro-organisms which swarmed within these. How exactly these "bacteriads," as these small bacteria-like organisms of the tuberosities are named, aid in this process of nitrification and precisely what relation they bear to the plant is still a matter of discussion.

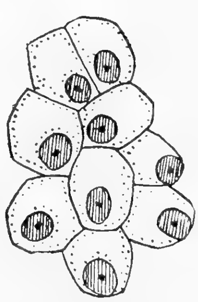


Fig. 4.—Cells from pith of root-nodule of scarlet-runner.

According to a paper lately published by Professor Marshall Ward (see "Nature" March 29th, 1894) there are four possible theories at present existing.

(1) The living cells of all plants may have the power of "fixing" nitrogen, and this only becomes more evident where root-nodules are present.

(2) The soil-bacteria, already considered, and the organisms of the tuberosities may have powers of directly fixing the nitrogen of the air as part of their life processes, and that the nitrates thus formed are subse-

quently absorbed by the leguminous plant.

(3) It may be that this nitrogen assimilation is a "powerful act of machinery on the part of the leguminous plant" which is stimulated to such unwonted activity by the organisms living in its root-nodules.

(4) Lastly, it may be that the nitrates elsewhere produced are simply gathered together by the root-organisms which are then, so to speak, devoured by the higher plant.

The first hypothesis depends chiefly for its support upon Professor Frank. It seems, in truth, to revive the old question, which, as already mentioned, was long ago believed to be decided by the work of Boussingault and others.

The second suggestion, which is due to Berthelot, perhaps brings with it the greatest plausibility. Whether it is a real factor or no, remains, of course, still undecided. It may very probably be that there are several causes constantly at work "fixing" the nitrogen of the atmosphere, but a consideration of Berthelot's experiments and of the inferences he draws from these, certainly gives colour to the idea that one of these is to be found in the organisms of the soil and roots, which, in the course of their vital activities, oxidise the nitrogen of the air which then finds its way into the higher plant.

Professor Hellriegel, who was the first to notice the root-nodules and their inhabitants and to connect them with the nitrogen supply of the leguminous plant, has gone further than this, and has also attempted to explain the manner in which the organisms of the root act. He says that these bacteriads do not themselves bring about the fixation of nitrogen, but that they act upon their host plant, stimulating its cells to unusual activity. The result of this increased vitality is shown in the direct assimilation of atmospheric nitrogen by the living cells of the sub-aerial parts. To anyone unacquainted with the unlooked-for responses which protoplasm frequently gives to stimulation, this theory may appear extravagant. But in the light of other facts connected with the so-called phenomena of irritability this view is one deserving careful attention. The last of the above-mentioned hypotheses is also by no means an improbable one. There can be little doubt that there are numbers of non-living agencies which fix small and much-scattered quantities of nitrogen, and it may be that the bacteriads simply draw together and concentrate this widely-spread store which then becomes available to the host plant. Still it must be admitted that it is very doubtful whether the nitrogen, "fixed" by inanimate causes, is sufficient to meet the large demand made unceasingly by the vegetation covering the face of the earth.

A fact which should be borne in mind in all these enquiries is that, of all parts of the plant, the nodules seem to be richest in nitrogen compounds. Whether these are formed here, or whether they occur simply as reserve substances, is apparently the undetermined point. However these nitrogenous substances originate in the cells of the tuberosities, they are utilised by other portions of the plant by the breaking down or absorption of the cells of the nodule. This conclusion has been particularly emphasised in the mind of the present writer by the observation that so many of the nodules have certain areas of the otherwise active cells undergoing dissolution and apparently absorption by the other tissues of the plant. Such a "corroded" area is shown in fig. 2.

Little need be said concerning the anatomy of the nodules, this can be gathered from the sketch given in fig. 3. On the extreme outside of the tuberosity there are corky cells, within this the living cells of the cortex, then are to be noticed the fibro-vascular bundles (three are shown in the figure), and within the ring of these again comes the pith which forms the main mass of the root-swelling. A few cells of this pith have been drawn under high powers in fig. 4. The most noticeable point in these cells is their evident protoplasmic contents and large shining nuclei, both of which facts are evidences of extremely active vitality, which we may well suppose to be in some way connected with the "fixing" of the free nitrogen of the air by the leguminous plant.

That the bacteriads of the root are of the utmost use to the higher plant is evident from the above considerations, but there is very good reason for thinking that the benefit is not altogether one-sided. It would seem, partly by analogy with experiments made by Kossowitsch and others on Algæ, partly on other grounds, that whilst the bacteriads furnish or aid in furnishing the leguminous plant with nitrogenous materials, the green plant in its turn provides the micro-organism with the equally necessary carbo-hydrate food, such as sugar, starch, etc. The relationship, therefore, between the lower and higher plants is one of symbiosis or commensalism.

*Elmwood, Bickley, Kent; March 28th, 1895.*

Death of Professor J. D. Dana.—Professor James Dwight Dana died of heart disease very suddenly on April 15th, in his 83rd year. Born at Utica, New York, he was educated in that State, graduating at Yale College. Professor Dana was most versatile in his scientific knowledge, and the subjects of his numerous writings range from volcanoes to the most minute corals. His great works, by which he holds world-wide reputation, are "Descriptive Mineralogy," now in sixth edition, of over 1,000 pages; "Manual of Geology," in its fourth edition; and other standard works on corals and zoophites. Dr. Dana was a great traveller, and investigated natural phenomena in many parts of the world.

# CHAPTERS FOR YOUNG NATURALISTS.

## Some Lodgers in a Pond.

By A. F. Tait.

EVERYONE is familiar with the appearance of the brilliant green carpet that covers in many cases the entire surface of ponds. This brilliant green carpet is mostly formed of the common duckweed, possessing roots of remarkable length—about thirty times the size of the visible portion of the weed, balancing the tiny plant, and anchoring it securely to the surface of the water. Most of us have read "Alice's Adventures in Wonderland," and remember the strange creatures and remarkable scenes Alice saw underground. If you can fancy that we have removed a portion of this wondrous carpet of emerald green, and descended under the surface of the pond, you will see living creatures more wonderful than ever were raised by the fabled wand of the enchanter.

Only a weed, you will say—let us pass on. We will stop to look at it, for though only a weed, as you say, it's one of the most wondrous things in the whole vegetable kingdom. It looks like a festoon of tiny leaves that might have been chosen by one of the elves or fairies to fashion a garland with. So much for its beauty, but the noteworthy fact about it is that it is one of the very few plants in the world that reveal to the observer the remarkable feature of the swift circulation of the sap—the plant's very life-blood, which rapid circulation is called, in scientific language, cyclosis. Cutting off a single leaf of *anacharis*, and placing it on the stage of the microscope on a slip of glass—what do we see? Scores upon scores of brilliant green emeralds flashing in the light, and chasing each other in a swift and perpetual race round the cell-walls, now running straight up where the course favours that mode of motion, and now curving quickly round like an arch, until the brilliance of the display, and the perpetual movement of the cell-contents, weary the eye, and you seek rest—and another object. Before parting from this remarkable plant, we may state one or two further noteworthy facts concerning it. *Anacharis* is a native of America, and was first seen in Britain fifty years since. Although a very small plant, it increased with such rapidity as actually to interfere with the navigation of many of our canals and rivers, especially the Cam and the Trent. The stem of the plant is extremely brittle, and, when broken in pieces, each little bit speedily takes root, and becomes independent. Water-fowl, swans especially, are very fond of it as food, and everyone who keeps an aquarium will find *anacharis* invaluable for the aëration of the water and the maintenance of its purity.

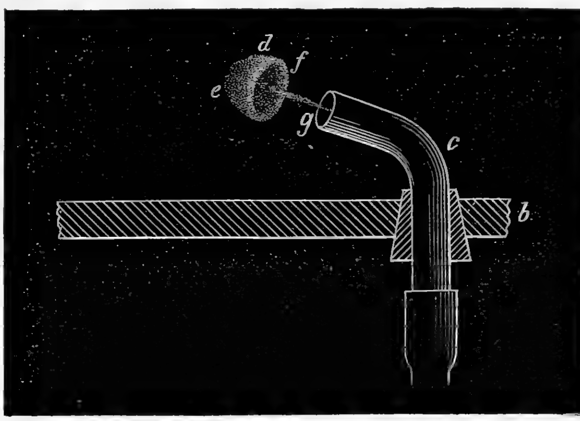
Instead of entering the pond in our researches, let us dip in a small bottle, and, having nearly filled the little vessel, we hold it up to the light to examine our capture the better. What are those remarkable-looking little green specks that are constantly moving about? Are they animal or vegetable? They are named *Volvox globator*, and the question of their inclusion in the animal or vegetable kingdoms has been hotly debated in the scientific world. One eminent man has set it forth in bold print that he will stake his reputation on it that *volvox* is an animal. However, scientific people, being only human, have been known to dogmatise on insufficient data, and it is now proved that *volvox* comes to us from the vegetable kingdom. Let us take a little glass tube and, placing it into our bottle of captures, examine for a minute the wonderful object—barely the size of a pin's head—which actually caused the scientific world to take sides. We place a few of the tiny green globules on a slip of glass on the stage of the microscope, and what do we see? During the two and a half centuries that have elapsed since the first workable microscope was made, the eye of man has not seen a more beautiful or more wonderful member of the minute world than that to which we now introduce you. Desiring to supplement my information about *volvox*, I looked up one of the authorities, but he had not found out the secret of Huxley's and of Tyndall's hold on their readers, that one may write about scientific subjects in plain English, and may make the subject as clear as an entry in the Directory, and yet full of interest. I refrain from inflicting the scientific bewilderment given by that author upon you, and quote instead a description of *volvox* which a distinguished Fellow of the Royal Microscopical Society (Mr. John Badcock) has given in "Vignettes from Invisible Life," one of the most delightful books on microscopical science ever written. "The *Volvox globator* is, as its name implies, a rolling globe, each sphere having within it a number of similar but only partially developed smaller spheres, or globes, the whole compound organism rolling and revolving in the water forms a picture which once seen is never forgotten. We call it a plant, for it is green and has very few of the ways of animal life. Yet you say it moves? Yes, they are motile plants, and if examined a little more closely are seen to be covered with fine cilia, or thread-like hairs, which by their constantly vibrating or lashing action are believed to be the cause of the revolving motion observable. It is a matter of common knowledge that all vegetable life seeks the light; now if a number of these *volvoces* be placed in a glass jar they will sink to the bottom when in darkness, but in the light will all arise, and congregate together at the side where there is most light. The cilia (thread-like hairs) already named are of great interest, and worthy of attentive study. Let us try to understand it. Looking now at one of those globes under slight pressure so as to keep it in one place, and with a high magnifying power we see that the entire surface of the little sphere is covered with a network of cells, each cell being a hexagon (produced by pressure) and each one is attached to its neighbour by a very fine thread which runs across from cell to cell. The whole membrane of the globe is thus seen to be so many distinct cells held together by this thread-like attachment. As the globe grows and expands these threads are stretched to their utmost limit, and finally a breach is made in the outer membrane, and the now matured inside globes make their escape, and begin an independent existence, repeating in their life-history that of the parent form. But no account that was ever spoken or printed can adequately convey to the mind the exquisite beauty and graceful motion of these pure green and transparent spheres. They are sometimes found in great abundance in rather shallow ponds and ditches and are always objects of keen interest to the beholder, especially when it is considered that all these wonderful things take place in an organism so small that the keenest vision can barely see it as a tiny speck, unless assisted by the microscope." Before leaving the subject of this wonderful little plant, you ask what is it that gives it the power of perpetually moving and revolving? This remarkable power of movement is given it by countless pairs of thread-like hairs, or cilia that are studded all over its surface. As long as the rolling-globe lives these hairs are in a continual state of agitation, how or why the wisest Fellow of the Royal Society is unable to tell us, but the motion of these minute hairs give rotary movement to the organism which revolves in the water with so much of beauty and grace that the observer is startled as delighted the first time he perceives it in the wonder-revealing tube of the miscroscope.

There was in our school-days, a certain big book with black boards and red edges, called "Smith's Classical Dictionary," and in that work is given an old Greek story which tells that there was a famous monster called Hydra that lived in a swamp near Lake Lerna in Argos, that it was so fierce and destructive that it laid desolate all the country in its neighbourhood, and whenever one of its numerous heads was cut off, two new ones grew on in its place, and one of the famed twelve labours of Hercules was to fight and to destroy the monster. No doubt the modern Hydra to which we are now going to introduce you, obtained its name from this old classic myth, and when its life-history first became known to scientific men, it created quite as much wonderment and excitement in the scientific world, as that of the fabled monster Hydra could have done amongst the Greeks. There is to this very day in the museum at Naples, a fine marble statue of Hercules. He is represented in the act of engaging the Hydra in mortal combat, and the nine-headed monster has leaped upon him with all its force. This creation in the enduring marble is suggestive of the creature now under our consideration. The difference between the story of the Greek poet about his Hydra, and the modern man of science about his Hydra, is that the latter has a history tenfold more wonderful, more interesting, and more full of instruction, with the added charm that every word of it is true. Just to think of it, that there is, at this very hour, in an Epping Forest pond, a Hydra with a real life-history more remarkable, a creature that does things more astounding than ever entered the heart of a Greek poet to imagine. Having dipped our little glass vessel, we succeed in securing a specimen of this wonderful animal, or polyp, as it is more accurate to term it. We hold this most remarkable of "pond lodgers" up against the light, and take a good look at him. The creature we happen to have taken captive is the variety called the Green Hydra, *Hydra viridis* is the name in the text-books. There are nine "business ends" to our captive Hydra, just like the Hydra in the Neapolitan marble of Hercules; each of these "business ends" are hollow tubes, and are "furnished with poisonous stinging-organs, which spring out with astonishing quickness the instant of contact with its prey, killing the smaller at once, and so benumbing the larger that they become quite helpless, and can be devoured at leisure." The absolutely true things observed and recorded of our Hydra, are more like a page out of Baron Munchausen than a record of sober fact from a science paper—but are matter of common knowledge to every student of minute life. "You can take our Hydra and cut off his head, and engraft it firmly and effectively on another whom you have beheaded, and you may exchange heads one Hydra with another. You can cut him up into forty or fifty pieces, and each piece will become a completely-formed and perfect Hydra. You can take a fine lancet, and cut him lengthwise, from head to base, and you will have a double-headed Hydra, and you can reverse the process, and have him single-headed with a double body. The creature may even be turned inside out, and its powers of adaptation are so great that it will continue to live and enjoy itself." The most ardent anti-vivisectionist may keep his mind easy, as the polyp suffers little, if at all, by these operations, for when his body has been cut in two lengthwise, as in a well-known drawing in "Contes Drolatiques," by Gustave Doré, the arms belonging to each side seize their prey as usual, and *Hydra viridis* goes on living his life as if nothing worth mentioning had happened. (*To be concluded next month.*)

# BOOKS TO READ

*What is Heat? A Peep into Nature's Most Hidden Secrets.* By Fredk. Hovenden, F.L.S., F.R.M.S. 370 pp. demy 8vo., and upwards of 90 illustrations. (London: W. B. Whittingham and Co., Limited, 1894.) Price 15s.

This book is wanting neither in boldness, originality nor courage of opinion on the part of the author. To say that his views upon the study of physical subjects are conventional would be incorrect, and it is a source for speculation whether future investigations will entirely confirm the theories propounded in this work. Two things are, however, very evident, Mr. Hovenden's earnestness and enthusiasm; to which may be added an honestness of purpose in trying to throw new light into an obscure subject. The author is clearly one of those students who do not take anything for granted; and, having to his own satisfaction enunciated a theory, or demolished a theory of some one else, he places his views before us plainly. The future will decide the vitality of these views.




The Birth of a Vortex Ring.
Fig. 32 in "*What is Heat.*"

In discussing the kinetic theory, he refers to it as follows: "Now the kinetic or dynamical theory also supposes that not only are these particles at a certain average distance apart but they are also in perpetual motion of impact or near impact and recoil, like so many atomic pugilists hitting each other or nearly approaching each other and recoiling in a linear direction, now hitting and approaching at one point then at another," etc.

Later the author figures the obverse and reverse of an Egyptian coin, over 2,000 years old, now in the British Museum, and says: "The kinetic theorists tell us that the particles (atoms or molecules) of which the coin is built up have been in a state of heterogeneous motion for these 2,000 odd years, a motion where the particles are impacting and recoiling, and after impact 'each molecule has its course changed and starts on a new path'—that is, the volume of the coin has been ever changing for over 2,000 years! Reader, use your good sense, can you imagine such a condition possible?"

We should like to quote considerably from this work had we space available, for it is one which will interest many people. We must, however, be content to suggest that our readers obtain the book for themselves, and we trust, when they come to discuss it, they will avoid arguments accompanied by actions like that of the molecules as described by "the kinetic theorists," who are so beloved by the author. The book is full of pretty and easy experiments, which are well illustrated. By the courtesy of the publishers we reproduce fig. 32, showing the birth of a vortex ring, which is followed by other figures or descriptions of its growth, differentiation, reproduction and death.

We will leave to our readers the pleasure of mastering Mr. Hovenden's own conclusions, for they would spoil by condensation. Whether they be right or whether they be wrong they are pleasantly told and are well worth examining. J. T. C.

*Short Studies in Nature Knowledge: An introduction to the Science of Physiography.* By William Gee. 321 pp. 8vo., with 117 illustrations. (London: Macmillan and Co., 1895.) Price 3s. 6d.

Mr. Gee has told his story brightly and with judgment, and his pictorial examples are judiciously selected. The work is divided into a dozen chapters, each treating of some great feature of the earth's surface. The titles of these chapters explain their contents, being such as "The Great Globe Itself"; "Mountains, Valleys, and Great Plains"; "Scenery and its Causes"; "Rivers and their Work," and so forth. Altogether it is a bright book, well suited to young people, and will make a good school prize.

*Wayside and Woodland Blossoms: A Pocket Guide to British Wild-flowers for the Country Rambler.* By Edward Step. 179 pp. small 8vo., with 128 coloured and 23 plain plates. (London and New York: Frederick Warne and Co., 1895.) Price 7s. 6d.

Messrs. Warne and Co., will receive the thanks of many people, both old and young, for placing within their reach this pretty little pocket companion. With its aid the country rambler will be able to make out the names of at least the 178 species of plants illustrated, and through them doubtless many more. Mr. Step's letterpress is concise, and, considering the small space at his disposal, he has got into the pages a large amount of information. Some of his translations of the scientific names are liberal enough, such as that of houseleek, *Sempervivum*: "As its scientific name (from *semper*, always, and *vivum*, fresh, green) indicates, it dies hard, and alike endures frost and drought. The descriptions accompanying the figures are very readable, and will, we hope, encourage many who use the book, to take, later, a more scientific interest in our wild flowers.

*Meteorology: Practical and Applied.* By JOHN WILLIAM MOORE, B.A., M.D., etc. 453 pp. 8vo. with 68 figures, 4 diagrams, 3 charts and 2 photographic pictures. (London: F. J. Rebman, 1894.) Price 6s.

We regret that we have not earlier had opportunity of noticing this very useful little work. It is one which should be on the shelves of every intelligent person living in the country. Of all the sciences meteorology seems to be the greatest laggard, but if behindhand in comparison with some of its sister sciences, there are the more opportunities for discoveries by its votaries. Dr. Moore has gathered together a mass of interesting material, which he has arranged with discretion, and placed before his readers in pleasing manner. The author divides his work into four parts, Part i. being Introductory; Part ii., "Practical Meteorology"; Part iii., "Climate and Weather"; Part iv., "The Influence of Season and Weather on Disease." The fifty pages devoted to the United States Weather Bureau, at first sight appears generous, but it was wise when viewed from the point of encouragement—or shaming—of our own authorities into more liberal support or even State management of the small Weather Department in Victoria Street. These pages are very instructive, and we find from them that the allowance voted by Congress, for the financial year ending June 1895, is $854,223, or roughly £171,000, showing clearly that our shrewd cousins must consider there is money's worth to be had from this large annual expenditure, or it would be quickly discontinued. The subject discussed in Part iv. is naturally, from Dr. Moore's professional insight, of great importance to the public. Everyone knows how a spell of bad or good weather sends down, or up, the death average. In this section of the work the author examines and sifts much valuable information on the effect of weather on infective and other diseases. Those chapters may be read with profit by members of the medical profession, as well as the general reader. The book is well produced, profusely illustrated and not overcrowded with technical terms. Dr. Moore has shown himself not only capable of dealing with the subject of Meteorology in popular scientific form, but has also produced a very successful work on the subject. J. T. C.

*Annals of British Geology*, 1893. By J. F. BLAKE, M.A., F.G.S. 386 pp. crown 8vo., with 90 illustrations. (London: Dulau and Co., 1895.)

We find from the preface that no important change has been made by Mr. Blake in the method of recording the geological literature of 1893. The number of geological contributions greatly increased in 1893, and form the largest number yet dealt with in these "Annals," in fact they stand as 730 as against 585 in 1890. An analysis of these articles shows the increase chiefly to have been in general geology, economics, and foreign geology, which latter has increased fifty per cent. This is, however, perhaps on account of the author of these annals having access to literature hitherto unavailable to him. We hope this work will be continued, though we fear, on account of Mr. Blake's absence from England, it is doubtful whether this is not possibly the last volume of the series, for the time being. Should this be so, it is to be deplored that Mr. Blake did not receive greater support in his useful work, from the geological public. J. T. C.

*Collected Papers on some Controverted Questions of Geology.* By JOSEPH PRESTWICH, D.C.L., F.R.S., F.G.S. 279 pp., crown 8vo. Illustrated by xiii. plates and 8 other figures. (London and New York: Macmillan and Co., 1895.) Price 10s. net.

This is a useful collection, for library and general use, of six well-known articles which have appeared elsewhere, by Professor Prestwich. They consist of (1) "The Position of Geology"—from "The Nineteenth Century," 1893; (2) "Considerations on the Date, Duration, and Conditions of the Glacial Period, with Reference to the Antiquity of Man," which has been revised from the "Quarterly Journal of Geological Society," 1887; (3) "On the Primitive Characters of the Flint Implements of the Chalk Plateau of Kent, with reference to the Question of Age and Make"—revised, with additions, from the "Journal of the Anthropological Institute," for 1892; (4) "On the Agency of Water in Volcanic Eruptions, and on the Primary Cause of Volcanic Action," revised from the "Proceedings of the Royal Society," 1885; (5) "On the Thickness and Mobility of the Earth's Crust, from the Geological Standpoint," revised from the "Proceedings of the Royal Society," 1888; (6) "On Underground Temperatures, with Observations on Certain Causes which influence Saturation and Imbibition, and on a Source of the Conductivity of Rocks; on the Thermal Effects of Heat in Mountain Ranges as affecting some Underground Temperatures," revised from the "Proceedings of the Royal Society," 1885. These excellent papers are so well-known to geologists and were so fully discussed at the time of their appearance, that it is unnecessary to do more than remind our readers that there are revisions and additions which should be referred to before again quoting any of the Professor's opinions and facts on these subjects. J. T. C.

*Sweet-Scented Flowers and Fragrant Leaves; Interesting associations gathered from many sources, and Notes on their History and Utility.* By DONALD MC DONALD, with Introduction by W. ROBINSON. 136 pp. 8vo, with 16 coloured Plates. (London: Sampson Low, Marston and Co., Ltd., 1895.) Price 5s.

The wonder is no one has previously thought of this title, for it is so suggestive of an old-fashioned flower-garden adjoining some ancient residence, where mezereons, jonquils, blue forget-me-nots and lilies-of-the-valley are followed by a fragrant host of others, as the spring advances into summer and lazy autumn. In his choice of illustrations, which are well treated and not over-coloured, the author has wisely chosen good old-fashioned flowers familiar to us all. The chatty fifty-three pages of history of the use of flowers as human civilization advanced, are entertaining, and include the old story, not now out of place, in connection with the presently discussed question of the scent of flowers being injurious to some hypersensitive people. It is told of a lady who fainted in the presence of roses, even if they were artificial. The letterpress forms a veritable encyclopœdia of hundreds of sweet-scented garden favourites. The book is just the present for a lady interested in them, and which, with a well-balanced mind, is not?—J. T. C.


| | | | | Position at Noon. | |
|---|---|---|---|---|---|
| | | Rises. | Sets. | R.A. | Dec. |
| | | h.m. | h.m. | h.m. | |
| | 1895. | A.M. | P.M | | |
| Sun ... | May 1 | 4.34 | 7.20 | 2.34 | 15° 5′ N. |
| | „ 11 | 4.17 | 7.36 | 3.12 | 17° 53′ |
| | „ 21 | 4.2 | 7.51 | 3.52 | 20° 12′ |
| | | Souths. | Sets. | | |
| | | P.M. | A.M. | | |
| Moon ... | „ 1 | 5.59 | 2.9 | | |
| | | Rises. | Souths. | | |
| | | P.M. | P.M. | | |
| | „ 8 | 7.38 | 11 51 | | |
| | | A.M. | A.M. | | |
| | „ 15 | 1.29 | 5.57 | | |
| | „ 22 | 2.53 | 10.56 | | |
| Mercury... | „ 1 | 4.34 | 11.46 | 2.18 | 13° 7′ N. |
| | | Souths. | Sets. | | |
| | | A.M. | P.M. | | |
| | „ 11 | 12.47 | 8.26 | 3.43 | 20° 47′ |
| | | P.M. | P.M. | | |
| | „ 21 | 1.11 | 9.39 | 5.6 | 25° 3′ |
| Venus ... | „ 1 | 2.33 | 10.46 | 5 0 | 24° 22′ N. |
| | „ 11 | 2.36 | 11.7 | 5 52 | 25° 25′ |
| | „ 21 | 2.47 | 11.18 | 6.43 | 25° 19′ |
| Mars ... | „ 1 | 3.48 | 12.15 | 6.25 | 24° 49′ N. |
| | „ 11 | 3.35 | 11.59 | 6.51 | 24° 23′ |
| | „ 21 | 3.22 | 11.40 | 7.17 | 23° 41′ |
| Jupiter ... | „ 1 | 3.37 | 11.54 | 6.14 | 23° 28′ N. |
| | „ 21 | 2.35 | 10.51 | 6 31 | 23° 21′ |
| | | Rises. | Souths. | | |
| Saturn ... | „ 1 | 6.18 | 11.30 | 14.8 | 10° 6′ S. |
| | „ 21 | 4.50 | 10 6 | 14.3 | 9° 39′ |
| Uranus ... | „ 1 | 7.50 | 12 24 | 15 3 | 16° 50′ S. |
| | | Souths. | Sets. | | |
| Neptune ... | „ 1 | 2.15 | 10.16 | 4.52 | 21° 6′ N. |

MOON'S PHASES.

| | | | | | |
|---|---|---|---|---|---|
| *1st Qr.* ... | May 5 ... | 1.16 p.m. | *Full* ... | May 12 ... | 8.12 p.m. |
| *Last Qr.*... | „ 19 ... | 4.6 a.m. | *New* ... | „ 26 ... | 12.1 a.m. |

THERE will be a brilliant shower of meteors on May 6th, the radiant point being $\alpha$ 338° $\delta$—2°.

MERCURY will be favourably placed for observation during the latter half of the month, as he sets two hours later than the Sun on the 30th, and his declination is considerably north.

VENUS will still be a brilliant object, setting comparatively late in the evening, and having a high north declination.

MARS sets about midnight in May, and is now so small on account of his great distance that he is not worth studying.

JUPITER must be observed early in the evening, as he sets about the same time as Mars.

SATURN will be well placed for viewing all through the month, except that his altitude is low.

URANUS is well situated this month, except for his south declination, but Neptune sets too early to be of any use.

IT is announced by "Nature" that Mr. Edward Crossley will present to the Lick Observatory the three-foot reflecting telescope, with its dome, for some time past at his Halifax observatory.

## MOUNTAIN SICKNESS.

PROFESSOR Roy, M.D., F.R.S., contributes to "Science Progress" an exceedingly well-considered paper upon Mountain Sickness, based upon Mr. W. M. Conway's experiences in the Karakorum Himalayas. The sensation, akin to sea-sickness, develops after exertion at altitudes of 16,000 feet and upwards. It varies in individuals, much as does the tendency to sea-sickness, becoming more distressing at higher altitudes, violent vomiting occasionally accompanying the other discomforts. Mr. Conway's party is said to have climbed higher than any other mountaineers on record, and those with him who suffered most severely were Gurkhas. Natives born and reared at 10,000 feet were as much affected as the Europeans of the party. Mr. Conway describes the general effect of high altitude upon their physical condition, as first shown in the diminished pace when they thought they were going as fast as at lower levels. The party stayed for four days at 16,000 feet in hope of becoming habituated, but in their case that result was not attained. Further up, when in enclosed places in the mountains, with sun hot, they felt the altitude badly by diminution in power, a desire to keep the arms from hanging at the side and general disinclination to do anything, even the observation of instruments being irksome. The least holding of breath produced giddiness and puffing. It became impossible to sleep upon the left side, as productive of heart palpitations. More comfort was found by night than in daylight, and in cloudy weather than in sunshine. The actual symptoms of mountain sickness are indicated by great difficulty in getting enough air into the lungs, causing anxiety, distress and fatigue. The respirations are rapid, short and gasping. Other indications are violent palpitations of the heart with quickened pulse, severe headache, giddiness, singing in the ears, diminished appetite, nausea with or without vomiting, bleeding at the nose and coldness of the extremities and livid features. A marked indication is an increasing indifference to danger, general loss of interest in anything, also tendency to sleep and spitting of blood from bleeding of the lips, gums, air passages and lungs. In severe cases the limbs may become paralysed, followed by loss of consciousness and perhaps death. Animals other than man appear to suffer equally. Mr. Conway took with him a Dudgeon's sphygmograph, with which instrument he obtained records of pulse curves of various members of the party at different altitudes up to his highest climb, viz., 23,000 feet. A diagram of these readings accompanies Dr. Roy's paper, but the irregularities do not seem to be so marked as one would expect when accompanying such violent discomforts. The experiences of other climbers, both in the Himalayas and the Andes, coincide as to altitude and general effects with the notes so carefully recorded by Mr. Conway, therefore the symptoms are not by any means geographically local, but the actual effect of altitude upon the animals which venture up to regions in which they are unaccustomed to live. I have, however, seen mules showing indications of mountain sickness at a much lower altitude in the Andes than the 16,000 feet claimed as the minimum height for it to affect man. On the descent, Mr. Conway states that the discomfort extended down until the party were below 13,000 feet.

JOHN T. CARRINGTON.

# SCIENCE GOSSIP

Professor G. Cole recently drew the attention of the Dublin Microscopical Club to a section of perlitic-obsidian from Sandy Brae, north of Tardree Mountain, co. Antrim. It represented a piece of probably the most beautiful example of unaltered perlitic glass in the British Isles.

Mr. W. Milner Christy has re-discovered in Scotland one of the rarest of the British Geometroid moths, *Nyssia lapponaria*, which has apparently only been found once previously in these islands. It is only known to occur elsewhere in the Upper Engadine. Mr. Christy found some larvæ last year which have produced this variety.

We have received reprints of papers on geological subjects from Mr. H. Bolton F.R.S.E., assistant keeper of the Manchester Museum. They include "The Metamorphism of Coal," "Some Fossil Trees at St. Helens," and a paper by Mr. W. E. Hoyle, F.R.S.E., and Mr. Bolton, on "Classified Cataloguing as applied to Palæozoic Fossils."

The Home Secretary, on the application of the East Riding (Yorkshire) County Council, has made an order prohibiting the taking or destroying of wild birds' eggs on the promontory of Spurn for a period of five years. Spurn Point is one of the chief places of deposit by sea-birds of their eggs on the Yorkshire coast, and it is stated of late years there has been wanton destruction of both sea-gulls and their eggs.

The "Annals of Scottish Natural History" for April, contain several articles of interest. Mr. W. Eagle Clark refers to the recent visitation of the little auk to Scotland, illustrating his remarks by a coloured map. Reference is also made to the "new British bird" shot at St. Kilda, in June, 1894. As many of our readers are already aware this was a wandering specimen of *Sylvia subalpina*, or sub-alpine warbler, which is a native of the Mediterranean shores.

The "Manitoba Free Press," the chief daily newspaper in North-west Canada, announces the arrival this winter, in Winnipeg, of house-sparrows. These must have been either designedly or accidently introduced. Considering the large amount of grain either growing or scattered about the towns of Manitoba, there seems every probability of these troublesome birds multiplying until they are a great source of loss to the farming population of the Province.

In a recent lecture at the Royal Institution, on "Atmospheric Electricity," Prof. Schuster discussed the effect of lightning upon trees, and remarked that statistics showed that forty-eight oak-trees are struck to one beech-tree, the ratio being dependent upon the amount of oily matter contained. In a thunderstorm the Professor said that the safest course for a human being was to get wet through to begin with, for Franklin had recorded that he could kill a rat when dry by a lightning discharge, but when wet never. Prof. Schuster expressed a hope that in the next Antarctic expedition due place would be given to researches upon atmospheric electricity at high latitudes.

We hear the remaining part of the late Mr. W. Machin's collection of macro-lepidoptera, referred to in these pages last month (*ante* page 45), is, after all, to be sold by auction in June next.

The "Observatory" for April contains a pleasing portrait of the late Professor Caley, the eminent mathematician, who for so many years edited the publications of the Royal Astronomical Society.

A variety of stoat, found in Ireland, is claimed by Messrs. Oldfield Thomas and G. E. H. Hamilton, to be a distinct species, for which they propose the name *Putorius hirbernicus*.

Writing to "Symons's Monthly Meteorological Magazine," last month, Mr. C. Leeson Prince, of Crowborough Observatory, Sussex, noticed a fall of snow-crystals and minute speculæ of ice, from a perfectly cloudless sky in brilliant sunshine, on February 6th last.

We greatly regret to hear of the serious illness of the Right Hon. Thomas H. Huxley, F.R.S., who has been in a critical state of health for some time past at his residence at Eastbourne. We trust he may recover strength with the approaching summer.

The London Geological Field Class commenced their Saturday afternoon excursions under the direction of Professor H. G. Seeley, F.R.S., on April 27th. Information on this subject may be obtained from the secretary, Mr. R. H. Bently, 31, Adolphus Road, Brownswood Park, London.

The interest in cave exploration in Ireland continues. In the April number of the "Irish Naturalist," Mr. R. J. Nosher, J.P. concludes an article on the subject, with a list of ten caves in co. Waterford. Mr. Coleman also draws attention to others in co. Cork and co. Kerry. The list of Irish caves is rapidly increasing.

We regret to see the announcement of the death of Mr. A. G. More, F.L.S., M.R.I.A., formerly Curator of the Natural History Museum, Dublin, and joint author of "Cybele Hibernica," the standard Irish botanical manual. This brings back memories of a happy visit to co. Wicklow the Editor of Science-Gossip spent with Mr. More.

Since the publication of the article on the newly discovered gaseous constituent of the atmosphere, termed by its discovers Argon, in the March number of Science-Gossip, some new facts regarding this new substance have been brought to light. In the first place Professor Ramsay has discovered in a mineral, cleveité, a new gas, Helium, which, up to the present time, was supposed to exist in the solar regions only. It is considered possible that atmospheric Argon contains, besides Argon, some other gas which has not yet been separated.

In May, 1893, the "Emily E. Johnson" set sail from Baltimore, bound for a three-months' scientific cruise to the Bahamas. In a recent number of the "Natural History Bulletin," published by the State University of Iowa, a well-written and well-illustrated account is given of the expedition by Mr. C. C. Nutting. In Egg Island the "agaves" or American aloe plants, or "pita plants" as they are called by the natives, excited much attention. The great sword-like fleshy leaves grow from four to seven feet in length, and are tipped with a sharp thorn. The fibre of the leaves is used in the manufacture of cordage, a very paying industry to the Bahamans. In the sandy open places bristled the prickly pear cactus with its yellow flowers and globose fruits. Near there was found one of the most beautiful of the Leguminosæ, a trailing pea-vine with showy lavender blossoms almost two inches long.

# SCIENCE ABROAD

THE AMERICAN JOURNAL OF PHARMACY (Philadelphia, March, 1895) contains, among other articles, *Structure of Cimicifuga*, by Mr. Edson S. Bastin, which is illustrated. *Cimicifuga racemosa*, the black-snake-root of America, is native of Eastern Canada and United States, down to Florida. A drug is made from the knotty rhizomes, which is said to be an insectifuge, whence the generic name of this genus of the Ranunculacæ. Mr. P. L. Simmons, F.L.S., continues a series of *Notes on some Saps and Secretions used in Pharmacy*. A short article by Mr. Hans M. Wilder, on *A Cheap Substitute for the Selenite*, will interest microscopists. Having mislaid his selenite plates used in polarizing, the author bethought himself of trying mica, from a store door. To his agreeable surprise, he found it fully equal to any ordinary selenite, and obtained colours quite as brilliant and as handsome. He claims two advantages for mica; the one, cheapness—a piece of mica costing two cents, against the same size costing one dollar or more in selenite—and that mica can be cut with a pair of scissors without breaking it. "Quite a variety of beautiful colour effects may be obtained by either using mica plates of varying thickness, or merely using two or more layers of thin plates superimposed. Three plates of varying thickness will be all that is necessary to keep." It is best to select the clearest pieces. He uses strips about one and a half inches wide, and somewhat longer than the stage of the microscope.

THE POPULAR SCIENCE MONTHLY (New York, March, 1895), contains several articles of interest. Dr. Bela Hubbard tells us *The Lesson of Forest Fires*. The author refers to the great forest fires of August last, when large districts of Wisconsin, and Minnesota were devastated, and many inhabitants, both human and otherwise, were consumed, and those of 1871, when in the same districts over 3,000 miles of forest was burned. He refers also to the marked difference of the forests of America since civilized man came among them; this being largely caused through fires by his agency. He holds, although there is not entire agreement among scientific men on the point, that since the great forests have been so much burned in the States, the local climate has changed, the temperature being hotter in summer and colder in winter, caused by the winds, which having greater sweep, dry up and refrigerate the ground. He calls for greater preservation of forests, though there are already forest reservations for public recreation and climatic effects to the extent of upwards of seventeen million acres scattered over the Union. He suggests that the forests should be put under military control and the national army used as a department of forestry, when not otherwise occupied. *The Highest Mountain Ascent and the Effects of Rarified Air* are described by Mr. Edwin Swift Balch. There seems to be some doubt as to the highest climb, and Mr. Whymper, the well-known mountain explorer states that he does not think anyone could reach 24,000 feet altitude, without extreme physical suffering on account of the rarified air. So much as 28,000 feet is claimed by one gentleman. From experiences in the Andes, Mr. Whymper suffered severely at 21,424 feet on Chimborazo, while Dr. Gussfeldt and party found no trouble on Aconcagua at 21,000 feet. The agony of mountain sickness may vary to some extent according to alterations in the atmospheric pressure, caused by weather changes.

THE OPEN COURT. Nos. 393 and 394. March 7th and 14th, 1895. (Chicago.) As stated in the subtitle of this well-known journal, it is "Devoted to to the Religion of Science." The science of Ethics occupies most of the pages of these two numbers, but there is an article on *The Kingdom of Protista*, by Professor Ernst Haeckel, being sections 35 to 38 of of the new phylogenie.

THE CANADIAN ENTOMOLOGIST (London, Ontario, April, 1895) contains a useful article on "Mounting Insects (as microscopic objects) without Pressure." In mounting without pressure some kind of cell is necessary, but Mr. R. W. Bennie, the writer, says his experience is that the cells are liable to separate from the glass slip when of ebonite, brass, tin, etc. The material found most useful is beeswax, with a small quantity of resin added. The cell is constructed while this material is at boiling point, the turntable being set in rapid motion. This cell answers for mounting with Canada balsam or glycerine jelly, but not for media containing oil, unless the inside of the cell is well varnished. The rest of his paper is devoted to the best media for mounting semi-transparent insects. His process of preparing the object is very simple, as he uses crystal carbolic acid and turpentine prepared with alcohol.

THE MUSEUM. (Vol. i, No. 5, March 15th, 1895. Albion, N.Y.) This is a new monthly magazine "devoted exclusively to research in Natural Science." By some of its contributors it is no doubt thought it will become a "live" journal, and we trust it may, with the support it deserves. It is a thoroughly popular collector's medium and will, we are sure, do much in spreading a taste for natural history studies in the States, where there is plenty of room for that interest, as well as some others. The exchange list extends to half-a-dozen columns, each notice, by the way, being charged a shilling or upwards for each insertion. The most important article is one on the *Rodents of Michigan*, by Morris Gibbs, "which practically embraces these mammals of the Great Lake Region." We notice that "the beaver still thrives in the Upper Peninsula, and is said to be increasing in several sections." This appears to be on account of the low prices paid for the pelts not making their slaughter worth while. Mr. Gibbs, however, thinks it only a question of time for these animals to become extinct in his districts. *Among the Rockies*, by M. J. Elrod, is a chatty article on Pike's Peak and other places in that fascinating region. In some *Notes on Antrostomus vociferous*, Mr. J. W. Bowles mentions the training of dogs to hunt for birds' nests. He says, "this is a very certain method of hunting nests, though some time and patience is needed in training the dog, who must also be taught to think an egg a combination of white lead, strychnine and cayenne pepper." *Anstrostomus*, which is better known in the States as "Whip-poor-will," appears to have different habits on the eastern side of the Continent than further west. For instance, in Michigan it nests "in the forest" but in Massachusetts the writer considers it affects high, scrubby ground, building in much-travelled clearings. There are many points of interest in the account of these goat-suckers.


ARUM MACULATUM WITH WHITE SPOTS.—On March 31st, while looking into the hedgerows for signs of spring in the shape of opening leaves, I found three leaves of *Arum maculatum* spotted white in the place of the usual brown spots. Can any readers of SCIENCE-GOSSIP tell me if this is very unusual? I think it must be, never having seen any so marked before.—*Robt. W. Chidwick, 4, Dagmar Street, Worthing: April 8th*, 1895.

IVY-SEEDS CARRIED BY BIRD.—A gentleman happened to observe among the fasces of a bird some pink-coloured bodies, which he thought to be seeds of some kind or other. He planted them in a pot, when they turned out to be *Hedera helix*; but they were not *Dicotyledonous*, as is usual, but *Tricotyledonous*. I should like to know if it is rare to find *Hedera* (ivy) *Tricotyledonous*; if not, I think that this case may be worth recording. *Hedera* belongs to order Umbelliferæ and family Araliaceæ (Goebel).—*J. H. Barbour, Queen's College, Belfast*; *March*, 1895.

THE SPRING SEASON.—Plants this spring are in the south of England, exceptionally late. This may be attributed to some extent to the comparative absence of rainfall. At Eastertime, or April 15th, there was no sign of the blackthorn in bloom in localities where it was well in flower, and even over at the same period last year. The almond trees in the London gardens were also exceptionally late in flowering. It is not probable that the late severe winter added much to this delay, but rather it is to be attributed to the paucity of warm rain. March, and the following month having been very dry until April 24th.

IMPATIENS NOLI-ME-TANGERE.—It may interest your readers to know that I find each autumn this beautiful and eccentric plant, the "touch-me-not," to which you refer (*ante* page 23), in abundance at the following places, within cycling distance of London: (1) Along the banks of the Wey, from Cart Bridge, Woking, towards Pirford; (2) by the sides of the brook on the left-hand side of the road leading to Weybridge, from Addlestone; (3) by the sides of the ditches bordering the road leading from Colnbrook to Longford.—*J. C. Dacie*, 105, *Upper Richmond Road, Putney*.

[Does not our correspondent refer to *Impatiens fulva*, rather than *I. noli-me-tangere*?—ED.]

PLANTS UNDER GLASS.—In a recent number of the "Kew Bulletin," it was stated that the use of green glass in the plant houses at Kew will be now altogether abandoned. Since 1886, the use of green glass has been discontinued in all the houses except the fern houses and the palm house, but it having been proved by experiment that even filmy ferns thrive better under white than under green light, if direct exposure to the sun is excluded, the green glass will no longer be used. M. Villon, some months ago, found that the light that favours vegetation most, is the orange light of the chromic glass, and the violet light of the manganic, and as the radiations that these glasses allow to pass are the red and violet, these rays seem to be the most favourable to the development of plants.

THE POPULARITY OF BOTANY.—It has often been a cause for wonder how it is that there are so few popular botanical societies. It is true that most field clubs include this study among their other objects, but we know of hardly any societies where those who take an interest in botanical rambles may meet and exchange notes or assist each other in identification. Can anyone tell us whether there be one such society in the whole of the metropolitan district of London, which has a population greater than that of the kingdom of Belgium? There must be a great number of persons interested in plants, not only in the metropolis, but also within easy reach of each other in various parts of the kingdom, who would be pleased to meet for winter conversations or summer rambles.

ABNORMAL EQUISETUM.—I send you some fruiting stems of *Equisetum maximum* which I gathered here yesterday. You will see that the cones are nearly normal at the base, but at the top they are divided each into several very small cones which are more or less perfect in themselves. I do not know if this is a common abnormity, but it may be interesting to some of your readers.—*Frank Sich, jun., Niton, Isle of Wight; April 17th*, 1895.

[These specimens are indeed unusual. The extra branches shoot out from the upper end of the fruiting stem to a length of from one quarter inch to nearly an inch in length. They vary in number from three to seven in different specimens. Each branch is perfectly covered with fruit as in an ordinary spike. Possibly the specimens were bruised when immature, and thus sported in the new growth.—ED.]

MR. F. F. BLACKMAN, Demonstrator of Botany in the University of Cambridge, has been making a series of experimental researches on vegetable assimilation and respiration, and has published some of the results of his new method of investigating the carbonic acid exchanges of plants in the "Proceedings" of the Royal Society. He finds that under normal conditions practically the sole pathway for $Co_2$ into or out of the leaf is by the stomata, and since oxygen diffuses more readily than $Co_2$ through fine openings, the same probably holds for oxygen and the whole of the gas exchange. While on the subject of the paths of gaseous exchange between aerial leaves and the atmosphere, it may be interesting to state that the oxygen evolved in six hours' time under the action of moderately strong sunlight has been calculated to be as much as would be absorbed by the process of respiration in twenty-four hours.

FRUITING OF EUONYMOUS JAPONICA.—Here, for the first time, I have seen this plant in fruit, and that only upon two specimens, one on a small shrub of about four feet high, almost covered with fruit; the other a plant of larger growth, some eight or ten feet, with only a very few capsules on the top. In this neighbourhood, the Japanese spindle-tree is a favourite shrub with those planting shrubberies or forming screens, and many hundreds are planted. Since seeing Mr. Eccles' note upon this shrub in SCIENCE-GOSSIP (*ante* page 16), I have kept a sharp look out for capsules, both in the park and in private grounds, but have not found any but the two mentioned. They are both growing in front of cottages with a southern aspect. Now the question arises, why do these plants so rarely fruit? I think the botanical students who read SCIENCE-GOSSIP might try to explain this fact. I have been trying to unravel the cause myself, but so far have failed. —*Robt. W. Chidwick*, 4, *Dagmar Street, Worthing; March 13th*, 1895.

## GEOLOGY

Neolithic Remains in Kent.—At a meeting of the Bromley Naturalists' Society, held on March 13th, Mr. A. S. Kennard read an interesting paper on "Neolithic Settlements at West Wickham" and exhibited a large number of beautiful flint implements which he had found on the fields in that neighbourhood. From a careful study of these implements he said he had arrived at the conclusion that there had been three successive settlements at West Wickham in neolithic times, and showed that in all probability more time had elapsed between settlement No. 1 and settlement No. 3, than between No. 3 and the present day.

Early Man in Britain.—While *Pithecanthropes erectus* is still the subject of animated discussion, we hear of the discovery of a low-type human skeleton in the Thames valley, under circumstances which indicate that it is of considerable antiquity. A detailed account of the find is said to be in preparation for the press. It will be remembered that portions of a human skeleton, bearing a striking likeness to the Neanderthal man, were unearthed during the excavation of the East and West India Docks extensions at Tilbury, and described by Sir Richard Owen, in 1884, so that there is nothing improbable in the above-mentioned report. Anthropologists will be fortunate, indeed, if the newly-discovered bones can be accurately described and safely housed before they are overtaken by that ill-luck which so persistently attends the discovery of human remains in this country.

Section of the Chalk at Croydon.—I am obliged to Mr. E. A. Martin for his remarks on this subject, and am well acquainted with the facts he mentions. I think, however, that if he had taken the trouble to visit the section he would not have suggested that the deposit in question is of recent alluvial age. I have again examined the section, and have not the least doubt that it shows the junction of the chalk with the Thanet sand. Although not abundant, I found several of the green-coated flints typical of the base of that deposit. The sand is identical in appearance with that of the Thanet outcrop a mile or so to the north, and I am not acquainted with any recent drift which shows ten or twelve feet of clean buff sand. Moreover, this outlier is almost wholly above the 500-foot contour line, and therefore occupies some of the highest ground in the neighbourhood. As to the deposit on the sides of the hills, a glance at the varying colours of the upturned soil and the irregular distribution of the vegetation suffices to show that a dressing of drift, or the detritus of older deposits still overlies the chalk. I have been able to trace the remains of the Thanet sand almost continuously from the above-mentioned outlier to the outcrop of the bed at Crohamhurst and Ballards. It is also interesting to note that pieces of Wealden ironstone are to be found on these fields, and, unless they have been accidentally transported thither by human agency, they can only have arrived there when the drainage of the country was entirely different to what it is at present.—*A. Absell, Jun., South Norwood.*

## MICROSCOPY

Vegetable Sections.—I beg to thank your correspondents for their information about Section Cutting (Science-Gossip, N.S., vol. ii., page 46). I have got Strasburger's book, and have read Bower's. I have tried to get Dr. Marsh's book, but I am told it is out of print. Could anyone tell me where I can procure a copy? My best results have been in cutting sections from alcohol material, staining with eosin, clearing in oil of cloves, and mounting in balsam and benzole. My greatest difficulty is fixing the stain.—*Isaac Stephenson, Accrington; April 16th*, 1895.

Cauthocamptus Minutus.—During the last month I have examined many individuals of this interesting entomostracan, and have paid special attention to the organ carried by the female, which is described by Dr. Baird, as "a very singular horny-looking, club-shaped organ, fastened to the body by a narrow elongated stalk." I have noticed in every individual I have examined, that this organ passes through the ovary, just within the surface nearest the body, and it appears to me that this organ is a support for the ovary, carrying it in a rigid position, and so providing against the danger of damaging the contents of the ovary, which would be likely to obtain if attached directly to a segment of the abdomen. Moreover, *Cauthocamptus* is in the habit of doubling the posterior portion of the body over the anterior, and the position of this organ would protect the ovary from the blow, on the body returning to its normal position. Up to now I have not observed the transit of the ovary to its carrying position.—*C. W. Maw, Bradford, Yorks.; April*, 1895.

Sections of Eye of Codfish.—I am sure we are all pleased with the New Series of Science-Gossip. It ought to have a large circulation, especially as you intend augmenting the Microscopical Department. This will be of value to us amateurs, who, though possessing a great love for nature and the microscope, yet find ourselves much limited by time, means, and isolation. We are, therefore, glad to avail ourselves of hints from the experienced workers who will thus kindly help us to the enjoyment they themselves desire. I have been making sections from the crystalline lens of cod-fish, with the object of rendering the beautiful wavy lines that pass through the ball as clear as possible. I first boiled the eye somewhat until fairly firm, and then cut. I stained two sections with aniline, blue and red, one with carmine, and left one clear. I mounted dry. I tried mounting in balsam, but found it made the sections too transparent. As far as I can judge, the apex of the waves are about $\frac{1}{1000}$-inch apart, and the lines about $\frac{1}{2000}$-inch, thus requiring about 500 × dia. to show them; under 50 × or 100 × they appear just lines. Perhaps some of your readers will kindly say if they know of any special way of mounting these sections, and what is the use or cause of these lines.—*Jas. Tomlinson, 280, New Hall Lane, Preston; April*, 1895.

# NOTES & QUERIES

COLLECTING DIPTERA.—I am thinking of taking up the study of the Diptera, and should be glad if you would be so kind as to give me a few hints as to the best way to set about it. I know only a very little about entomology, having hitherto taken no interest in insects other than moths and butterflies. Is there any book on the dipterous insects to be had? Perhaps some of the entomological readers of "SCIENCE-GOSSIP" would help me to a wrinkle or two.—*E. P. Oates, Moat Bank, Alrewas, Burton-on-Trent; April 16th*, 1895.

PRESERVATION OF COLOURS OF SHELLS.—I find that the colours seem to sink when certain species of shells become dry. Could any of your readers, through the pages of SCIENCE-GOSSIP, tell me the best means of fixing the colours without having to use anything in the nature of a varnish. From some specimens I have purchased from dealers, I conclude there is something that is used which will stand washing, and at the same time does not give the shell an appearance of having been artificially treated.—*A. K. Lane*, 11, *Geneva Road, Fairfield, Liverpool.*

VALVATA PISCINALIS AS A SPINNER.—I do not know whether *Valvata piscinalis* is well-known as a thread-spinner? It is not included in the lists which I have seen. A few days ago I noticed some immature specimens from this neighbourhood, while in captivity, actively engaged in thread-spinning. Their usual mode of procedure was to crawl up the side of a glass vessel nearly to the surface of the water; they then gave one or two twisting motions, and crawled out on the under surface of the water, leaving a thread joining them to their point of departure. They then either sank slowly, remained floating, or sank about half way, where they stopped. In either case the thread could easily be demonstrated with a pin, and though in most cases sufficiently strong to raise them to the surface, I have not been able to withdraw them entirely from the water by its means.—*Arthur E. Boycott, The Grange, Hereford; April 8th*, 1895.

LUMINOUS CENTIPEDE.—As I was coming up our garden last night I saw what appeared to be an unusually bright glow-worm. It was raining fast and so cold that this sight surprised me. On picking it up it turned out to be a slender pinkish-coloured centipede about one and a half inches long. I carried it indoors and placed it under a glass, but did not notice any further luminosity. I am curious to know if this is a special species of centipede gifted with the glow-worm's power of showing a tiny lamp, or whether it was accidental. The creature is quite lively this morning, so the light could not have been due to decomposition, such as I have seen on dead fish or fungi. Perhaps one of your readers could enlighten me on this subject. I will endeavour to keep the centipede in case anyone cares to identify the species.—*Annie M. Mann, Grange House, Chigwell, Essex; March 21st*, 1895.

THE LATE FROST.—I have read with great attention the paper on "The Frosts of the Century" (*ante* page 3). As I live on a hill, in a house facing east, with windows and doors none too close-fitting, my experience of the frost was severe. I have many reminiscences also of the frost of 1881 and 1891, such as the lid freezing to the teapot, water freezing in bedroom over a fire-heated room, etc. This year an unprecedented thing happened. The ink, corked down, five feet from the fire-place (there was a fire all day), was frozen, so also was ink corked and shut in a desk. Everything liquid in the house, excepting turpentine and oil (olive oil did freeze) was frozen. A hot-water bottle in a bedroom—a fire was in the room every night—although within a yard of the fire, split all down. The water for breakfast was placed in the fender, and was frozen in the morning. I have never known the ink to freeze before this year.—*S. A. Ladkin, Stowe, Weedon; March 8th*, 1895.

PIGMY FLINTS.—I have read with interest the Rev. Mr. Gatty's paper in SCIENCE-GOSSIP (*ante* page 36), on the subject of "Pigmy Flints." He there ascribes the chipping on the edges of these flints to human workmanship put on the flint. I have been long acquainted with pigmy flints, and have come to regard the flaking or chipping on their edges not as the result of workmanship bestowed on the flint before being used, but as having resulted from usage of the flint. By way of illustration I have just taken a small crescent flint, which happens to be an ancient flake, about the size of the crescent figured on page 36. I examined it with my lens, and found that there is no chipping on any of the edges. I then used it, as one would do a bit of glass, in throwing off a few shavings from my hammer shaft, and again examined it with my lens. I found that the edge I had worked with was chipped along its entire length. I have also long since come to the conclusion that what is known in archæological language as "secondary chipping" is not the result of workmanship bestowed on the flint, but as that of work done by it after the flake had been trimmed.—*J. Smith, Monkredding, Kilwinning; April*, 1895.

CURIOUS BEHAVIOUR OF CADDIS-WORM.—Mr. H. B. Guppy's note on "Caddis-Worms and Duckweed" (*ante* page 11) reminds me of a curious and amusing incident which took place in my aquarium last summer. I had three specimens of these larvæ, and found great interest in watching their movements and habits. Two of them had cases composed entirely of sand grains and very small fragments of other material, whilst the third was distinguished by the addition of a small twig and a piece of straw, both of which overlapped the extremity of his case by about a quarter of an inch. I noticed that it was continually followed about by one of the other caddis larvæ, which was often to be found hanging on to the end of the twig. In about three days it had succeeded in detaching the portion of the twig that projected from its neighbour's habitation, and was wearing it about upon its own back. Not even then satisfied, it shortly afterwards commenced a similar attack upon the piece of straw, and on securing possession of a fragment, perched it sideways just over its head. I ought to mention that there was plenty of sand and pieces of water-plants eaten off by snails in the aquarium, so that lack of building material cannot be urged as the reason for this caddis-worm's behaviour.—*F. G. Bing*, 16, *Lower Coombe Street, Croydon; April 6th*, 1895.

## ZOOLOGY

The Cornish Chough.—The Home Secretary has issued an order prohibiting any person from taking or destroying the eggs of the Cornish chough. This sub-family of the crows is represented with us by the red-billed or Cornish chough, and the bird is now restricted to certain localities in the south-western counties of England, parts of Wales and the Isle of Man. It is still by no means rare in localities in Ireland. It also occurs in some of the western islands of Scotland as far north as Skye. In the mountains of Switzerland the Alpine chough occurs, in Australia the sub-family is represented by the white-winged chough, and there are some curious desert choughs which inhabit central Asia.

The Sallows in Yorkshire.—On Good Friday, April 12th, I accompanied my friend, Mr. W. Hewitt, of York, to the sallows in bloom at Strensall. While waiting for darkness we had the pleasure of taking *Lobophora carpinata* (*lobulata*) in considerable numbers at rest on the trees. At the sallow bushes we found that *Tæniocampa munda* was fairly common and variable, the var. *immaculata* being about as numerous as the type. The commoner insects of the same genus were out in force, and some nice forms of *T. incerta*, *T. stabilis*, and *T. gothica* were boxed, but only one *T. populeti*. The usual sprinkling of such things as *Anticlea badiata* and *Larentia multistrigaria* was enlivened by the occurrence of four fine examples of *Panolis piniperda*, while *L. carpinata* also came to the catkins. On the Saturday the wind chopped round to north-east and sallows were unproductive, still we added *Xylocampa areola* to the list. Unfortunately the cold wind endured for the remainder of the holidays.—*W. Mansbridge*, 9, *The Green*, *Stratford*, *E.*

Locusts in London.—The repeated involuntary appearance of *Œdipoda tartarica* in London is certainly very interesting. The three other species of locusts in our lists, viz. *Pachytilus migratorius*, *P. cinerascens*, and *Schistocerca peregrina* are all true migrants. The two first-named species appear at intervals, occasionally in some numbers, as for instance, *P. migratorius* at Cheddar, in 1874, and the last-named species having been taken in considerable numbers in 1869. All these instances are clearly straggling portions of flights, no locust in an immature state ever having been recorded in Great Britain. There seems good reason to suppose that this species, which is better known under the name of *Acridium ægyptium*, and is the largest of the European species, may be the locust of Holy Scripture, and its body is certainly large enough to render such an idea probable; possibly, however, the scriptural locust included more than one species. In addition to the three specimens recorded by Mr. Sauzé, one of which he has most kindly given to me, I have heard of a fourth specimen taken last month in Covent Garden market. It is certainly strange how so large and active an insect can allow itself to be packed up in a crate of cauliflowers, and not be noticed by the packers.—*C. A. Briggs*, 55, *Lincolns Inn Fields*; *April* 11*th*, 1895.

## TRANSACTIONS

Royal Meteorological Society.—At the meeting of this Society on Wednesday evening, the 17th inst., which was held at the Surveyors' Institution, Westminster, Messrs. F. C. Bayard and W. Marriott communicated a paper on "The Frost of January and February, 1895, over the British Isles." The cold period which commenced on December 30th and terminated on March 5th, was broken by a week's mild weather from January 14th to 21st, otherwise there would have been continuous frost for 66 days. Mr. Birt Acres also read a paper on "Some Hints on Photographing Clouds."

Royal Institution, Albemarle Street, London.—The following are the lecture arrangements after Easter:—Professor George Forbes, three lectures on "Alternating and Interrupted Electric Currents"; Professor E. Ray Lankester, four lectures on "Thirty Years' Progress in Biological Science"; Professor Dewar, four lectures on "The Liquefaction of Gases"; Dr. William Huggins, three lectures on "The Instruments and Methods of Spectroscopic Astronomy" (The Tyndall Lectures); Mr. Arnold Dolmetsch, three lectures on "Music and Musical Instruments of the Sixteenth, Seventeenth and Eighteenth Centuries—(1) English, (2) French, (3) Italian—with Illustrations upon Original Instruments"; Mr. Seymour Lucas, two lectures on "Picture Making"; Professor Edward Dowden, two lectures on "Elizabethan Literature: (1) The Pastoral, (2) The Masque." The Friday Evening Meetings were resumed on April 26th, when a discourse was given by Dr. John Hopkinson, on "The Effects of Electric Currents in Iron on its Magnetisation"; succeeding discourses will probably be given by The Earl of Rosse, Veterinary Captain Frederick Smith, The Hon. G. N. Curzon, M.P., Professor Walter Raleigh, Mr. J. Viriamu Jones, Professor Alfred Cornu, and other gentlemen.

Norfolk and Norwich Naturalists' Society.—The annual meeting was held on Tuesday evening, March 25th, 1895, at the Castle Museum, the president (Dr. Plowright) in the chair. The following officers and committees were appointed for the ensuing session:—President, Mr. H. D. Geldart; treasurer, Mr. W. H. Bidwell; the vice-presidents, hon. secretary, auditor, Journal and Excursion committees, were re-elected. Messrs. F. C. Hinde, A. Mayfield, and J. Reeve were elected to serve on the general committee, in place of those who retire, according to the law. Alterations in the laws were made as follows:—"That the meetings of the society take place on the last Monday in the month, instead of on the last Tuesday; and that the composition fee for life membership be raised from £3 to £4." The treasurer's report was read and adopted. The president (Dr. Plowright) then delivered his address. After giving a *résumé* of the papers and communications which the society had received during the past year, as well as accounts of the excursions, and referring to its satisfactory financial condition, it was stated that the present membership amounted to 275. He devoted the rest of his address to the subject of the mildew in wheat, which, although a well-known theme, has recently had fresh light thrown upon it.

North Staffordshire Naturalists' Field Club and Archæological Society. — The third evening meeting of the Winter Session of this Society was held in the Town Hall, Stone, Staffordshire, on the February 19th last. There was a large attendance, and the exhibits included a fine collection of clutches of birds' eggs, each containing a cuckoo's egg, shown by Mr. Wells-Bladen, and heads of deer, belonging to Mr. Basil Fitzherbert, and other subjects. A report of the last meeting of the British Association, on subjects of interest to the Club, was submitted to the meeting by Dr. Arlidge. Two most interesting papers, by Dr. McAldowie, on "Notes on Bird-Life during the Severe Weather of January and February, 1895," and by Mr. Robert McAldowie, on "An Ornithological Excursion," were read. A discussion was opened by Mr. John R. B. Masefield, M.A., on the "Wild Birds Protection Acts," and resolutions were passed, inviting the Staffordshire County Council to apply to the Secretary of State for an Order to prohibit the taking or destroying of the eggs of barn-owl, goldfinch, nightjar, great crested grebe, curlew, spotted flycatcher, pied flycatcher, wagtail, swallow, martin, sand martin, swift, and tree creeper, in the County of Stafford, and reasons were set forth in support of the application.

# NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s.* 6*d.* for twelve months (including postage), are now due.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

## CORRESPONDENCE.

R. W. Chidwick (Worthing).—Not unusual; several species of rhododendron bloom in March and April.

J. Burns (Swansea).—Your specimen and bottle were broken in post. We returned it to you, but it has come back with charges, and marked "not known." It is our rule to only notice communications with full name and address.

C. Rea (Worcester).—The box and contents were badly broken in post. All the moths are specimens of one species, *Diurnea fagella*, which is subject to much variation. Stainton's "Manual," read in conjunction with the serial literature on the Micro-lepidoptera since it appeared, is still the best; Morris is sometimes useful, but uncertain for identification.

J. Harrington (London, N.).—The office of Science-Gossip was moved from St Martin's Place many years ago. The National Portrait Gallery stands on the site.

## EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Mactra exoleta; Ranella pulchra and other good shells offered in exchange.—Please send lists to Mrs. Carphin, 52, India Street, Edinburgh.

Duplicates. — Larvæ of Hispidaria; desiderata very numerous, lepidopterous larvæ preferred.—A. M. Montgomery, 32, The Grove, Ealing, W.

J. H. Stewart's "Lord Bury" telescope, in leather case, with straps, cost 50s.; will exchange for good binocular of equal value.—J. E. Lord, Rawtenstall.

Wanted, diatoms, mounted or unmounted; slides of palates of Mollusca offered in exchange. — A. Alletsee, Clifton, Milward Crescent, Hastings.

Microscopic Slides.—Over 100 slides of various subjects in exchange for stove and greenhouse plants, flowers, ferns, etc.—John T. Neeve, 4, Sydenham Road, Deal.

"British Naked-Eyed Medusæ," by Forbes (Ray Society), micro. slide scale of sole, for other slide or material, what offers?—C. W. Maw, Bradford, Yorks.

Offered, "Our Country's Birds," by Gordon, nearly new, in exchange for natural history or other books.—E. Wood, 245, Norwood Road, Tulse Hill, London, S.W.

What offers for Journal of R.M.S. for 1892 (bound), 1892 and 1893 (unbound), also text books for London B.Sc. examination?—H. W. Parritt, 8, Whitehall Park, London, N.

Small collection of minerals, about 100 named specimens, cost £2; will exchange for foreign marine shells, corals, or polished stones.—W. J. Mountford, 3, Foster Street, Darlington.

Healthy pupæ and larvæ of ligniperda, or great moth; desiderata, good British or foreign butterflies or moths.—Wm. Travis, 18, Primitive Terrace, Walcott Street, Hessle Road, Hull.

Offered, Cassell's "European Butterflies and Moths," 62 coloured plates, half morocco gilt; or exchange for "Entomologist's Record," vols. 2, 3, 4, 5.—E. Lambert, 4, Wildwood Terrace, Hampstead.

Wanted, to correspond with a lepidopterist in north of England or Scotland for exchange of southern Lepidoptera for northern, and *vice versâ*.—T. B. Fletcher, 78, Thornlaw Road, West Norwood.

Rare exotic butterflies—Ornithoptera urvilliana, ritsemæ, cræsus, Papilios, Dynastor napoleon, etc. Wanted, others or rare British and foreign stamps.—W. Dannat, Ivy Dene, Westcombe Park, S.E.

Offered, 1894 eggs of merlin, golden plover, dunlin, phalarope, divers, merganser, scoter, long-tailed duck, scaup, bean goose, whooper, ptarmigan, etc.—W. Gyngell, Murchison Street, Scarborough.

Wanted, good machine (Abbot Bros.) for pyrography, pattern touches and attachments, fret-saw; offer Tuck's door-panels ("Autumn Leaves") new, shells, greenhouse plants, ferns, cacti.—Mrs. M. A. Oldroyd, Faversham.

Offered, marine and land shells (2,500 species), Cossman's catalogue Paris Basin Fossils, new and complete. Wanted, land shells, or extracts on same from scientific journals.—Miss Linter, Arragon Close, Twickenham.

Duplicates.—Phascum bryoides, Sphœrangium muticum, S. trignetrum, Pottia pusilla, P. cœspitosa, Eucalypta vulgaris, Orthodontium gracile and many other species; desiderata, local mosses.—W. E. Nicholson, Lewes, Sussex.

Pathological and anatomical material, four bottles; Science-Gossip, 1886, unbound; Oliver's "Botany"; Lindley's "Botany"; fossils and minerals. Exchange for micro. slides.—G. H. Corbett, 13, Church Road, Nechells, Birmingham.

Wanted, Cooke's "Fungi," or other botanical works or Lepidoptera, in exchange for skins and stuffed specimens of jay, starling, rook, magpie, meadow pipit, linnet, wrens, blue tit and others.—A. Binns, Dean Lane, Sowerby, Sowerby Bridge.

Food's "International Scientific Series," Pritchard's "Microscopic Illustrations," 26 numbers of "The Student and Intelligent Observer," in exchange for good micro. objectives or apparatus.—J. Harrington, 45, Palace Road, Crouch End, N.

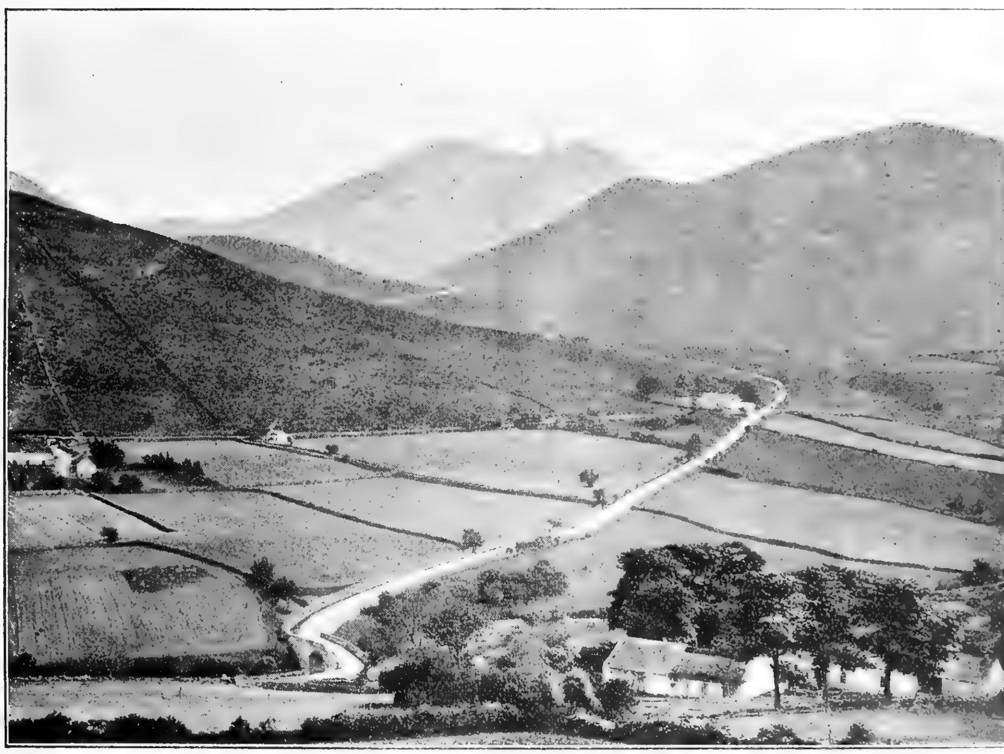
Offered, fine specimens Cardium rusticum, tuberculatum, echinatum, Pecten maximus, opercularis vars., Ceratisolen legumen, Pectunculus glycerimus, etc. Exchange British and foreign shells and works of fiction.—Mrs. Heitland, The Priory, Shrewsbury.

"Journal Anthrop. Institute," Nos. 33-41, 85-6, 88-9; Science-Gossip, vol. 29, with Index (less June), Nos. 307-312 (vol. 26), and vol. 1 New Series (complete); "Knowledge," Nos. 99, 100, 101, 103, 104, 107 (99 out of print). Required, foreign shells not in collection, or minerals.—Rev. R. Ashington Bullen, Shoreham Vicarage, Sevenoaks.

# THE MOURNE MOUNTAINS.

By R. Lloyd Praeger, B.A.

THE fine mountain group of Mourne, anciently *Beanna Boirche* (the peaks of Boirche, an Irish chieftain), lies in the southern extremity of co. Down, in the north-eastern portion of Ireland. On a day of tolerable clearness, as far south as Dublin, their lofty domes may be sighted rising out of the blue waters of the Irish sea, far to the eastward of the low and indented coastline, the eastern



R. Welch. *Photo.*] Slieve Bernagh, Mourne Mountains.

edge of the great limestone plain, that stretches its sinuous length between. From the north, as seen from the neighbourhood of Belfast, the Mourne Mountains tower up nobly beyond the undulating and fertile surface of co. Down. From the eastward we get glimpses of the long ridges of their western extremity as the train hurries us northward through the rugged hills and boggy flats that lie around the huge mass of Slieve Gullion, in Armagh—that mountain famed in Irish romance as the home of dread wizards and strange monsters, and the scene of hero-deeds by mighty champions. To the eastward the Mournes impend over the Irish Sea, where their picturesque outline arrests the eye of the summer visitor to the Isle of Man.

With these distant views acquaintance has, in most cases, stopped, for few have ventured on a thorough exploration of these brown hills and deep silent valleys. The reason is, probably, absence of knowledge concerning the district, unacquaintance with the picturesqueness and scientific interest of this region, and with the important fact that comfortable though unostentatious inns are to be found in almost all the villages that lie along the margin of the mountains.

We shall, then, briefly sketch the natural features of this region. All the higher mountains, and the more interesting ones, lie to the eastward, where the little town of Newcastle faces the Irish Sea, with the mountains overhanging it on the one side, and the broad sands stretching away northward on the other. Right above Newcastle rises

Slieve Donard, the loftiest of the range, 2,796 feet in height, flanked by Slieve Commedagh (2,512 feet). At the back of these hills rise two streams, the Annalong River and Kilkeel River, which flow southward through deep and romantic valleys, and divide this portion of the range into three more or less parallel series of peaks, of which some of the finest are Slieve Bearnagh (2,394 feet), Slieve Muck (2,198 feet), Slieve Bingian (2,449 feet), and the two Slieve Meels (2,310 and 2,237 feet). Several of the eastern faces of the hills which overlook these valleys are very precipitous, such as those of Slieve Beg, Cove Mountain, and Bencrom ; and while the majority of the mountain summits are rounded and smooth, others, notably Slieve Bearnagh and Slieve Bingian, are crowned with enormous crags of granite. In every direction the slopes are steep, but here and there a moraine-blocked hollow occurs, filled with the waters of a brown tarn. One road alone intersects the mountains; elsewhere loneliness reigns supreme, and the silence is only broken by the distant murmer of the streams, and the bleating of the sheep.

The geologist will find much to interest him in this district. The mountains are an old core of granite, which has intruded through the Ordovician grits that extend over co. Down and the land to the eastward. The latter, indurated by contact, lap round the flanks of the granite hills, rising on Slieve Muck to over 2,000 feet, where they have been carried up by the intrusive rock. Along the eastern coastline a number of dykes are exposed, famous as being one of the few British localities for the rare rock variolite. (See Cole : " On the Variolite of Annalong, co. Down." Sci. Proc., Roy. Dublin Society, N.S., vol. 7, 1891.) At the back of Slieve Commedagh, on the steep slope overhanging the source of the Annalong River, may be seen some beautiful examples of the weathering of the granite into jointed columns. This is well shown in the accompanying photograph, which, like the other illustration to the present sketch, is the work of my friend Mr. Robert Welch, of Belfast, whose instructive series of geological photographs are already well-known. (Catalogue of Geological Irish Views, with condensed descriptive notes. Published by the Author, 49, Lonsdale Street, Belfast. Price 3d.) In other places, notably at the Diamond Rocks on the southern slope of Slieve-na-glough, the granite is filled with cavities lined with crystals of smoky quartz, orthoclase, mica, topaz, beryl and amethyst. The Ordovician grits which lie to the northward contain many graptolites and some other fossils, and the Carboniferous limestone which occurs where the western end of the Mournes is opposed by the rugged mass of Carlingford Mountain (1,935 feet), with the deep bay of Carlingford between, yields an abundant and characteristic fauna. Fine examples of terminal moraines occur in several of the valleys, a particularly striking one being that which dams the valley of the Kilkeel River below Slieve Bingian. Ice-modelling and ice-scratchings are seen to advantage in many places. The drift deposits, which cover the lower grounds, are fossiliferous in places, and are well worthy of study. A fine raised beach, containing marine shells, sweeps round from Kilkeel westward, attaining an extensive development on the long, low spit of Greenore. Further to the westward and outside of the Mourne district a series of igneous rocks of high interest extend from Carlingford to Dundalk, and northward to Slieve Gullion.

The botany of the Mourne Mountains has recently been worked out by Mr. S. A. Stewart and the writer ("Report on the Botany of the Mourne Mountains," Proc. Roy. Irish Academy, Third Series, vol. ii, 1892), and while, in common with other Irish mountain groups, alpine plants are rare, the flora presents some points of interest. Hawkweeds are abundant, numbering fifteen species, among which *Hieracium hibernicum* is known elsewhere in only one Scotch and one other Irish locality, while the fine variety *Stewartii* of *H. gothicum* (so named by Mr. Hanbury after my colleague) is confined to this district ; *H. argenteum*, *H. flocculosum*, *H. auratum* are among the other forms that occur. On the cliffs and rocky banks of streams we find *Thalictrum montanum*, *Meconopsis cambrica*, *Saxifraga stellaris*, *Sedum rhodiola*, *Juniperus nana*, *Hymenophyllum unilaterale*, *Equisetum hyemale*, and high up, *Saussurea alpina* (one station), *Vaccinium vitis-idæa*, *Salix herbacea*. The tarns all contain *Isoetes lacustris* and *Lobelia dortmanna*. By the river in Tollymore Park, *Festuca sylvatica* is plentiful. On the Newcastle sandhills may be found *Thalictrum dunense*, *Viola curtisii*, *Erodium maritimum*, *Phleum arenarium*, *Triticum junceum* ; on the coast line further south, *Erodium moschatum*, *Mertensia maritima*, *Atriplex littoralis*, *Polygonum raii*, and in the neighbourhood of Carlingford Lough, *Statice bahusiensis* and *Atriplex portulacoides*, while *Barbarea intermedia*, *Linaria repens*, *Lamium intermedium* and other plants inhabit the lower grounds around the mountains.

The fox and the badger still haunt the rocks and the glens of the Mournes, and the otter skulks along the streams. The Irish stoat, which has recently received the unexpected honour of specific distinction at the hands of Mr. Oldfield Thomas, is common here as elsewhere. The marten has been occasionally trapped in the district.

Among birds, the peregrine and raven hold sway on the mountain cliffs ; the former breeds in a number of places, and I have seen two broods of young on the cliffs of Eagle Mountain at the one time, while as regards the raven I have watched five splendid birds in company on the rocks of Slieve Commedagh, soaring in majestic circles, and filling the valley with their hoarse cries. The invertebrate fauna of the district still needs elucidation. Mr. C. W. Watts has recently worked at the lepidoptera (C. W. Watts: "Lepidoptera taken in the Belfast District." Proc. Belfast Nat. Field Club, 1893–4, Appendix), and finds on the Newcastle sand-hills a tolerably abundant fauna, including large and highly-coloured varieties of *Lycæna icarus* and *Satyrus semele* in great abundance, while in August the flower-heads of the ragweed swarm with Agrotidæ and Noctuæ. Among the micros, *Anerastia lotella*, *Crambus warringtonellus*, *C. geniculeus*, *Dictyopteryx bergmanniana*, may be mentioned. The fir-woods of Donard Lodge, on the slopes of Slieve Donard, form a good hunting-ground. Here are found *Bupalus piniaria*, *Boarmia repandata* and its fine banded variety *conversaria*, *Emmelesia teniata*, and *Thera firmata*.

For those wishing to explore the Mourne district, Newcastle will be found the most convenient centre. Here there are plenty of good hotels, and the mountains rise right over the town, while tourist coach-routes along the base of the range enable approach to be made from various points. From Belfast, Newcastle is distant some forty miles, which the express trains of the co. Down Railway cover in less than an hour, whilst to Belfast there are plenty of good passenger routes from English and Scotch ports. A good inn will be found in the beautiful little village of Bryansford, two miles from Newcastle, and close to the woods and streams of Tollymore Park, classic ground of local naturalists. At Hilltown, Kilkeel, Rostrevor and Warrenpoint, also, there is plenty of accommodation. I regret that I cannot refer the reader to any guide-book for information concerning this interesting and picturesque mountain-group. Guide books there are, where all necessary information will be found concerning trains, hotels, car-routes and the various "sights" on the lower grounds, but the mountains, their topography, natural history and geology still remain undescribed save in scattered scientific papers in many instances not accessible to the enquirer; and the present sketch, brief and incomplete though it be, may, perchance, be useful as a slight indication of the natural features of a yet too little-known holiday resort.

R. Welch. *Photo.*] [In the Castles of Kivvitar, Mourne Mountains. *Belfast.*

*National Library, Dublin;*
*May*, 1895.

# EXPLOSIONS IN ELECTRIC-LIGHT MAINS.

By J. Alfred Wanklyn and W. J. Cooper.

An essential feature of almost every great advance in those arts and manufactures which accompany, and in a sense form constituent parts of, civilisation is peculiar and unlooked-for dangers attendant on each great advance. The steam-engine had its own peculiar dangers, as, for instance, the liability of the steam boilers to burst. The fear that the gas-holder would be prone to explode, which in the early days of gas-lighting was very generally felt, belongs to the imaginary order. Other dangers there have been which were real enough but quite unlooked for. There was the mysterious explosion in the gas-mains in France, which was traced to a most interesting source. It appeared on making investigation that copper service-pipes had been put down in some localities in France, and that that interesting hydro-carbon, Acetylene, which is one of the constituents of coal-gas, had somehow formed its well-known compound with the copper. That compound bears the name "acetylide of copper," and is endowed with explosive properties; and the mysterious French explosion was attributed to acetylide of copper.

Just as there have been mysterious gas explosions in the past, so now we have mysterious explosions connected with the installation of the electric light. Some of these recent mysterious electrical explosions which have taken place in London, promise even greater interest than the French acetylene explosions in the gas industry. They carry the mind back to that great achievement of a now well-nigh forgotten English chemist, in the year 1807. At that date (now in ancient chemical history), the great English chemist, Sir Humphrey Davy, discovered potassium, which he obtained by electrical decomposition of caustic potash. The alkali-metal, sodium, which is twin-sister to potassium, was likewise, in that same year, discovered by Davy. The conditions for the electrical separation of the metal sodium from its compounds, which Davy realized with great labour, care and forethought in the year 1807, appear to have realized themselves spontaneously in a most wonderful manner in these latter days in London. Among the current news of the day, a short time ago we read that metallic sodium was found coating the wires conveying the electric current. Sodium decomposes water when brought into contact with it, and decomposes it with violence and explosion. The explosions to which we refer have taken place in the Euston Road and its neighbourhood within the last two years. The cause of the explosions was at first supposed to be the accumulation of an explosive mixture of air or coal-gas in the vicinity of the service-mains. But, as we have said, closer investigation brought to light the fact that in some instances there was an actual deposit of metallic sodium, and that deposit, when exposed to the action of water, is quite adequate to produce explosions, and to kindle explosive gaseous mixtures.

The explosions in the Euston Road were fortunately not attended with any fatal result, and the damage to property was very trifling. The circumstance that they happened during a political dynamite scare attracted rather more attention to them than in ordinary times.

Early on a Sunday morning in the beginning of 1894, one of us, being on a visit to Endsleigh Gardens, was startled from sleep by a loud explosion which was at once set down to the dynamiting fraternity. During the next few months there were several explosions of a very similar kind, and an official enquiry was ordered, and finally Major Cardew, investigating on the part of the Government, reported upon two explosions later on in the same year. The official report makes no mention of dynamiters but attributes the explosions to the firing of explosive mixtures of coal-gas by the electric spark, or by the flame arising from the contact of metallic sodium and water. Here we would remark that granted the presence of metallic sodium and moisture, that state of things is quite adequate to the production of the Euston Road explosion, and that the existence of the mixture of air and coal-gas need not be assumed at all. The sodium explosions which have taken place in the manufacture of pure caustic soda from metallic sodium, and which have indeed caused one manufacturer to abandon that operation on a large scale, testify abundantly to the adequacy of sodium and moisture to occasion such explosions.

It goes without saying that if you are to obtain metallic sodium as a coating to the wires conveying the electric current you must first permit some compound containing sodium to come into relation with those wires; and Major Cardew very pertinently warns against suffering the formation of an incrustation of common salt, the prime source of sodium.

One of the most satisfactory aspects of the subject is the circumstance that such explosions as we are considering are absolutely preventable. That there can be such explosions under certain conditions needs but to be pointed out in order that the proper steps may be taken to ensure that the conditions shall never again be realized.

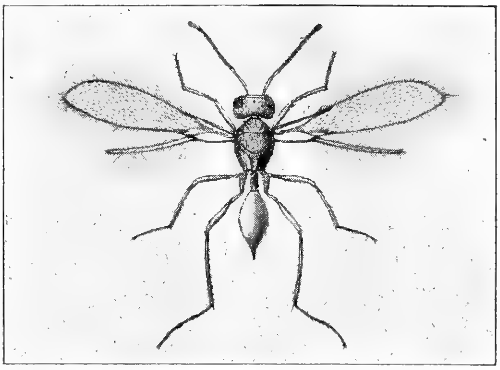
*New Malden, Surrey; May 14th, 1895.*

# AN AQUATIC HYMENOPTEROUS INSECT.

By Fred. Enock, F.L.S., F.E.S.

UNDER the above head in the "Transactions of the Linnean Society" (vol. xxiv., 1864, page 135, etc., plate 23) will be found an interesting account of the capture of *Polynema natans* (Lubbock), by Sir John Lubbock, who mentions that on examining a basin of pond water, he was astonished to see a number of minute hymenopterous insects swimming about in the water, and *using their wings* for that purpose. Within a week of this grand chance capture, another specimen was found by Mr. Duchess, of Stepney; then nineteen years after (1881), Mr. Bostock found a single specimen in a bottle of pond water at Stone, Staffordshire. Since 1876, I have paid particular attention to this interesting family, the Mymaridæ or Fairy-flies, and though I have searched many ponds, year after year, all my efforts to obtain specimens of *P. natans* have been unsuccessful.

On Saturday, May 4th, at the fortnightly excursion of the members of the Quekett Microscopical Club, which was to Totteridge and Mill Hill, Mr. Wm. Burton, brought home two small phials of water, containing various organisms. The first to appear in the trough was a small fly, which appeared quite at home climbing about the weeds. Mr. Burton, knowing my weakness for these small creatures, kindly brought it to me for examination, when I immediately recognised it as the long-sought-for *P. natans*, this capture making the fourth time it has been taken by chance.



Polynema natans, × 15 diams.
*Drawn from life by* Fred. Enock.

On Monday, May 6th, Mr. Burton and I, started out to search for more specimens. We dipped our nets and bottles in and out for over two hours when my dip brought to land a beautiful female, which I quickly transferred to a phial. Then in the course of a few hours more search, I found four males. On reaching home, these, together with the female, I put into an observation tank, where they remained *under water* for over four days, swimming or *flying* through the water in the most lively manner, their progress being decidedly jerky. The female was chiefly engaged examining the flocculent matter at the bottom of the tank, no doubt searching for eggs in which to oviposit. I now have several fresh specimens under close observation during day and far into night, and in course of time hope to complete the life-history of this marvellous creature.

It is much to be regretted that so very little interest has been taken by entomologists in this most extraordinary family, the Mymaridæ, which have scarcely been noticed since the death of Mr. Haliday, whose type collection has remained in oblivion. When this collection is brought to light, I am inclined to think that the generic name of *Polynema* with regard to *natans* will prove to be the wrong one, as the male of that genus has thirteen joints in the antenna, whereas the male *P. natans* has but twelve, and the abdomen is distinctly petiolated so that it cannot belong (as suggested by the late J. O. Westwood) to *Anaphes*, whose abdomen is subsessile.

Strange as the habits are of many parasitic Hymenoptera, they are completely eclipsed by those of the Mymaridæ. The fact has now been fully established, that the females lay their eggs in the eggs of other insects. *Polynema natans* (according to Ganin), ovipositing in those of dragon-flies. I have repeatedly watched *Alaptus* wandering over leaves in search of the eggs of *Psocus fasciatus* and on finding them, she gently taps one with her heavily clubbed antennæ to ascertain whether the egg already contains a parasite, if not, she leisurely mounts on the top, pressing the tip of the tiny ovipositor against the convex surface, the boring machinery is set in motion, and in about two minutes a hole is pierced and an egg transmitted by the *Alaptus* in so perfect a manner that nothing is injured. The microscopic aperture is hermetically sealed by saliva from the tongue, and the fairy-fly steps on to the next egg until the whole cluster has been "struck," and all chance of an injurious *Psocus* emerging has been destroyed. I hope the time is not far distant when we shall have figures of all the known genera of this most interesting group.

*21, Manor Gardens, Holloway, London, N.*
*May 13th*, 1895.

# THE WORK OF A SCIENTIFIC SOCIETY.

By Rev. H. N. Hutchinson, B.A., F.G.S.
*(Author of "Extinct Monsters," etc.)*

IN these days when a powerful search-light is continually being thrown upon nearly every institution of our country, it is impossible that the learned societies, as they are called, should escape much longer the public gaze. The time is soon coming when they will, one and all, be subjected to a severe criticism on behalf of the democracy. It is quite clear that at present their work, their methods, and their organization are matters of comparative indifference to the general public. This state of affairs, however, cannot last for ever, and it is highly probable that before very long we shall see some influential newspaper or magazine devoting its columns to a searching and probably far from friendly inquiry into the whole question. To be forewarned is, or ought to be, to be forearmed, and therefore I make no apology for bringing forward this very important and interesting question.

Scientific men ought, whenever such inquiry comes, to welcome it rather than show any resentment—if it is done carefully and conscientiously. I believe that there is a real need of inquiry and criticism in this matter, and that the learned societies have much to gain thereby in the end—even should they receive severe criticism at the time. My work as a lecturer and writer on geology has been the means of drawing my attention to this subject; and, after reflection thereon, I am convinced that our learned societies might play a much more important part than they do in further spreading scientific knowledge and feeding the people intellectually. At present they are sadly behind the age, and, moreover, they appear to have no idea but to go on in the same humdrum way as they always have done, publishing their ponderous and almost unreadable reports, quarterly journals, etc., with a cheerful and almost proud contentment that is really astonishing when one considers for a moment how much more they might do. Of course, no sensible person would presume to find fault with or condemn the work which is being done by any of our leading learned societies, such as the Royal Society, the Royal Astronomical, the Physical, the Chemical, the Linnæan, the Zoological, the Geological. They encourage workers to carry on researches in all departments of science; they listen to the valuable papers that are often read, bringing forward new facts, new observations, and sometimes new ideas. The discussions which take place after the reading of such papers are frequently of much value and interest, and then the papers and discussions are generally published to the world. At the same time one cannot help noticing that papers are sometimes unnecessarily multiplied, and that they often contain too much detail. The sum and substance of a long paper could often be compressed into a single column of Science-Gossip.

The question which rises so constantly to my mind in considering the work of our Geological Society is—why should we stop here? Have we not yet much useful work to do? Could we not cover a larger field of operations, and play a more useful part in our country and empire? In other words, have we not got too much into one groove—and that of a somewhat narrow kind? There is something essentially conservative about a learned society; tradition and custom count for much, and it seems at first sight rather presumptuous for an individual member to dare to suggest to a number of distinguished geologists (such as are on the council of our society) that their ideas are not sufficiently progressive, or that the gentle application of a *vis a tergo* might be a good thing for them. However, it is in no disrespectful tone that I wish to offer the following practical suggestions for extending our sphere, and I am not without hope that in some quarters they will be welcome.

1. The Library.—A good deal might be done to make our library more complete, and also to keep the books in better order. In the first place one often finds that some important book is not in the collection, and that means going to the British Museum instead. There is a very good collection of pamphlets; but in some other directions there are gaps to be filled up. Many of the books are in a dusty condition; and they are very much scattered about for want of more room, some being in one part of the building, some in another. This want of space leads to our next heading.

2. New Rooms with a good Lecture-Theatre.—By moving to larger buildings the books could be more conveniently arranged, and perhaps a Lecture-Theatre could be added on. The latter is an important part of our scheme, as will be seen presently.

3. Incorporation with the Palæontographical Society.—Surely the important work of publishing well-illustrated monographs on Palæontology is one which ought properly to belong to the Geological Society. Would it not be more economical, as well as more convenient, to have a common home for both the Societies?

4. A Publishing Department.—It seems to me there ought to be a publishing department to

every important scientific society, and certainly to ours. Every geologist knows that there is no great temptation to publishers to undertake the publication of works of a geological nature. A large number of such books are a source of loss either to the author or the publisher, or both; and yet it is hardly necessary to remark that many such works are of considerable value. In fact, one might almost say that the more valuable the book to geologists (rather than to the public) the less is it likely to be a financial success. It is a matter of great regret that such a valuable publication as "The Geological Record" should have been allowed to drop for want of funds. Our friend, Professor Blake, made a gallant attempt with his "Annals of British Geology," but this has also died a natural death from the same melancholy cause. The State will do nothing to help us, so we must help ourselves. Again, take the case of "The Geological Magazine": that most excellent perodical, which is read with so much pleasure and profit by geologists in all parts of the world, can hardly be expected to pay its expenses; if the Geological Society could undertake to grant an annual subsidy, the magazine might be extended, further illustrations might be added, and perhaps (if this is not Utopian) editors might be paid for the labour which they now undertake voluntarily? One of the very first duties of a Geological Society ought to be the annual publication of a Geological Record; and, moreover, every line of work done on such a publication ought to be paid for, whatever it cost. The important work at present done, rather slowly and not quite completely, by the Royal Society in publishing from time to time a Catalogue of Scientific Papers ought to be divided up among the different scientific societies. Our Society would then be doing its share by including in its annual Geological Record a list of all the important papers that had been read. The Catalogue published by the Royal Society comes out so long after the appearance of most of the papers that its value to scientific workers is very much impaired. Other societies in France, Germany, Belgium and elsewhere, might work in harmony with us in this matter, and so the burden of this task would be lightened. For instance, take the case of England and Germany: we should send to the leading Geological Society there our list of English papers on Geology read anywhere in England or our Colonies, and they would send us their list. So with regard to books, a subject index might be added, which is at present a great want in the Royal Society's Catalogue of Papers.

Photographs illustrating the geology of the British Isles might be collected and stored up in the library. We are aware that a Committee of the British Association is at present collecting such photographs; but this work seems to belong more naturally to our Society. Some of the photographs might be copied on a reduced scale, being reproduced by process, and blocks lent to authors to illustrate their works. I would even go so far as to suggest that the Society might undertake the publication of useful and well-illustrated little manuals of geology. Such might be far better illustrated than those that are at present brought out by different publishers, frequently with woodcuts half a century old. When once a publishing department has been formed no doubt many useful schemes could be set on foot; thus, for example, a series of good wall diagrams might be published. At present publishers, at least in England, will not undertake so unprofitable a task, and yet such are certainly an educational want. Good sets of lantern slides, carefully selected by specialists in each department, might be supplied to schools and colleges. Another useful work in this department might be the publication of instructions, in the form of a leaflet, to workmen in quarries, stoneworks, clay and gravel pits, etc., urging upon them the great importance of the careful extraction and preservation of fossils and especially bones. Sir Richard Owen mentioned in his work on "Palæontology" that, but for the carelessness and indifference of some workmen, a complete skeleton of a British mammoth might have been preserved. How many a good thing has been lost from the same cause it would be impossible to say. The leaflets might be sent to the Fellows in each county, and each should be asked to distribute them as opportunity offered.

5. The Admission of Ladies as Members and as Fellows.—I am quite aware that the admission of the gentler sex to the ranks of the Geological Society has already been discussed by members, and that there is a great difference of opinion on this subject. But we are only at the beginning of a long struggle on the part of the ladies for admission to all our learned societies, and as they seem to have made up their minds on the question, it seems to me that we of the sterner sex had better bow to the inevitable at once, for the women are sure to win in the end. Apart from this argument it is an acknowledged fact that there are women of considerable scientific attainments, who are fully entitled by the papers they have written and the work they have done in various directions, to the honour of belonging to the learned societies. To take Geology alone, we know that excellent work has been done by ladies, and that some papers of great merit have been read on their behalf at certain of our meetings. Some people are afraid that there would be a danger of our societies becoming too popular if ladies were admitted, that the standards might be lowered, and the more serious work comparatively neglected for geological excursions

of the nature of picnics, popular lectures with lantern illustrations, and general discussions at or after meetings. Surely there is no ground for such serious apprehensions, we need not argue from the British Association. The same rules that apply to the election of gentlemen as Fellows would of course apply to the ladies who might from time to time be proposed. But one of the essential parts of my scheme is the admission of a very large number of members of both sexes as Members only. The conditions of their election would be easier and all who were genuinely interested in Geology might be eligible. It is only, or chiefly, in this way that a large annual subscription list could be depended upon, and if the reforms here indicated, are to be carried out, it is obvious that the sinews of war must be provided in no small measure. The subscription list must be raised from something over £2,000 as it is now, to £5,000 or £6,000 at least, and I do not see how this can be done without admitting ladies. Members should not be admitted to the ordinary meetings except by special written permission from a Fellow, though perhaps a gallery or some special part of the meeting room might be set apart for members. Under my scheme special meetings would be held for the benefit of members and their friends. Members would be allowed to purchase the Quarterly Journals of the Society at a special rate, but their subscription alone would not entitle them to receive it free, as the Fellows do now. This brings us to a very important part of the scheme.

6. Fortnightly Meetings in the Lecture Theatre to alternate with ordinary meetings, at which both Members and Fellows would meet to hear good illustrated lectures on really interesting and important subjects, and to join in the discussions afterwards. The papers or lectures on these occasions to be of a more general nature than the elaborate original papers now usually read by fellows, with details that only appeal to a few specialists. I cannot help thinking that even many of the Fellows would find these meetings both interesting and instructive. Take, for example, the case of a specialist, either in petrology, in field-work, or in palæontology; unless he happens to be a lecturer or professor in some university, or in some way engaged in teaching geology, is it not pretty certain that his general knowledge of geology is getting somewhat rusty? In that case, would it not be a good thing for him to come to such meetings, listen to the paper or lecture, and join in the discussion afterwards, if he be so inclined? Many of the Members present would be eager young students fresh from schools and colleges, and ready to enter keenly into any of the deeply-interesting physical, chemical, and biological problems that present themselves to the geologist. I can imagine that many an evening might be profitably spent in discussing such problems as the age of the earth; the origin of mountains; the causes of earthquakes and volcanoes; the astronomical theory of the ice-age; the permanence of ocean-basins (or the contrary); the origin of lakes of all kinds; the former existence of a great antarctic continent, such as seems to be implied by the curious distribution of animals at the present day; the conclusions to be drawn from the researches on the deep-sea deposits by the "Challenger" and other expeditions; former changes in climate, as indicated by fossils; problems in evolution, such as possible causes of extinction of certain groups of plants and animals; problems in ancient geography; the origin of our chalk; or, to turn to a rather different subject, methods of teaching might be discussed with advantage. It goes without saying that members attending such meetings would learn a great deal and would be encouraged in their studies. Besides, they would often in this way hear of new books and new sources of information that might be useful to them. Everyone who studies any science at all deeply finds that much time is spent in getting on the track of the literature of his subject, especially with regard to foreign publications. But let it not be assumed that all the benefit would be on one side. There must be a good many members of every learned society who, though they may have read a useful paper on some particular question, or have described some new species of fossil or living animals, yet have perhaps only a very limited acquaintance with the principles of the particular science to which their society is devoted. Thus it does not follow that because a Fellow of the Geological Society has described certain igneous rocks, or done a little bit of field work somewhere, or devoted a few years to working at some small group of fossils, that he therefore possesses any particular knowledge on some of the questions which we have enumerated above. Unless he is a teacher of geology in one way or another it is highly probable that, by attending such meetings, he would greatly improve his general knowledge of geology. Admission to a learned society does not require any very great amount of learning, and it is possible that in future some stricter kind of test, or even an examination, may be required.

7. An Annual Conversazione.—Such evening meetings of a social character have occasionally been held, but the expense was found to be too great. Now, it seems to me a pity that such pleasant opportunities of mutual intercourse should be altogether abandoned. Surely we could find a way out of the difficulty, and a more economical manner of setting about the matter. It can hardly be necessary to spend some £50 or more on such an evening's entertainment, as I am told has been

done, and here the ladies could help us in economy. On the new double basis of membership here suggested, and with large rooms at our disposal, there ought to be no great difficulty. There should be no lack of suitable and interesting exhibits on such occasions, such as fossils, rock-sections under the microscope, photographs, geological maps and sections, models, diagrams, etc. It should be the object of a great scientific society like ours, not merely to add to the sum of human knowledge, but to take Geology generally under its wing, to spread an interest in it, and to do what is possible to instruct the public. There is in these days much danger of scientific men becoming, as it were, Brahmins, speaking a language not understood of the people, of living a life too much apart from them, and of ceasing to care for them in any way.

8. To Offer to the Members Prizes and Medals for the best Essays on general Geological Subjects.—This would be an excellent method of stimulating the study of geology, and I doubt not that in this way a few students might be tempted to become regular workers. Again, prizes might be offered for the best ideal landscapes of different geological periods. This is a thing that seems to be much wanted, and if the prizes offered were of more than a merely nominal value some of the best geologists might be tempted to employ really good artists to carry out their ideas on the subject. If a prize of £100 were offered for some six or eight such pictures, we should see some very good attempts made. The same would apply to the "restoration," either by means of models or of drawings, of extinct types of animal life. One result of such attempts, if successful, might be the publication of wall diagrams of this kind for use in schools and colleges. And surely that would be a useful service to the cause of education. Some four or five grants are made each year to those geologists who have made important researches. As these are often the result of a good many years of work, involving in some cases no small expense, a money grant of some twenty or five-and-twenty pounds seems but a poor reward. Would it not be desirable to increase these grants (Lyell Geological Fund, etc.)?

9. The Occasional Purchase of Valuable Geological Specimens, or even of Collections of Fossils, for Presentation to the National Collection in the Natural History Museum.—This might seem at first sight rather an unnecessary departure; but it almost goes without saying that the grants from the Treasury to the National Museum are far from adequate, and therefore when good and valuable collections are in the market, they cannot be bought for England, but go to America or some other country. Funds are at present sadly wanted for the purchase of casts of fossil reptiles, mammals, etc., especially those which Professor Marsh has unearthed in America. If funds were forthcoming it might be possible to fill a whole gallery with such casts. Very few of the great dinosaurs, for example, are at present represented in the Natural History Museum, and yet they are of great importance to the palæontologist.

10. Travelling Studentships might be founded by the Geological Society, in order to send out promising young geologists, who have been properly trained, to new countries, to report on their geological features, mineral wealth, etc.

The above suggestions are made in the hope that they may lead to further discussion of this most important subject, and that in time we may see one at least of the leading scientific societies acting and working in harmony with the spirit of the age, and extending its influence in many directions.

*Westminster, S.W.; April, 1895.*

## THE NEW F.R.S.

THE following list of fifteen candidates has been selected by the Council of the Royal Society for recommendation at the next election of Fellows. J. Wolfe Barry, C.B., Civil Engineer and designer of the Tower Bridge; Alfred Gibbs Bourne, D.Sc., Professor of Biology at Madras; George Hartley Bryan, M.A., Lecturer on Thermodynamics at the University, Cambridge; John Eliot, M.A., Meteorological Reporter to the Government of India; Joseph Reynolds Green, M.A., D.Sc., F.L.S., Professor of Botany, Pharmaceutical Society of Great Britain; Ernest Howard Griffiths, M.A., Physicist and investigator of the phenomena of heat; Charles Thomas Heycock, M.A., Lecturer on Natural Science, King's College, Cambridge; Sydney John Hickson, D.Sc., M.A., F.Z.S., Fellow of Downing College, Cambridge, investigator of anatomy of lower zoological forms; Henry Capel Lofft Holden Major, Royal Artillery, inventor of ordnance apparatus and investigator of electrical phenomena; Frank McClean, M.A., LL.D., F.R.A.S., inventor of a star-spectroscope, astronomical photographer and donor of a large telescope to the Cape of Good Hope Royal Observatory; William MacEwen, M.D., Hon. LL.D., Professor of Surgery at Glasgow University; Sidney Martin, M.D., B.Sc., F.R.C.P., University College Hospital, distinguished in chemical physiology and parthology; George M. Minchin, M.A., Professor of Mathematics, Royal Indian Engineering College, Cooper's Hill; William Henry Power, Assistant Medical Officer, H.M. Local Government Board, London, natural historian of epidemic diseases; Thomas Purdie, B.Sc., Ph.D., A.R.M.S., Professor of Chemistry, St. Andrew's University.

# GEOLOGY OF THE ISLE OF WIGHT.

By Thos. Leighton, F.G.S.

(*Concluded from page 64.*)

THE Chalk in the Isle of Wight forms the central hills (or northern downs) and caps the hills above the Undercliff (the southern downs). The beds may be examined both at the coast and in the numerous quarries which are found along the outcrop. The usual Chalk fossils occur, probably as plentifully as anywhere else; the fact that they are somewhat uncommon in collections is doubtless due to the distance from London rendering search and preservation unprofitable to the workmen. The Chalk Rock, and also, possibly, the Melbourn Rock, have been recognized, whilst the following Table exhibits the zones as worked out by M Barrois :—

| | | |
|---|---|---|
| Chalk with flints 1,016 feet | Zone of | *Belemnitella* |
| | ,, | *Micraster cor-anguinum* |
| | ,, | *Micraster cor-testudinarium* |
| | ,, | *Holaster planus* |
| Chalk without flints, 196 feet | ,, | *Terebratulina gracilis* |
| | ,, | *Inoceramus labiatus* |
| Grey Chalk, Chalk Marl, 115 feet | ,, | *Scaphites æqualis* |

These divisions do not exactly coincide with those of the Geological Survey, whose thicknesses are as follows :—

| | | |
|---|---|---|
| Upper Chalk | .. | 1,370 feet |
| Chalk Rock | .. | a line |
| Middle Chalk | .. | 180 ,, |
| Melbourn Rock | .. | 14 ,, |
| Lower Chalk | .. | 206 ,, |

The Eocene Beds of the island occupy a narrow tract at the foot of the northern slope of the central hills. Striking east and west, although between 1,500 and 1,600 feet thick, their outcrop is extremely narrow by reason of their vertical position. (See figs. 2 and 3.) On this account they can perhaps be more fully examined in other localities, although they are well exposed on the east coast in Whitecliff Bay, and on the west coast in Alum Bay. The Eocenes, however, are nowhere lacking in interest—an interest indeed almost poetical—best illustrated by the appropriate name conferred upon them by Sir Charles Lyell, *i.e.* Eocene—"the dawn of recent [times]."

Resting on a slightly eroded surface of the Chalk, are the plastic clays of the Woolwich and Reading Series, estimated at 84 feet in Alum Bay and at 163 feet in Whitecliff Bay. The thicknesses of the lower beds of the Eocene in the Isle of Wight are, however, scarcely comparable with those in other localities, since it is impossible to say to what extent the beds, particularly those near the Chalk, have been squeezed up by folding. The magnitude of the pressure to which these beds have been subjected can be somewhat realised at Alum Bay by careful examination of their junction with the Chalk. A mass of crushed flints will be found here welded into a compact bed, perhaps slightly altered in texture, and, from later infiltration of iron, forming a curious store.

The London Clay follows above the Woolwich and Reading Beds, 233 feet thick in Alum Bay, and 320 feet thick in Whitecliff Bay. It contains occasional lines of flint pebbles and is more sandy throughout than in the London area, conditions pointing to shoaling waters in this direction. *Ditrupa plana* occurs at the base, and other fossils may be found throughout, which, from not being pyritized, as in the London area, can be readily preserved.

The Lower Bagshot Sands follow next: they are unfossiliferous except in the leaf bed of Alum Bay, at which place they are also followed by other unfossiliferous beds. If at Alum Bay the whole of the celebrated coloured cliff is placed in this series it attains a thickness of 662½ feet, against 100 feet in Whitecliff Bay, whilst in the series immediately above, these thicknesses would be nearly reversed at the two localities. Accordingly, Mr. Clement Reid suggests that the upper 450 feet of the coloured cliff at Alum Bay may be the decalcified equivalents of fossiliferous beds at Whitecliff Bay. Mr. Starkie Gardner again separates certain of the higher beds as equivalent to the freshwater Bracklesham of Bournemouth, and his dividing lines do not in other respects coincide with those of the Geological Survey. The leaf bed of Alum Bay has been admirably described by Mr. Gardner, who states that the flora is the "most tropical of any that has so far been studied in the northern hemisphere." The plant remains cannot now be readily found, they occurred mainly in a lenticular bed of pipe-clay which has been worked out.

The marine Bracklesham Beds lie above the Lower Bagshot Sands. They are highly fossiliferous at Whitecliff Bay, where they are 653 feet thick. The fossils can be best obtained by digging on the foreshore at low water; so collected, however, the sea-salt must be abstracted before they can be safely preserved. In Alum Bay only a few casts of fossils occur at this horizon, the series, however, contains four beds of lignite of some interest, since each bed rests on a regular underclay with rootlets, as in the coal measures, showing that the vegetation of which the lignites were formed actually grew on the spot.

The Barton Beds which follow are 255 feet thick at the western and 162 feet thick at the eastern outcrop. Fossils occur at both places but more plentifully at Alum Bay, where they can be easily collected, although even there the richest zones are now concealed by the pier. The fauna approximates closely to that of the beds on the mainland, although from the small extent of the exposure fewer species have been recorded.

The Headon Hill Sands form the top of the Eocene Formation of the Isle of Wight. They consist of pale buff quartz sand, practically unfossiliferous, and are 170 feet thick at Alum Bay and 184 feet at Whitecliff Bay. At the latter place the occurrence of casts of *Tellina* and *Panopœa* has caused them to be classed with the Eocene rather than with the Oligocene, whilst they constitute, in fact, a passage between the two conformable formations.

The Oligocene Beds of the Isle of Wight spread out over the whole of the area to the north of that already described, on the south affected by the great anticlinal fold, and to the north occupying the area of the sinclinal trough.

The Headon beds are about 150 feet thick on the west coast and 212 feet thick at Whitecliff Bay. They are freshwater and estuarine beds, with strongly marked marine conditions near the middle of the series, hence their separation into upper, middle and lower beds. The whole series is simply crowded with fossils, which may be readily collected in the most perfect condition, some few species retaining traces of their colour markings. The marine Middle Headons contain the most species, but the character of this horizon varies in an interesting way at different places. On the south-west side of Headon Hill the marine shells, whilst not uncommon, are confined to a few species, whilst estuarine forms are very decidedly in the majority. At the north-east side of the same hill considerable change is noticed; marine species become more abundant and individuals more numerous, whilst at Colwell Bay the marine type is altogether in the ascendant. Along all this coast the Middle Headons are only about 30 feet thick, whilst at Whitecliff Bay they are increased to 126 feet, and have at their base a true marine bed with corals, sometimes described as the Brockenhurst Bed, from its general agreement with a bed in a similar position at that place. This multiplication of names is, however, unnecessary, because the Middle Headons, as a whole, simply and clearly indicate that the stream, near the estuary of which they were laid down, came from the south-west.

The Osborne Beds are chiefly a freshwater series, some 100 feet in thickness. They are seen overlying the Headon Beds, on the west coast, on Headon Hill and in Colwell Bay, on the east coast, in Whitecliff Bay, and at various places at the north of the island. Freshwater shells may generally be found, but at King's Quay, near Osborne, there is a bed of clay, in which Mr. Colenutt, of Ryde, has discovered multitudes of small fish (*Clupea vectensis*), evidently, as Mr.

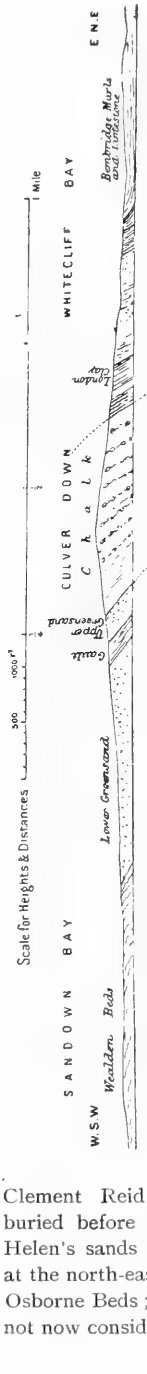



Fig. 2.—Section from Sandown Bay to Whitecliff Bay.—W. Topley.
(*Reprinted from Proc. Geol. Assoc., Vol. VII., page 187.*)

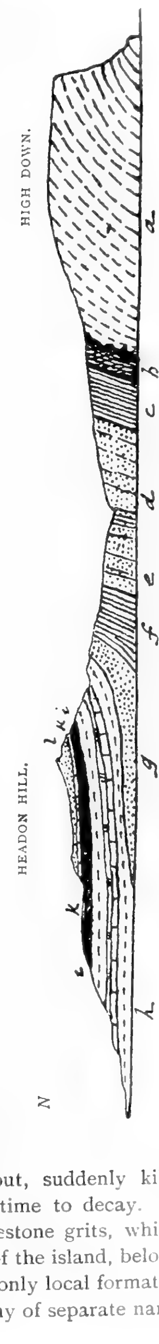



Fig. 3.—Section across Alum Bay from Headon Hill to High Down.—*After H. W. Bristow.*
(*l*) Plateau Gravel, (*k*) Bembridge Beds, (*i*) Osborne Beds, (*h*) Headon Beds, (*g*) Headon Hill Sands, (*f*) Barton Clay, (*e*) Bracklesham Beds (*d*) Lower Bagshot Beds, (*c*) London Clay, (*b*) Reading Beds, (*a*) Chalk.

Clement Reid points out, suddenly killed and buried before they had time to decay. The St. Helen's sands and Nettlestone grits, which occur at the north-east corner of the island, belong to the Osborne Beds; they are only local formations, and not now considered worthy of separate names

The Bembridge Limestone, although only some ten feet thick, is an interesting freshwater deposit, containing numerous land shells (such as *Helix*, *Bulimus*, etc.), besides several freshwater species. Both may readily be obtained at all the exposures, the more important of which are on Headon Hill, at Cliff End and Sconce, and at Bembridge Point. The Bembridge Limestone is remarkable for the persistence of its lithological characters throughout the island, an unusual thing in beds of the kind.

The Bembridge Marls are chiefly of freshwater origin, but a thin marine band occurs near the base. They are some 100 feet thick and may be seen east of Yarmouth at low tide on the foreshore, at Bembridge Point, at St. Helen's, and in Gurnard Bay. At the last place a thin limestone, with many insect remains, occurs just above the marine bed. The freshwater and marine fossils can be collected at all the places named when the beds respectively are exposed.

The Hampstead Beds cover a great part of the tertiary outcrop of the island but they can only be conveniently studied at Hamstead Hill, east of Yarmouth. They are about 260 feet thick, of freshwater origin below, passing up gradually into marine beds. They contain many fossils, which may readily be collected. Besides many species of mollusca, vertebrate remains—such as teeth, scales, or bone fragments of *Hyopotamus*, crocodile, turtle or fish are common.

The chief interest of the Quarternary Deposits of the island is in the Plateau Gravels which cap many of the hills, and show, accordingly, the great amount of denudation which has taken place since their deposition. No organic remains have been found in these old gravels, but in the Valley Deposits the mammoth and rhinoceros have been found.

In conclusion it only remains for the writer to express his indebtedness to the authors of the works he has consulted in the preparation of this paper, since detailed references have necessarily been omitted. "The Isle of Wight Memoir of the Geological Survey" (1889), by Clement Reid and Aubrey Strahan has been freely consulted, also papers in the Quart. Journ. Geol. Soc., by Keeping and Tawney (1881), and by Gardner, Keeping and Monckton (1888).

*Lindisfarne, St. Julian's Farm Road,*
*West Norwood, S.E.; April, 1895.*

# WINTER IN THE HEBRIDES.

By W. B. Jones.

It was, I suppose, to be expected that so unusual a winter as the one now happily departed should be attended by unusual phenomena in the organic world. Probably a fitter opportunity for observation of its effects could scarcely be looked for than here in Islay, where no such winter has been seen within the memory of the oldest inhabitant. This island, with the rest of the Hebrides, has, compared with the mainland of Scotland, or even of England, a very exceptional climate. Although we have not the same heat in summer, it is questionable whether our average winter is not as mild as that of the Channel Islands, or even of the south of France. Snow, worthy of the name, is very rare, and frosts, when we get them, are usually confined to the night. Sometimes a shift of wind to the north will bring a light sprinkling of hail or sleet, but it either melts as it falls or disappears soon after, giving place to a diluted sunshine or mist and drizzle. Then, perhaps, at night the wind will veer round to the west or south, and it will blow for a week, with heavy rain at intervals; but the temperature rarely falls below 40° F. Last winter, however, all this was changed, and we received our full share of the roughest weather that was going. We had two heavy falls of snow—the last of which completely blocked the roads for a week, and did not disappear for a month, followed by a succession of hard frosts and a mean day temperature 15° below that of ordinary winters. This unwonted severity found the inhabitants of the island, both human and animal, as might be expected, entirely unprepared, and the result was sufficiently deplorable. Many old people, who, under ordinary circumstances, might have continued to live for some years, went to their final rest prematurely. The death-rate amongst the children was excessively high, and scarcely any household was exempt from some severe and unusual form of sickness.

The effect upon the bird life of the island was disastrous beyond all precedent. My own observations were limited to the very narrow area within which my business confines me, but I could not avoid seeing phenomena of a very unusual character. The exceeding tameness of the birds was what struck me most. All day long, while the severe weather lasted, the main street of the village of Port Ellen was alive with gulls of various species, and the air resonant with their cries and the continual rustle of their wings. Viewed from one end, indeed, this thoroughfare looked like a perfect wilderness of birds, which at one moment would be a surging white sheet on the ground-level, and the next would rise up a fluttering and gleaming column that reached above the house-tops. Scourged by famine, the courage and pertinacity of these poor creatures was extraordinary.

They would alight close to the doors of the houses and contend with the domestic fowls, or the household cat or mongrel dog for any stray morsel of edible matter. In some cases they even entered the houses, and one man who lives close to the sea told me that, in consequence, his boys had done a good thing in gull catching. They set open the front and back doors of the cottage and concealed themselves within, when the birds began to fly through the passage and at last to alight in the living room. By simply closing the doors they were enabled to capture a great number, whose fate, I am afraid, was not of the happiest. Your western Highlander, although by no means a hard-hearted being as far as his own species is concerned, has, as yet, no conception of a humanity that extends itself to all living things. The old hunter instinct is still strong within him, and he regards wild animals as only so much raw material furnished by nature to supply his wants, whether it be for the nutriment of the body or for the gratification of that delight in killing which with the natural man is as inherent as it is with any other beast of prey. One man, after obtaining a number of specimens, clipped their wings and went about selling them for domestic pets, which, I fancy, in many cases would be simply toys for the children.

After the heavy fall of snow on February 7th, the small birds seemed driven to extremity. Every bare strip of sand on the sea-shore and every sheltered nook that was clear of snow swarmed with them. A small field, through which I had occasion to pass daily, afforded an unusually good place of refuge. It lies at a lower level than the surrounding country, is bounded by a stone wall, and, being protected by some high mounds on the north and east, had been merely touched by the skirts of the storm as it passed over. It was consequently almost free from snow, and advantage had been taken of this circumstance to make it a temporary sheep-fold. The animals were fed daily with turnips and the "draff" or grains from the adjacent distillery. Here then, while the frost lasted, some thousands of small birds found food and comparative shelter; and here certain species, which we are not accustomed to regard as gregarious, might be seen in flocks. These included the hedge-sparrows, wrens and robins. There was also a fair proportion of wagtails, chaffinches, linnets and greenfinches; but the whole of these were outnumbered, as ten to one, by the larks. The tameness of these last was very remarkable. On being approached, the other species would make a short flight and settle again, but the larks would not rise on the wing. They would run to right and left as I advanced, opening a passage for me, but if I stood still, they would gradually close in about me and go on feeding with the utmost indifference to my presence. It would have been quite easy to have killed any number of them with a switch, after the manner, related by Darwin, of the boy in the Galapagos Islands.

Outside the limits of this sanctuary, I saw numbers of dead birds, the most common of which were wagtails and lapwings; but as I remarked before, my survey was limited. The mortality over the whole island must, I think, have been very great. A gamekeeper told me he had seen dead birds of all kinds, even grouse and crows, the last of which I take to be the hardiest of the feathered race. During the frost, he said, a gun was almost superfluous. Even those wary birds, the curlews, had, to use his own words, "come about the doors like hens to be fed," and numbers of them had been killed by boys with sticks and stones. He had examined some of them, and found that they were scarcely more than skin, bones and feathers.

Among other unusual circumstances I may mention that I saw several moor-hens (*Gallinula chloropus*) looking for food in the ebb of the sea; and my friend Dr. Gilmore had a water-rail (*Rallus aquaticus*) brought to him, which I understand was found in a like situation. The last is a rare bird in this island.

With regard to the mammalia, I think they did not suffer nearly so much as the birds, though I have few reliable data to go upon. I saw one dead hare in the open, and heard of others; but a couple of rabbits shot by the distiller here, after the frost, were in fairly good condition, although their feeding-grounds had been covered with snow for some weeks. While on the subject, I may add that two otters have been taken recently at Lagavulin, about a mile-and-a-half from here. One, I understand, was a dog-otter of extraordinary size, but I had no opportunity of seeing it or of obtaining measurements.

*Laphroaig, Islay; April 15th, 1895.*

THE HORSE'S FOOT. — Some interesting facts relating to this subject were brought forward in a lecture recently delivered at the Royal Institution by Veterinary Captain Frederick Smith. The physiology of the foot, said the lecturer, centred round the amount of moisture contained in the horn of the foot, which, when moist, was soft and elastic, but when dry became hard and brittle. A horse always put the back part of his foot to the ground first, and so the purpose of the elastic, rubber-like structure of the pad was to save the leg from concussion. The front part was harder because it had to support the wear and tear of friction with the ground. Although the footpad played so important a part it was usually removed by the farrier, and then a thriving trade was done in artificial pads. Horses in London would last very much longer if they were allowed the use of the pads with which the foot had been provided by nature. Another evil in shoeing, as generally practised, was the paring away of the horn of the sole.

# NEW HAND BINOCULAR TELESCOPES.

THESE remarkable instruments have been greatly improved, and produced for the English market by the Carl Zeiss Company, of Jena. Before describing the instruments it may be well to say something about the manufacturers, which will be found of more than passing interest.

The Carl Zeiss Optical Works are probably the the most important of their kind in the world and are quite exceptional in their constitution. The

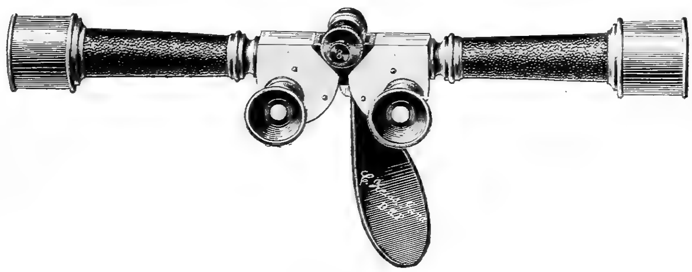


Fig. 1.

firm was established some years ago by a skilled workman whose name it bears. He is no longer living, neither is any member of his family connected with the factory. Jena is a university city in Saxe-Weimar-Eisenach, one of the Thuringian states of the German Empire. When Zeiss began to make his way he found the necessity of the association of some scientific adviser, and was fortunate enough to obtain in that capacity the well-known Professor Abbe. In consequence of the rule that only the very best possible work should leave the factory, the business grew with great rapidity.

This institution is now a public trust, with the Duke of Saxe-Weimar as Chairman. By public trust it must not be supposed that a public company in the ordinary sense is meant, for the profits annually earned, which are large, do not benefit individuals in the sense of shareholders. The payment of wages to the ordinary staff is liberal, the scientific staff receiving no less a sum than £5,000 annually. In this division is still included Professor Abbe, with whom is associated Dr. Czapski, as advisers in the optical department, and Dr. Pulfrich in a like capacity on instruments for physical research, whilst Dr. Rudolph advises on photographic objectives; Mr. Fischer being general business manager. To return to the question of the profits, they are divided between old-age pensions for the workmen and grants for the encouragement of scientific research. The University of Jena receives a portion of these latter grants and more than one Englishman has participated, if not actually in money, in the form of scientific instruments. The invested pension fund now exceeds £250,000.

Some idea of the magnitude of the Carl Zeiss Works may be gathered from the fact that it requires three hours to pass through the various wings and departments, without leaving much leisure for inspection of details. Upwards of 500 workpeople are employed, a curious feature being that there is no difficulty in obtaining skilled workers in metals, but the optical hands have to be trained within the works from boyhood. In consequence of the frequent addition of extra rooms to the factory difficulty in transmitting the power from a central steam engine was from time to time increasing, the loss of power being more than forty per cent. This difficulty has been overcome by making the steam-engines drive large electric dynamos, which are connected to separate motors under each workman's bench, the loss has thus been reduced to eighteen per cent.

We figure two of the Zeiss instruments, fig. 1 being the Hand Binocular Telescope, and fig. 2 the Field Glass on the same principle. The telescope was originally designed by an Italian engineer, named Porro, for military purposes, but has been much improved by Carl Zeiss. By the aid of this instrument an officer in the trenches can see what is going on with perfect accuracy, without exposing his head above the edge of the trench. In the same way a naturalist is able to watch the habits of a bird or other animal from behind a rock, a wall, or a bush, without being seen. This is accomplished in consequence of the apertures for the lenses being in the sides of the metal terminals

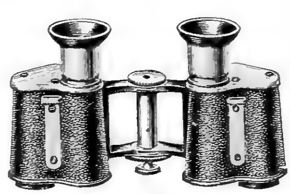


Fig. 2.

and not at the ends, as is usual. Thus by spreading out the two tubes from the vertical position to one that is horizontal, an observer may stand behind a tree and see round it, without being observed by the object under examination.

This effect is obtained by an ingenious arrangement of prisms, which is fully explained and illustrated in the specification of the patent which was completed last year, It would take up too much space if fully explained here. The remarkable part of this invention is that there is hardly any appreciable loss in the magnifying power of the lenses, through the image passing the prisms. A further feature of great value is that the picture resulting is truly stereoscopic, the object appearing solid and alive, instead of flat and only a picture. The magnifying power of this instrument is very great in proportion to its size. In a trial it was quite easy to see the particles of soot clinging to telephone wires at 500 yards away with a bright sky for background.

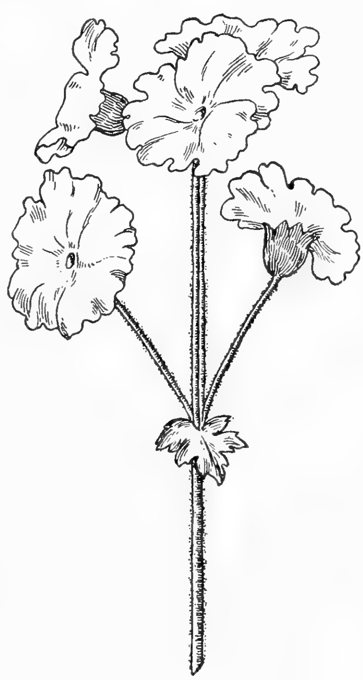
The field-glasses are among the best we have met with, also in consequence of the marked stereoscopic effect produced on the image. The focussing of the eye-pieces in both instruments is an important matter; it is so arranged that each eye may be separately focussed, which is important, as few persons have exactly the same range of sight in each eye. This is accomplished by a special outside movement, which renders almost impossible for dust to enter the instrument and so obscure in a measure the faces of the prisms. As both instruments have a central movement, the eye-pieces can be exactly adjusted to the distance between the eyes, and can be fixed by a little mechanical check.

There are three sizes of the stereo-telescopes, the three prices being £7 10*s*., £9 and £10 10*s*. The field-glasses are £6, £7 and £8 per pair. The London Agency is at 29, Margaret Street, Regent Street, London, W.

J. T. C.

## THINNING EPPING FOREST.

UPON the invitation of the Essex Field Club, we joined their visit of inspection of Epping Forest on May 18th, to view what had been done by the verderers in thinning the trees, about which there has been recently some outcry in the newspapers. The party numbered upwards of one hundred persons, and was conducted by Mr. E. N. Buxton, vice-president of the Society, who is also a verderer appointed by the City of London. The visitors were driven to various parts of the western side of the forest, visiting Bury Wood, also known as Hawk Wood, in which there are, approximately, 2,000 oak trees, as well as hornbeam aud blackthorn. In this wood 300 small and scrubby oaks, which were overcrowding others of finer growth, have been removed, and a further 300 have been marked for future felling. Loughton Valley and Monk's Wood were then reached, where extensive clearances took place many years ago, and the new growth has now reached from ten to twenty feet in height. This is largely composed of birch, which looks bright and elegant all the year round. After luncheon the party went to Epping Thicks, where the undergrowth was thinned some years since. The general opinion of those present, some of whom were experts in forestry from various parts of the country, including Scotland, was that what had been done was for the future good of the forest. We certainly could not see much appreciable difference in Bury Wood, about which so much has been said. Is it possible that some of the objectors to the policy of the verderers are as inexperienced in woodcraft as was a certain Lord Mayor in times past, who visited the forest in state to fulfil the annual custom of "hunting the hare"? A courtier ran up to his lord-mayorship, who was seated on his horse, waiting in one of the rides, and exclaimed, "My Lord Mayor, the hare cometh." To which the civic magnate replied, as he drew his sword, "I am thankful I fear not."—*John T. Carrington.*



Abnormal Primula.
(*Mr. Henry Ward's Specimen.*)

## ABNORMAL PRIMULA.

I DO not know if the enclosed Primula is of any importance, but I have not seen one before with three heads on one stem, so send it you.

Henry Ward.

*12, Norham Gardens, Oxford; May 8th*, 1895.

[This specimen of white Primula has one stem fasciated, but not broadly, supporting three distinct flowers crowded together in a bunch. The remaining stems are normal, carrying one flower each.—Ed.]

# CHAPTERS FOR YOUNG NATURALISTS.

## Some Lodgers in a Pond.

By A. F. Tait.

*(Concluded from page 74.)*

If every brickmaker and bricklayer in England were to go out on strike to-morrow, the industry of brickmaking, and the craft of bricklaying would still go on in full swing in the most remarkable of its branches. There is a humble but most active and independent member of the building trades to whom your attention is now invited. Competition, over-production, the crowded state of the labour market, and the vexatious and disturbing effects of a big strike could never disturb the mind of the little builder to whom we have the pleasure of introducing you. *Melicerta ringens* is the name of this most remarkable of artificers. This little creature was, as you will remember, beautifully illustrated in Science-Gossip last month by that prince of microscopists, the Rev. Dr. Dallinger, F.R.S. Melicerta is his own architect, his own brickmaker, and his own mason, and he is capable of constructing as graceful and handsome a tower as one can well imagine. Many of us have heard of the round towers of Ireland, and some of us are aware that our learned friends, the archæologists, have had battles royal as to whether these round towers were originally Christian belfries, or heathen buildings for the celebration of pagan ceremonies. We know not whether the excessive heat of the Hibernian atmosphere, theological and political, has caused the Melicertan to cast anchor in a more temperate zone, or whether he has had access to the plans in the "Archæological Transactions," but the broad fact remains that he (judging by appearances) must have been a resident at one time in "the distressful country," and has carried with him in his mind's eye an exact copy and pattern of the famed Round Towers of Ireland. That these towers must have been his *beau ideal* of beauty, strength, and utility, for his domestic architecture is invariably designed and executed on this very plan, the chief alteration he has made to meet his own requirements being that whereas the Hibernian tower is broadest at its base, the Melicertan tower is broadest at its summit. The structural difficulty of this arrangement vanishes when we are made aware of the fact that the Melicertan fixes its tower strongly to the stem of a water plant with a kind of mortar that binds together the foundation courses of its dwelling with the tenacity of Roman cement. What is the size, you ask, of this wonderful creature that is architect, brickmaker, master-builder and mason's labourer all in one. A giant specimen would be the one twenty-fourth of an inch in height, and an average worker about the thirtieth of an inch, so that although an artificer of tireless energy, absolute sobriety, and high intelligence, he will never compete with the nineteenth century Ben Jonson, and bring down the current rate of wages, nor will ever a Luke Fildes or a W. P. Frith paint a group of him, his wife and babes to picture the horrors of a strike. One of the usual likings of our little friend the Melicertan is his preference for what the advertisements call "a detached residence," his round tower or castle being usually built quite apart. Isolated from his neighbours, however, he has sometimes shown a disposition for society, and an inclination to be sociable; he has even been known to take a hint—apparently from London suburban architecture, and has occasionally run up "eligible dwelling-houses" in rows of four.

Like the beautiful princess of the fairy tale, he is shut up in a tower, and not even the arrival of the handsomest prince in Christendom could break the enchantment and give him freedom. True it is that, like Sister Anne in "Blue-Beard," he can look out of the tower, and probably says to himself, "I see somebody coming," and that somebody seeing the Melicertan will, slightly misquoting Thomas Hood, "Take him up tenderly, lift him with care, fashioned so slenderly, young, and so rare," for there are dozens of ponds in this country that you may search without finding a single specimen. The young ones of the Melicertan resemble in their origin the familiar chicken in this, that they are developed from eggs, and these eggs are laid and hatched within the round-tower-like house. Again quoting Mr. John Badcock, he says in "Vignettes from Invisible Life": "Owing to the fragile and peculiar character of its inhabitant, the greatest care is needful in this process. The egg is shot forth near the summit of the tower and is caught within it, falling gently alongside the animal to the base of the tower, where it is hatched, and where the youthful Melicertan lives until he leaves the parental abode which he quits never to return," and sets up business for himself as a free and independent member of the great building trades, in which, like a Michael Angelo, he is capable of doing justice himself to every branch of the profession, from architect and sculptor downwards. We again quote Mr. Badcock: "A young Melicertan is a very different creature from its parent, having two eyes, and swimming rapidly from place to place. This is the period of youth, free and easy it travels over its little world. Soon, however, it tires of this roving life, and selects some congenial spot on which to build a house, and having attached itself or—literally—put its foot down, never removes. It is generally some filament of Algæ, or other water-plant to which this attachment is made, sometimes to the wall of the paternal dwelling. The eyes now disappear from view, being changed from the prominent eye-spot character hitherto seen, into exquisitely fine crystalline ruby-like points."

We will now examine perhaps not the most remarkable but certainly the most beautiful of all "Lodgers in a Pond." Even the most hardened bachelor we suppose has not visited the West End of London for the first time without looking in at the jewellers' windows, where the gems are with which beauty heightens and accentuates the charms of countenance and person. Who, that has ever looked into a Bond Street or Regent Street window and seen the jewels from "far Cathay," from further India, from the mines of Golconda, but must have thought, if he thought at all, that the gems he saw flashing in the light, actually appearing to give light, could not be rivalled on earth, or expressed in art by the most cunning touch of the painter. Now, there are jewels—ready cut, set, and polished—in the pond we have been examining, that far out-shine in lustre and excel in loveliness the finest gems that Bond Street ever fashioned into a crown to adorn the shapely head of an empress. What are these extraordinary jewels called, and why isn't a limited company formed at once to place them on the market? They are called diatoms, and can never disturb the operations either of the Stock Exchange or the jewellery trade, for the simple reason that, although they are the loveliest objects not possessing life that ever were fashioned by nature, they are amongst the very smallest objects known, a moderate-sized specimen can barely be seen when fixed on a slip of glass and held up to the light. Some are so exceedingly small as to require the highest, the very highest, powers of the microscope to reveal their presence. Some species are so minute that a lady's thimble would contain more specimens than the entire population of our globe, and yet such is the power of the little diatom, that the paving stones of the London Royal Exchange is entirely composed of them; the City of Richmond, in Virginia, is built on a great stratum of them, some eighteen feet in thickness, and miles upon miles of the bed of the ocean is formed of countless millions of these diatoms that were sculptured with lines of undying loveliness æons of ages before man came on the earth. Just think of it, before the Alps were seen, and before the giant chain of the Himalayas emerged from the ocean, there was written one of the "wondrous manuscripts of nature" with illuminations in purple and vermillion, in blue and crimson, in scarlet and gold, and heightened with an iridescence that the Indian opal never displayed and the eye of man never saw, save perhaps in the setting sun. Portions of this wondrous "manuscript" have been found everywhere—now on the bed of the Atlantic, now at the greatest depth plummet has ever fathomed—which is a depth of nine miles, a little east of Japan—now on the summits of lofty mountains, and in lakes, ponds and rivers innumerable.

Not the least of the remarkable physical characteristics of the diatom is the exquisite sculpturing of its twin surfaces. It is matter of common knowledge to every worker with the higher powers of the microscope that there is not in Christendom a west window of a cathedral possessing anything like the beauty of form or the oriental opulence of sculpturing displayed by many varieties of the diatom. It is a curious and interesting fact for the mathematician, who tells us "a perfect circle is unknown," that the little band of pure flint which binds together the twin valves of every circular diatom is a true ring, so absolutely flawless that a magnifying power which would extend a postage stamp to a square mile, would fail to reveal the most trivial deviation from a fidelity of curve mathematically perfect.

34, *Woodlands Road, Ilford, Essex; March*, 1895.

## PROTECTION OF BIRDS AT EPPING.

At a meeting of the Essex Field Club, held in Epping Forest on May 18th, at High Beech, Mr. E. N. Buxton explained in an address, his successful efforts to preserve the birds of Epping Forest, and to encourage others to settle there. The forest, which is public property managed by the Corporation of the City of London, extends to about 6000 acres of woodlands. Through the influence of Mr. Buxton, owners of lands adjoining the forest have agreed to co-operate in the scheme, and have promised to preserve the birds generally on their estates. Exception was taken against the sparrow hawks, but among the birds to be preserved are all the other species of hawks, the owls, magpies (which were becoming very scarce, though there are three nests there this year), the lapwings, and kingfishers. Of herons there were fifty-five nests in the forest heronry this year, and sixty nests last season. Wild ducks were said to be nesting near to the house where the meeting was being held. Bird-catchers are to be in future checked, and every possible means used to induce our wild birds to settle in Epping Forest and vicinity, which will be kept as a veritable birds' sanctuary, covering over 20,000 acres.

## BOOKS TO READ

*The Royal Natural History.* Edited by RICHARD LYDEKKER, B.A., F.R.S. Illustrated with 72 coloured plates, and 1,600 engravings. (London and New York: Frederick Warne and Co., June, 1895.) Published in 1s. parts.

Since our last notice of this handsome and popular natural history, it has proceeded to 19 parts and volume iv. This last part also contains the index to volume iii., which completes the Mammals and commences the Birds. There is a liberal sprinkling of ornate coloured plates thro' the volumes, but as we have previously said, we much prefer portraits of all kinds of animals without colour, unless they are far too expensively produced for ordinary illustration; take for instance the plate of hoopoes in part 19 before us. Its brilliancy far outshines its accuracy. The plain illustrations are generally most effective, and we reproduce two of them which have been recently drawn for this work. As a general guide to a knowledge of the different kinds of living animals, we strongly commend Messrs. Warne and Co.'s Royal Natural History.

NARINA TROGON.
(From "*The Royal Natural History.*")

*The Lepidoptera of the British Islands.* By CHARLES G. BARRETT, F.E.S. Vol. ii. Heterocera (Sphinges and Bombyces). 372 pp. large 8vo. (London: L. Reeve and Co., 1895.) Price 12s.

This is, as explained in a supplemental title, a descriptive account of the families, genera, and species indigenous to Great Britain and Ireland, their preparatory states, habits, and localities. This great undertaking by Mr. Barrett is one which is looked upon with much interest by the entomologists of these islands, and we believe this volume contains the letterpress which accompanies coloured plates in another edition, which we have not yet seen. There does not appear to be any reference in the volume before us, that such other edition exists with plates. This we consider unfortunate, because the uninitiated acquiring this volume would think its purchase was comparatively money wasted, on finding there is a more complete book on the same subject, by the same author, published at the same time. In writing the letterpress for this work, Mr. Barrett has largely catered for the requirements of the collector, rather than for the scientific student, and its pages bubble over with the author's great experience in studying this group of insects, as learned in their haunts and among them when living. A fuller description of the habits of some of our rarest species, as known on the Continent would have been of much help. For instance *Sesia andrœniformis* as an imago is fond of frequenting the flowers of the privet, and if this is more generally known, it may not continue to be the rarity it is now with us. We hope Mr. Barrett will be spared to complete this great work, which will indeed be monumental; but we cannot help wishing he had commenced with the Micro-Lepidoptera, for there is no one who has a greater knowledge of them in this country. J. T. C.

*Lens-work for Amateurs.* By HENRY ORFORD. 225 pp. 8vo, with 231 illustrations. (London and New York: Whittaker and Co., 1895). Price 3s.

"Of all branches of handiwork this is perhaps the most difficult, and most abounding in disappointment to the inexperienced, and no amount of theoretical or mathematical knowledge will supersede many hours of careful, and often wasted, labour." So says Mr. Orford in his preface. He has, however, set himself to lessen that loss of time, and maybe of temper also, by setting forth in simple manner the best means of proceeding when one desires to make one's own lenses. Even for those who do not care to expend time on such work, this book will be useful in giving a better understanding of the place of lenses in optics, and will explain the occasional great cost of such as they may require to purchase.

*Primitive Man in Ontario*, By DAVID BOYLE. Being an appendix to the Report of the Minister of Education for Ontario. 98 pp. small 4to, with 263 illustrations. (Toronto: Warwick Bros. and Rutter. Printed by order of the Legislative Assembly, 1895.) No price given.

Every one who has had the pleasure of meeting the enthusiastic author of this work will be glad to hear that another of his handbooks has been printed by the Government of Ontario. Its intention is to place before teachers and others in Canada, a concise and fully-illustrated account of the Indian people of North America, from an ethnological point of view. In his first chapter entitled "Whence came the Indians," Mr. Boyle points out the probability of frequent enforced vogages to America by stress of weather, from Asia on the one side and Europe on the other, in those dark ages long prehistoric to the Columbian period. Certain it is that the earliest remains of human civilization found on the American continent ot the stone age, are in many instances almost identical with the types of worked flints of the old world. The numerous illustrations are for the most part, if not entirely, new, and are taken from the provincial collection in the Museum at the Canadian Institute, at Toronto. J. T. C.

*Illustrations of the Zoology of H.M. Indian Marine Surveying Steamer "Investigator."* Part i. Twelve large 4to plates and corresponding pages of explanation. Published under the authority of the Royal Indian Marine. (Calcutta and London: Bernard Quaritch, 1892.) Price 15s.

We have received Part i. of this handsome work from Mr. Quaritch. Plates i. to vii. refer to fishes, and the other five to crustaceans. Mr. A. C. Chowdhary's beautiful drawings have been well reproduced by a photo-etching process. The animals illustrated were described in the Annals and Magazine of Natural History.

*A Primer of Evolution*. By EDWARD CLODD. 186 pp. small 8vo., with illustrations. (London and New York: Longmans Green and Co., 1895.) Price 1s. 6d.

It is seldom one meets with such a concise treatise, so fully explained and in such handy form, for so little money. Mr. Clodd, by condensation from his larger work, "The Story of Creation," has extracted just the essence of the whole subject,

BRAZILIAN MOTMOT. (From "*The Royal Natural History*.")

without inflicting on us "dry-as-bone" pages of highly scientific verbiage. This little book is most readable, and will be thoroughly enjoyed by persons of all ages and all states of education. The chief fault with this primer is that it has been so cut down that in some places the readers would have benefited by fuller explanation.

*A Hand-Book to the Carnivora.* Part 1. By Richard Lydekker, B.A., F.R.S. (Allen's Naturalists' Library). 320 pp. 8vo, and 32 coloured plates. (London: W. H. Allen and Co., Limited.) Price 6s.

This volume of the Naturalists' Library contains the groups of mammals including the cats, civets and mungooses. In the editor's preface, Dr. R. Bowdler Sharpe again refers to the question of scientific nomenclature, defending the duplication of generic and specific names, for instance, that of the Common Genet, *Genetta genetta*. He also has induced the author to Latinise the generic term Linsang into *Linsanga*. Like all Mr. Lydekker's work, the letterpress is dealt with in the most modern manner, and his facts are well up to date. Every species hitherto described is mentioned. The chapter on the origin of the domestic cat is instructive, and not altogether in accordance with some previous writers on this subject. We observe that the author uses the generic term *Felis* in a wide sense, including such divergent animals as the lion and the lynxes. The plates are apparently much the same as appeared in the corresponding volume of Jardine's Naturalists' Library.

*The Birds' Calendar.* By H. E. Parkhurst. 350 pp., 8vo, with 24 illustrations. (London: John C. Nimmo, 1895.) Price 6s. net.

This is an American book treating popularly some birds of the Eastern States. These birds are considered in company with the months of the year, hence the title. English readers will find plenty of novelty and not much science. The illustrations are nicely reproduced, but, unfortunately, apparently from photographs of stuffed specimens, with, in many cases, artificial vegetation and backgrounds for decoration. Messrs. Nimmo have done their part very nicely and produced an artistic book. It will be useful in America for spreading the taste for natural history, which so much needs stimulating there among the public.

*Abstract of Proceedings of South London Entomological and Natural History Society for the year* 1894. 136 pp. 8vo. (London: Published by the Society, 1895.) Price 2s. 6d.

The Society has succeeded in publishing last year's "Proceedings" in good time when compared with former years. The position of the Society appears from the balance sheet to be prosperous, and the council's report indicates an increased membership notwithstanding a heavy obituary record. Reports of most of the meetings have already appeared in the pages of Science-Gossip, but those interested in the burnet-moths will find several lengthy abstracts of papers read by Mr. J. W. Tutt, F.E.S., upon "European species of the Zygænidæ." These papers form a critical consideration of half a dozen species, and throw some light upon local races and obscure types.

*Bird Notes.* By (the late) Jane Mary Haywood. Edited by Emma Hubbard. 198 pp., with 16 illustrations. (London and New York: Longmans, Green and Co., 1895.) Price 6s.

To the unsophisticated lover of birds in their native haunts this prettily produced little book may appeal. Much allowance must be made for the late author's idealisms, which clothe her favourite birds with a human-like individuality far from natural. There is a good deal of chatty pleasantry in the pages which will amuse even the hypercritical reader.

*The London Catalogue of British Plants.* Ninth Edition. Part I. Edited by Frederick J. Hanbury. 50 pp. 8vo. (London: Geo. Bell and Sons.) Price 6*d.*; or, interleaved in limp cloth, 1*s.*

Part I. of the ninth edition of this standard list of British plants contains the Phænogamia, Filices, Equisetaceæ, Lycopodiaceæ, Selaginellaceæ, Marsileaceæ and Characeæ, "adapted for marking desiderata in exchanges of specimens, for an index catalogue to British herbaria, for indicating the species of local districts, and for a guide to collectors, by showing the comparative rarity or frequency of several species." There are a good many changes in this edition, chiefly in the nomenclature. These alterations are stated by Mr. Hanbury, in his prefatory address, to be "the results of the field-work, the critical study of British plants, and the researches on nomenclature, made during the last nine years." The plan of this edition is similar to the last, but with the addition of the authorities to the generic names; though "Linn." does duty for the pre-Linnæan nomenclators. The author says, "the changes in nomenclature are, unfortunately, again numerous." We quite agree with the author in the misfortune, for we believe that every new standard list, in whatever department of Natural Science, which institutes numbers of changes of names, actually tends to check the study of the animals or plants in that department. The chief changes in the ninth edition of the London Catalogue are in the genera *Rubus*, *Hieracium* and *Salix*. As an addendum to the catalogue there is a supplementary list of the willows, by the Rev. E. F. Linton, which is in consequence of Dr. Buchanan White, in whose hands the genus *Salix* had been left, unfortunately dying before he had opportunity of going through the proof-sheets. In other groups Mr. Hanbury acknowledges the co-operation of specialists of the highest repute. The very careful manner in which the author has produced the catalogue will, we hope, more than set off any passing feeling we may possess with regard to the vexed question of nomenclature. J. T. C.

*A Dictionary of Bathing Places and Climatic Health Resorts.* By B. Bradshaw. 438 pp. small 8vo, with maps and illustrations. (London: Kegan Paul, Trench, Trübner and Co., Limited, 1895.) Price 3*s.* 6*d.*

This useful compilation comes out in improved form, some of the articles having been re-written, and much additional information added to the book generally. It will be found useful to naturalists contemplating a holiday as well as to invalids seeking a health resort. Almost every such resort in Europe is mentioned, from Mablethorpe to Nice. Some others are included, such as Madeira and the Canaries.

*Field-path Rambles: Comprising Routes Round Guildford,* etc. By Walker Miles. Eighth series, pp. 219 to 328, with map showing paths, and illustrations. (London: R. E. Taylor and Son. 1895.) Price 1s.

For the unsophisticated lover of nature, this series of little guides is most useful for pointing out new walks in pretty neighbourhoods. There are few districts within easy reach of London more beautiful than that covered by the guide before us.


| | 1895. | *Rises.* h.m. A.M. | *Sets.* h.m. P.M | *Position at Noon.* R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* ... | June 1 ... | 3.51 ... | 8 4 ... | 4.36 ... | 22° 4′ N. |
| | " 11 ... | 3.45 ... | 8.14 ... | 5.18 ... | 23° 6′ |
| | " 21 ... | 3.44 ... | 8.18 ... | 5.59 ... | 23° 27′ |
| | | *Souths.* P.M. | *Sets.* A.M. | | |
| *Moon* ... | " 1 ... | 7.18 ... | 1.14 | | |
| | | *Rises.* | *Souths.* | | |
| | " 8 ... | 10.7 ... | 1.22 | | |
| | " 15 ... | 12.19 ... | 6.34 | | |
| | | A.M. | A.M. | | |
| | " 22 ... | 2 29 ... | 11.36 | | |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| *Mercury*... | " 10 ... | 1.38 ... | 9.55 ... | 6.53 ... | 23° 26′ N. |
| | 20 ... | 1.8 ... | 9.6 ... | 7.2 ... | 20° 42′ |
| | " 30 ... | 0.9 ... | 7.54 ... | 6.43 ... | 18° 44′ |
| *Venus* ... | " 10 ... | 3.6 ... | 11.11 ... | 8.20 ... | 21° 51′ N. |
| | " 20 ... | 3.10 ... | 10.55 ... | 9.4 ... | 18° 47′ |
| | " 30 ... | 3.12 ... | 10.35 ... | 9.45 ... | 15° 4′ |
| *Mars* ... | " 10 ... | 2.55 ... | 10.58 ... | 8.10 ... | 21° 29′ N |
| | " 20 ... | 2.41 ... | 10.34 ... | 8.35 ... | 20° 2′ |
| | " 30 ... | 2.27 ... | 10.9 ... | 9.0 ... | 18° 21′ |
| *Jupiter* ... | " 10 ... | 1.34 ... | 9 48 ... | 6.49 ... | 23° 6′ N |
| | " 30 ... | 0.35 ... | 8.46 ... | 7.8 ... | 22° 41′ |
| | | P M. | A.M. | | |
| *Saturn* ... | " 10 ... | 8.43 ... | 1.59 ... | 13.59 ... | 9° 22′ S. |
| | " 30 ... | 7.23 ... | 0 39 ... | 14.1 ... | 9° 18′ |
| *Uranus* ... | " 30 ... | 8.20 ... | 0.58 ... | 14.55 ... | 16° 21′ S. |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Neptune* ... | " 30 ... | 2.23 ... | 10.25 ... | 5.1 ... | 21° 21′ N. |

## Moon's Phases.

*Full* ... June 6 ... 11.0 a.m. *1st Qr.* ... June 14 ... 11.28 a.m.
*New* ... " 22 ... 9.51 p.m. *Last Qr.*... " 29 ... 2.1 p.m.

*Mercury* is an evening star in this month, and is at its greatest elongation on the 5th.

*Venus* is still well situated for observation after sunset.

*Saturn* may be observed early in the evening, especially at the beginning of the month.

Spectroscopic Astronomy. — Dr. Huggins, F.R.S., delivered, at the Royal Institution on May 23rd, the first of three lectures on the instruments and methods of spectroscopic astronomy. He explained how it was that for upwards of half a century astronomers came very near to the discovery of the importance of the dark lines in the solar spectrum, but just missed it; and that all the original discovery by means of the spectroscope, which has so vastly enlarged our knowledge of the heavens, is compressed within the period of the last thirty years. Bunsen, one of the founders of spectroscopic analysis, still survives. The lecturer demonstrated how the latest triumph of the spectroscope was obtained by Professor Keeler—the confirmation of the atomic theory of Saturn's rings.

The April Meteor shower was not favourably seen in Britain, on account of the prevalence of clouds in many places where observations were made Still, several of about the first magnitude were seen.

Saturn's Ring.—There have latterly appeared, especially in the newspapers, some announcements that the actual constitution of the ring of Saturn had been discovered. This was attributed to Professor Keeler of the Alleghany Observatory. That gentleman writes to "Science" of May 10th, to correct some of these statements and to authoratively say what he has done in investigating Saturn's ring. His observations, says he, "furnish direct proof of the accepted hypothesis that the ring of Saturn consists of a multitude of small bodies revolving around Saturn in circular orbits." This theory is an old one and has been universally accepted since 1859, when Maxwell's prize essay appeared. Professor Keeler says that he has done no more than confirm "the hypothesis by the widely different method of direct observation with the spectroscope." He continues: "The proof depends upon an application of the well-known principle of Doppler, by which the motion of a heavenly body in the line of sight can be determined by measuring the displacement of a line in its spectrum. Under the two different hyphotheses, that the ring is a rigid body, and that it is a swarm of satellites, the relative motion of its parts would be essentially different; hence, to distinguish between these two hypotheses, it is only necessary to find a method of sufficient delicacy in order to bring the question within the province of the spectroscope." He then describes his system of observation, which has already been fully explained in the May number of the "Astrophysical Journal." Professor Keeler finds the actual aspect of the lines on his photographs of the spectra of the ball and of the ring are exactly as theory had indicated before practice had confirmed the hypothesis.

The Eclipse Committee of the British Astronomical Association has had under discussion the subject of organising an Expedition to observe the total solar eclipse of August 8th, 1896. The Committee considers the best method of procedure would be to engage a special steamer for the service of the observers, so as to form a home and base of operations. The party would thus be independent of local accommodation, which is evidently far from satisfactory. To enable the Committee to carry out the proposal, an invitation is issued to those who would like to accompany the expedition to Norway, which would extend from July 21st to August 22nd, at an estimated cost of from £17 to £36 per head, according to the route finally decided upon. If facilities could at the same time be afforded to naturalists for dredging or other means of studying the flora and fauna of the North Cape, no doubt it would be found easier to make up one or more parties with separate routes and more or less expense. Information may be obtained from Mr. T. E. Maunder, 26, Martin's Lane, London, E.C.

Mr. Walter F. Gale records in "The Journal of the British Astronomical Association" the rare observation of an occultation of a star by the Moon, taken in the daytime in sunshine. It took place on November 24th, the star being Spica and the instrument used was an eight-and-a-half-inch equatorial reflector of six-feet focus, with power of seventy diameters. The disappearance occurred at 17h. 24m. 15·45s. local sideral time, the position, longitude, 10h. 4m. 54·79s. E., latitude, 33° 53′ 12·3″ S.

On May 9th, the Duke of Devonshire unveiled in Westminster Abbey a memorial tablet to the late Professor Adams, of Cambridge. On the medallion is carved a portrait of the late astronomer.

# SCIENCE GOSSIP

PROFESSOR ALFRED CORNU, of Paris will deliver the Friday Evening Discourse at the Royal Institution on June 7th. The discourse will be in French, and the subject will be "Phénomènes Physiques des Hautes Régions de l'Atmosphère."

THE BRITISH ASSOCIATION meets this year at Ipswich. The first general meeting will be held on Wednesday, September 11th, when the Marquis of Salisbury will resign the chair, and Sir Douglas Galton, the well-known writer on hygiene and allied subjects, will deliver the presidential address.

THE Bristol Geologists' Association has issued its programme of summer excursions, which are five in number. The dates fixed are all on Sundays, which gives the members a long day, as the start is usually made by 9 a.m. The annual subscription to this society is only one shilling.

IN our account of the sale of birds and eggs last month (*ante* page 69), through an oversight it was stated that the auctioneer withdrew the skin of a great auk at 150 guineas, which should have been 350 guineas. It was afterwards privately sold for £350 to the Edinburgh Natural History Museum.

GREENLAND SHARK OFF SCOTLAND.—"The Annals of Scottish Natural History" last published, records the capture, in January last, of a Greenland shark (*Lœmargus borealis*) at about twenty-five miles north-east of the Isle of May. It weighed one ton seven and a half hundredweights, and was twenty-one feet in length. Its stomach contained a seaman's boot with a portion of a human leg.

M. MOESSARD, of Paris, has recently invented the Cylindrograph, or panoramic camera, by means of which magnificent panoramic views can be taken, embracing half the horizon without distortion, on films from sixteen and a half inches to fifty-five and a half inches long. This camera, which can be supplied in England by Houghton and Son, of High Holborn, possesses the advantage that if one part of a landscape or building is in shadow, whilst the other is well lighted, it is easy to give the dark part two or three times the exposure of the other

THE Royal Society held their first Conversazione, on May 1st, in their rooms in Burlington House. The second conversazione will be held sometime in June; to this ladies will be admitted. The Marine Biological Association, at Plymouth, sent some marine organisms preserved in formic aldehyde, in dilute solutions, this being specially useful for the preservation of transparent organisms as museum specimens. Another exhibit showed the action of light on the under-sides of flat fishes. The flat fishes exhibited were reared in a tank with a flat, slate bottom and glass front. Those portions of the under side of a fish which were not in contact with the slate, and to which light was accessible, this point being demonstrated by the exposure of a photographic plate upon which the fish lay, had become pigmented, whilst the remaining portions were without pigment.

AN interesting feature at the conversazione of the Royal Society, in May, was the results obtained by Mr. W. T. Burgess from experiments proving the extent to which flies may transmit infection of disease from one person to another. It is needless to add that harmless microbes were chosen for the demonstration.

APROPOS of the value of specimens, we understand that an extensive fraud has recently been discovered in making up common species of humming-birds to imitate others of great rarity. By a skilful system of dyeing the feathers, these have been successfully passed off upon some experts as well as others, at high prices. We hear the "manufactory" has been in Paris.

DR. LUDWIG MOND, who has already done so much to promote scientific research in this country, opened, on May 3rd, at the Owens College, Manchester, the Schorlemmer Laboratory. Dr. Mond said that the opening of the first laboratory solely devoted to the study of organic chemistry, connected with the only university in England which could boast of a professor of that subject, marked a distinct step forward in the development of science in this country.

PROFESSOR DEWAR, on May 16th, brought to a close a course of lectures at the Royal Institution on "The Liquefaction of Gases." The Professor went very fully into the historical aspects of his subject, and justified himself against the charges brought against him by Professor Olsweski, of Cracow, in Austria. Liquid oxygen and liquid air were exhibited to the large audiences by the pintfuls, and we shall probably soon have the satisfaction of seeing some liquid hydrogen.

THE recently constituted Union of Irish Field Clubs will hold its first conference at Galway, from July 11th to 17th. Excursions will form part of the programme, including visits to the lakes and mountains of Connemara, and to the Arran Isles. As we understand our Irish colleagues will welcome English and Scotch visitors who are students of natural science, or archæologists, this will form an excellent opportunity for visiting Western Ireland, with especial facilities for travelling at reduced rates and in good company.

THE circular issued by the Netherland Zoological Society on the subject of the second International Zoological Congress to be held at Leyden, from September 16th to 21st next, gives particulars of sectional meetings. Full particulars may be obtained from Dr. P. P. C. Hock, of Helder, the general secretary. The Director of the celebrated Leyden Natural History Museum, Dr. Jentink, is to be President, and the Queen Regent of the Netherlands is Patron. The subscription is £1 for members.

AT Whitsuntide, at least two London societies take lengthened excursions. The Geologists' Association, under the direction of Mr. E. A. Walford, F.G.S., visits Banbury from Saturday until Tuesday, the headquarters being the White Lion Hotel. Mr. C. Davies Sherborn, F.G.S., of 540, King's Road, London, S.W., is the Hon. Secretary of this vigorous society. The South London Entomological and Natural History Society has fixed a three days' excursion to the New Forest. The forest should be looking almost at its best, clothed in its new garb of spring foliage and flowers; some of the local insects are due to emerge, especially among coleoptera.

# SCIENCE ABROAD

MÉMOIRES PRESENTÉES PAR DIVERS SAVANTS À L'ACADÉMIE DES SCIENCES DE L'INSTITUT DE FRANCE. Tome xxxi, 1894.—This volume, which has just been published at the Paris National Press, contains the famous memoir with which Madame Sophie Kovalevsky won the Bordin prize of the Paris Academy in 1888. The subject proposed was, *To perfect in one important point the theory of the movement of a solid body round an immovable point*, and in recognition of the extraordinary merits of Madame Kovalevsky's work, the judges raised the amount of the prize from three thousand to five thousand francs. But the talented authoress did not live long to enjoy the high position she had gained, In February, 1891, she was attacked by an illness which ended fatally after three or four days. In the "Fortnightly Review" for May, may be found a most interesting account of this lady, one of Russia's most talented daughters. Sophie Kovalevsky was born in Moscow, about 1850, and her interest in the mathematical sciences was first aroused by the room in which she spent much of her childhood. This room had been papered with old disused printing paper, amongst which were several sheets of Ostrogrodski's lectures on the differential and integral calculus. The child puzzled out many of the problems on the walls, and this was the foundation on which the splendid superstructure of her scientific attainments was reared.

THE NEW SCIENCE REVIEW (April, 1895).—This journal is published monthly in the States by the Transatlantic Publishing Company of New York, and may be obtained in London at Gay and Bird's, Chandos Street, Strand. It aims at saying in plainer language all that the technical papers say in their abstruse phraseology. This number opens with an article on *The Elements*, by Professor William Crookes, F.R.S., one of our greatest chemists, and the inventor of many improvements in the spectroscope. He refers to the gaps in Mendeleeff's system of the elements, and to the probabilities of these gaps being filled up. He thinks much research will have to be gone through and a long time spent before a really new chemistry of elements and meta-elements can be constituted. Miss Mary Proctor contributes some autobiographical notes written by her father, the late Richard A. Proctor, and Professor G. F. Fitzgerald writes on *The Ether and its Functions*.

BULLETIN DU MUSÉUM D'HISTOIRE NATURELLE, ANNÉE 1895, NOS. 1-3.—Every month the directors, naturalists, assistants, etc., of the various departments of the Paris Natural History Museum, meet together and detail their work during the past few weeks. This journal contains accounts of these reunions. In the first number, M. Saint-Loup writes on *A new species of the Leporidæ, Lepus edwardsi*. In No. 2 M. Diguet gives an account of his expedition to Lower California, and M. Van Tieghem describes two Loranthaceæ brought from Lower California by M. Diguet, one a Viscum, the other a Loranthus. This latter differed from all the known American Loranthaceæ by its leaves, which were narrow, long, and cylindrical. Several other naturalists describe the collections brought home by M Diguet. M. Oustalet writes on three birds of Paradise from New Guinea, lately presented to the Museum. Before the Paris museum acquired these birds, *Pteridophora alberti*, *Parotia carolæ* and *Amblyornis inornata*, Schleg, the Dresden museum was the only one that contained them. M. Bureau writes on *Dorstenia scaphigera*, a plant remarkable for its inflorescence, or the arrangement of its flowers on the flowering stem or branch. M. Franchet writes on *Some Plants of East China*, and M. Bouvier on *The Geographical Distribution of the Crustacea of the sub-family of Lithodes*. In No. 3, M. Lapicque describes his cruise to the East in the yacht Semiramis, chiefly for ethnological and anthropological causes. M. Filhol writes on *The restoration of a skeleton of Hippopotamus lemerlei*, which has been accomplished by M. Grandidier, at Ambolisatra, in Madagascar, where the animal was found. M. Brongniart writes on *The Homoptera of the genus Flatoides*. MM. Phisalix and Bertrand write on *Some peculiarities relating to the Venom of the Viper and the Cobra*. These Bulletins deserve to be studied by those who wish to keep abreast of current investigation and thought, and it might be hinted to the keepers of our Natural History Museum that they would do well to imitate the example set them by their Parisian confrères.

REVUE SCIENTIFIQUE (May 4th, 11th, 18th). In the issue of May 4th, M. Axel Ohlin has an article on *The Fauna of the Polar Regions*, in which he enumerates the mammals and birds observed by the members of the Peary Expedition. In the same number M. Pajès writes on *The Physiology of the Mineral Matter of Milk*. In the issue of May 11th, M. Laborde has an article on *The True Microcephaly and the Descent of Man*. He gives photographs of three microcephalic or small-headed brothers, and compares the anatomy of these three idiots, who were born in Greece, to that of a young female chimpanzee, and shows how strongly these brothers resemble monkeys. M. Laborde accounts for the strange state of these idiots to an arrest in their development and a consequent reversion to an ancestral type. M. Sabatier writes on *The Immortality of Protoplasm*. The article is a thoughtful and well-written account of some of the problems that centre round that strange substance known as the physical basis of life. In the issue of May 18th, M. Naville writes on *Order in Nature*. He traces the course of thought along the ages, and shows that the modern scientific thought has cast aside metaphysical questions and was endeavouring to create order in every sphere of nature.

LA NATURE (May 4th, 11th, 18th). In the issue of May 4th, is an interesting article by M. Coupin, on *The Origin of the Silk-worm*, illustrated by drawings of the various stages of *Theophila mandarina*. We hope to give a short abstract of this article in our next number. In an article on *The Sense of Colours* (in the issue of May 11th), M. A. de Rochas refers to a recently published thesis on this subject, by M. Hugo Magnus, appearing in the "Mémoires de Physiologie," published by the University of Jena. In the same number is an article on *The Parasites of the Cricket*. In the issue of May 18th, is an illustration of a wonderful elm in the United States which is bent in the form of an arc, and which seems to have taken root twice over.

# BOTANY

EUONYMUS JAPONICUS.—Referring to the note by Mr. J. C. Eccles (*ante* page 16), as to the fruiting of *Euonymus japonicus* at Ventnor, and to the reference to the subject (on page 27) in report of the annual meeting of The South London Entomological and Natural History Society, where it is remarked that the shrub rarely flowers in this country, it may be of interest to note that I saw a specimen in flower at Dawlish, Devon, on or about the 5th of August last. The shrub was trained on the front of a house under the cliffs facing the sea, but in a somewhat sheltered position.—*W. P. Quelch*, 8, *Eccleston Road*, *Ealing Dean*, *W.*; *April 30th*, 1895.

BOTANICAL FIELD CLUBS.—With reference to a paragraph which appeared under the heading of "The Popularity of Botany" (*ante* page 80), you say that the subject of botany is rarely included in the subjects of a Field Club. Permit me to say that the Field Club of the Selborne Society, the committee of which has organised a series of rambles round London, for every Saturday, from April to September, includes many members of the Society and associates of the Field Club that are very much interested in botany. We have several excellent referees on the subject. The Editor of "Nature Notes" (the magazine of the Selborne Society), Mr. J. Britten, F.L.S., is an eminent botanist. I am sure that we would heartily welcome anyone who was interested in the subject, either at our rambles, or if that is not convenient to exchange notes and assist in identifying specimens. Any information on the subject I should be very happy to give.—*E. J. Temple*, *Hon. Sec. Field Club*, *Selborne Society*, 50, *Clovelly Mansions*, *W.C.*; *May 17th*, 1895.

FIELD BOTANICAL SOCIETIES.—With reference to the paragraph which appears in this month's SCIENCE-GOSSIP (page 80), on the popularity of Botany, I should much like the opportunity of taking an active part in forming a popular London Botanical Society. The flora of London is a subject well worth working, and replete with interest for many a Saturday-afternoon's ramble. Any scheme or society with the object of working this field, I should be most happy to help to organize and carry out to the best of my power. I have had a good many years, practical experience of field-work, especially in the south-east of England. During last summer I gave much attention to the flora in the country immediately round the Metropolis, with results that surprised me. I trust that should there be any response to your paragraph, you will allow me a chance of doing what I can to further it.—*T. Alfred Dymes*, 16, *Lancaster Road*, *Kensington Park*, *W.*; *May 11th*, 1895.

[Will others interested in Field Botany who desire to join such a society, send in their names to the Editor of SCIENCE-GOSSIP, who will be pleased to assist in any way, to form local "Botanical Gossip" Clubs. The subscription need be only nominal.—ED.]

WE hear that the beautifully prepared herbarium of British plants, prepared with so much care by the late Mrs. Elizabeth Ann Lomax, who died at Torquay in March last, has been offered by her trustees to the National History Museum, Owens College, Manchester.

MANY students of botany will miss the courteous head of the Botanical Department at Cromwell Road. Mr. William Carruthers, F.R.S., retires on superannuation, and is to be succeeded by Mr. George Murray, F.L.S., so well-known by frequenters of the students' room for his unfailing help in cases of difficulty. We congratulate Mr. Murray and our botanical readers upon his appointment as keeper of botany in the British Museum.

IMPATIENS NOLI-ME-TANGERE.—With reference to your comment upon my notice of the whereabouts of this plant (*ante* page 80), I regret to find that I have been mistaking *I. fulva* for it, having been misled by reading in C. A. John's "Flowers of the Field": (*a*) "*Balsaminaceæ*, the only British species belonging to the balsam tribe," etc.; (*b*) "*Impatiens*, the only English species (*I. noli-me-tangere*)."—*J. C. Dacie*, 105, *Upper Richmond Road*, *Putney*.

SHRUBS KILLED BY FROST.—Now that the spring foliage has appeared it would be well to take notes of some of the plants and shrubs which have suffered severely from the late prolonged frost. In Sussex, between London and Brighton, as seen from the railway carriages, the gorse, *Ulex europæus*, seems quite dead and shrivelled, having lost all its deep green colour. There are very few sprays in flower. Laurestinus was much killed in south-east Essex, and the margins of bramble leaves were commonly brown for at least half-an-inch from the edge. Many evergreen oaks also have succumbed. If correspondents would give us some particulars of the plants which have been killed during the past winter, we might arrive at valuable data for the guidance of those cultivating such plants for ornament or otherwise. In writing, particular note should be taken of the aspect in which the plants grew, whether sheltered or not.

IMPATIENS FULVA IN SURREY.—There can be no doubt that the above species, and not *I. noli-me-tangere*, is the plant found by your correspondent, Mr. J. C. Dale (*ante* page 80). The localities he mentions render this certain. It is a North American plant and I have seen it growing on the banks of the Niagara river, near the falls. In my opinion the seeds were originally introduced among a cargo of wheat, and that this wheat was ground at a mill near Abinger, in the county of Surrey, in the mill-pond of which, *Impatiens fulva* is growing in the greatest profusion. From this pond it was carried down the stream called the Tillingburn, into the river Wey, where it was found occasionally many years ago. In the later botanical works it appears as an introduced species found on the Wey and its tributaries. It is now getting quite common on the Thames and its tributaries, and abounds on the Grand Junction Canal and by ditches and streams communicating therewith. There is also in Britain, another introduced species, the Russian *Impatiens parviflora*, a much taller plant, with insignificant yellow flowers. This was many years ago a perfect weed in our garden in Essex, and also at Kew. *Impatiens noli-me-tangere* I have never seen out of the lake district. It is the only true British species, and is very local.—*A. Sewell*, 62, *Ranelagh Road*, *Ealing*, *W.*; *May*, 1895.

## MICROSCOPY

Mr. Walter P. Young, of 251, Lavender Hill, London, S.W., has forwarded his list of Micro-chemical re-agents, staining fluids and mounting media, which may be useful to microscopists.

A new microscopical journal has just made its appearance at Leipzig, called "Zeitschrift für angewandte Mikroskopie." It is edited by G. Markmann, and is published, in German, once a month, by Robert Thost.

Vegetable Sections. — Your correspondent, I. Stephenson (*ante* page 81), will obtain Dr. S. Marsh's "Section-Cutting" I believe from C. Collins, 157, Great Portland Street, London, W. I see in the catalogue it is advertised at 3*s.* 6*d.* Referring to the difficulty of fixing the stains on vegetable sections, he will be more successful in using cedar oil, instead of clove oil. It does not dissolve the colour so rapidly as clove oil.—*Walter Newton*, 33, *Brunswick Terrace, Macclesfield; May 6th*, 1895.

Vegetable Sections. — Your correspondent, Mr. I. Stephenson, finds a difficulty in fixing the stain in his vegetable sections (*ante* page 81). Some kind of mordant is necessary to render an aniline stain permanent. Dr. Marsh recommends tannic acid, 1 drm. of the acid in 2 ozs. of methylated spirit, the product being filtered. The sections having been bleached and washed, after a preliminary soaking in alcohol, should be placed for about one minute in the tannic fluid and thence transferred to the dye. A copy of Dr. Marsh's work on "Micro-Section Cutting," may perhaps be obtained from Mr. Charles Collins, Scientific Bookseller, 157, Great Portland Street, London.—*Major J. Stuart, St. Peters, Jersey; May*, 5, 1895.

Conochilus volvox.—As most, if not all, of the microscopists with whom I have come in contact seem unable to keep this favourite rotifer for any length of time, some even saying they rarely get it home safely, the following experience of mine may be of interest. On December 24th, 1894, I obtained a good number from a very small roadside pool at High Beech, Epping Forest, and I have some still, in spite of repeated subtractions from their number for exhibition. They were brought home in a ten-ounce screw-capped bottle, with a small sprig of *Myriophyllum*, sp., and placed in a window facing north. Part of the water was emptied out, leaving about six ounces. Since then they have had no attention; the water has not been changed nor added to, evaporation being prevented by the cap. During the great frost the water was frozen nearly solid for several days. I am inclined to think my success is due to the weed. It has not only ærated the water, but has formed a congenial resting-place for the rotifers, which, although free swimming, take a considerable amount of rest. They frequently remain attached to the weed for hours. —*Alfred W. Dennis*, 48, *Mansfield Road, London, N.E.; May 16th*, 1895.

## NOTES & QUERIES

Rook Stealing Chicken.—This morning a rook descended into a field where chickens are being reared, and, seizing one of the number, carried it off in its beak to safe quarters, there I suppose to enjoy at leisure. Is this a usual thing for a rook to do?—*A. Binns, Dean Lane, Sowerby, Sowerby Bridge; May 16th*, 1895.

Biology in Essex.—Mr. David Houston, the Essex County Biologist, keeps "Biology Notes," the organ of the County Technical Laboratories, Chelmsford, well up in interest. We are pleased to find that besides residents in the county, to whom it is sent free on payment of postage, non-residents can now purchase this interesting monthly magazine for threepence per copy.

Caddis Worms.—What are the best means of preserving caddis worms in an aquarium, so as to see the various transitions, particularly from pupal to imago? What are the best books published on the order Neuroptera? I have looked many catalogues through, and the only article I have seen is in Science-Gossip for 1868.—*A. Binns, Dean Lane, Sowerby, Sowerby Bridge; May 16th*, 1895.

Recent Dendritic Crystals.—I send you a good example of dendritic crystals in paper, which cannot be more than about six years old. The paper is the white "Hieratica" commonly used for note-paper. This is of interest, in view of Mr. Tait's suggestion (Science-Gossip, N. S., Vol. i., page 86) that he never met with specimens in recently produced books. The fronds of crystals are in this instance of ordinary character, surrounding a small nucleus.—*W. H. Nunney, Bloomsbury; May 6th*, 1895.

Woodpigeons nesting by the Strand.—A pair of woodpigeons have built a nest, and one of the birds might have been seen incubating the eggs, during the last week of April and into May, in the branches of a plane-tree in Clement's Inn, London. The bough is overhanging the grass adjoining the Law Courts in the Strand. A constant stream of people was passing all day long just beneath the birds, which have lost all their natural shyness, now that they have become citizens of this great metropolis.—*John T. Carrington.*

Helix nemoralis as Ornament.—The old women at Bundoran, who sell odds and ends to the visitors, made, when I was a child in the early sixties, and I believe still make, necklaces of the shells of *Helix nemoralis*—about a hundred shells in each—which they sell for threepence or fourpence a necklace. Do your readers know if this is carried on elsewhere. It is apparently the only place in north or north-west of Ireland where it is done. The main varieties, such as the bandless forms of the same colours are strung together, as are the banded varieties. They also use *Helix acuta* for small necklaces. It may be that this custom is a survival from ancient times, as so many other old customs have come down, on the West Coast of Ireland.—*W. Welch*, 49, *Lonsdale Street, Belfast.*

# ZOOLOGY

Early Hepialus hectus.—I was at the Lakes in the middle of April (Easter week), and picked up a perfect specimen of *Hepialus hectus* on the open road, under a wood below Lyn Rigg, about a mile from Ambleside. As the caterpillar of this pretty moth appears in April, and the perfect insect in June, this seems a remarkable occurrence. I have set it and placed it in my collection as an exception.—*Miss W. Jarrett, Camerton Court, near Bath; May 10th*, 1895.

Testacella haliotidea in Kent.—A number of this species of snail were dug up in the vicarage garden here last autumn and present spring. One specimen secured was devouring a worm which it continued to consume in captivity. It afterwards rejected it and seemed only to suck the juices. One half of the rejected worm was normal in colour, the other half of a dirty white. *T. haliotidea* was found generally at a depth of six inches under the surface. — *(Rev.) R. Ashington Bullen, Shoreham, Kent; May*, 1895.

Those who have visited the Grosvenor Museum at Chester, must have noticed the cases illustrating the life-history of birds. These beautiful groups are acknowledged to be some of the most skilful examples of artistic and scientific taxidermy and natural arrangement ever produced. It is therefore interesting to note that Mr. G. Watmough Webster, of 33, Bridge Street Row, Chester, is about to publish by private subscription a series of photographs of these groups. In some cases it is scarcely possible to credit the statement that photographs are other than instantaneous pictures taken in the open air, and so skilfully have the cases been arranged that the final effect is as though the camera had been brought face to face with nature.

Bat Flying in Daytime.—On the 13th April, I observed a bat on the wing at about one o'clock in the day, in bright sunshine. The locality was the main road through the village of Bonchurch, Isle of Wight, near the pond familiar to all to whom the neighbourhood is known. The bat was flying leisurely to and fro over the road at a height which I estimated to be about ten or fifteen feet from the ground. It several times came lower and flew close round my head, when it might have been easily captured with a net. A cold east wind was blowing at the time, but the spot in question was sheltered by the trees and high ground. I am not sufficiently acquainted with the bats to be able to offer any definite opinion as to the species, but it appeared to be a small one, probably the pipistrelle. On a passer by throwing a cap at it, the little animal flew rapidly away in a straight line, from which it would appear that notwithstanding the bright light, it was able to see sufficiently clearly to readily direct its flight.—*W. P. Quelch, 8, Eccleston Road, Ealing Dean, W.; April 30th*, 1895.

Abundance of Wasps.—From several parts of the country an abundance of female wasps is reported this spring. This might have been expected, considering the long time they were locked up by frost during hibernation, safe from predatory enemies. J. T. C.

Luminous Centipede.—In reply to the query of Miss Mann, the centipede is probably *Geophilus (Anthronomalus) longicornis*, pictured in Wood's Natural History (Vol. iii., page 693). I found a specimen late one evening, in August, many years ago, but have never seen one since. It left a track of phosphorescent light on the herbage over which it had crawled, and my fingers had the appearance of having handled one of the old-fashioned lucifer matches.—*Hy. Ullyett, Folkestone; May*, 1895.

Luminous Centipede.—On a night walk from Ben Alder, in Inverness-shire, to Loch Rannoch, in Perthshire, by the side of the River Ericht, in company with the late Dr. Buchanan White, I saw many luminous centipedes. We walked in "Indian file" on account of the narrowness of the path, and the first disturbed these animals and caused them to glow brightly. The night was wet and warm in summer-time, in 1875. I have also seen them on the Poll Hill, near Sevenoaks, in Kent.—*John T. Carrington.*

Luminous Centipede.—The species mentioned by Miss Mann (*ante* page 82), as occurring in her garden at Chigwell, belongs to the family Geophilidæ. It is either *Geophilus longicornis* or *G. electricus*. I suspect that it is the latter as it exhibits more phosphorescense than *longicornis*. Miss Mann can easily distinguish its species, as *longicornis* has fifty-five pairs of legs and long antennæ. *G. electricus* is very common about Shoreham, Kent, on wet, warm nights, from February to June. I have only noticed it once on a dry night, viz., June, 1894, in a road called "Old Ham," which is about a mile from the village.—*(Rev.) R. Ashington Bullen, Shoreham, Kent.*

Notes of a Home Naturalist.—On April 18th, in one of my glass jam-bottles, in which I keep small aquaria subjects, and in this special one, *Corethra plumicornis*, or Phantom Larva, I noticed on the surface three dove-grey midges, or two-winged flies. Thinking they must be the produce of the larvæ which I had never seen transformed, I covered the bottle up with green gauze. On April 20th, I found another midge. I removed the three original and new inmate, noticing on top of the water what resembled a glass-jointed rod, with a diamond-like round head. Thinking this was the larva developing, I recovered it, but next day found another fly drying wings still limp. I then discovered the glass rod object was the original shell of the fly, and removed three to a card where they soon lost their elegant crystal appearance, and became like gold beaters' skin in texture. Numberless flies now began to appear, some brown with straight antennæ, others dove-grey with sickle-shaped antennæ, much haired or plumed. At last I had the pleasure to see one born. The head first emerged from the odd shaped and horned pupa case; then after a period of rest, with a long continuous effort, one wing much crumpled emerged, and after a longer period of rest the other wing. The fly's case remained as a crystal transparent casket. After an hour or so the insect's wings were dry, and it was ready to fly. Are the brown and grey flies male and female or different species?—*(Mrs.) Emily J. Climenson, Shiplake Vicarage, Oxon; May 13th*, 1895.

# TRANSACTIONS

PHILOSOPHICAL SOCIETY OF GREAT BRITAIN.—At the meeting held on May 6th, at the Victoria Institute, 8, Adelphi Terrace, London, Dr. Chaplin in the chair, a paper on the so-called *Pithecanthropos* of Dr. E. Dubois was read by Professor E. Hull, LL.D., F.R.S., after which a paper by Sir J. W. Dawson, C.M.S., F.R.S., "On the Physical Character and Affinities of the Gaunches, or Extinct People of the Canary Islands," illustrated by photographs, was read. In it the author reviewed the historical facts as to the Canary Islands and their inhabitants, the characters of the crania found, and the weapons, ornaments, etc., and described the conclusions he had arrived at with reference to the relationship of the Gaunches to ancient peoples of Western Europe and Africa, and their possible connection with the colonization of Eastern America.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—May 9th; T. W. Hall, Esq., President, in the chair. Mr. Williams exhibited a curious cluster of cocoons fastened on a twig in a caterpillar-like group. Mr. T. W. Hall a var. of *Sphinx ocellatus*, having a considerable obscuration of the ocelli. Mr. Carrington, a number of richly-banded specimens of *Helix pomatia*, and some showing the winter epiphragm. He said that he had found the young of this species crawling up the stems of grass as is usual with other members of this genus. Mr. Step sent for exhibition flowering specimens of *Scilla verna*, from Portscatho, and contributed notes on this local plant. Mr. Enoch, specimens of the exceedingly rare fly, *Polynema natans*, Lub. Mr. Mansbridge read an interesting paper on "Prairie Insects," giving an account of the insect inhabitants of prairies in the Indian territory, U.S.A., other than lepidoptera. In the discussion which ensued, Messrs. Pearce, Carrington and Warne gave their experiences in similar regions. At the meeting held May 23rd, the President in the chair, Mr. C. G. Barrett exhibited a gynandromorphic specimen of *Saturnia pavonia*, which showed the male and female characters on opposite sides of the body and wings. The antennæ were simple on one side and pectenated on the other. Mr. Mansbridge drew attention to a case where several gynandromorhpic specimens of the same species had emerged from one brood, the pupæ of which had lain over a second winter before producing perfect insects. The sexual differences on the wings in those specimens were demonstrated in a curious diagonal manner, though divided evenly down the middle of the body, the antennæ being as in the example exhibited by Mr. Barrett. Mr. Alfred W. Dennis showed, with the aid of a microscope, ova and living larvæ of *Lycæna argiolus*, also ova of *Leucophasia sinapis*.—*Hy. J. Turner* (*Hon. Report Sec.*)

NORTH STAFFORDSHIRE NATURALISTS' FIELD CLUB.—With Mr. C. E. de Rance, F.G.S., of her Majesty's Geological Survey, for leader, some eighty members of this field club visited Marston mine, on May 4th. From Stoke to Hartford the party travelled by railway, and thence in carriages to Great Budworth. Objects of interest were pointed out on the way, and it was explained on arrival at Budworth Mere and Pickmere that the space covered by these lakes had probably subsided owing to the natural dissolution of rock salt beneath. The upper bed of rock salt was stated to have been discovered in 1670, and the lower bed a century later, to which mining has since been confined, the rock being of better quality. At Marston the beds are eighty-four and ninety-six feet thick respectively, and separated by thirty feet of marl. At Marston the mines are dry, and still worked for rock salt. By the courtesy of the Salt Union, Limited, a descent of the Adelaide mine was made, the visitors being greatly interested. Mr. de Rance addressed the large company on their emergence from the mine. He pointed out that the salt districts of Northwich, Winsford, Wheelock, Middlewich and Nantwich are wholly in the basin of the Weaver. Brine is pumped for commercial purposes in all these districts except the last, in which it is only pumped for use in brine baths, and moreover rises in natural springs, flowing to waste at various points as far south as Hankelow, near Audlem, at 134 feet above the sea. Following the course of the Weaver to Shrewbridge Hall, a boring has proved the glacial drift overlying the saliferous marls to be no less than 113 feet. He stated that if the glacial drift were absent the old Weaver valley at this point would admit several feet of tidal water, at a point now twenty-four miles above Runcorn, where the Weaver falls into the Mersey, and forty-four miles from the mouth of the latter, near Liverpool. The pre-glacial valley of the Weaver can be traced at various points from the numerous borings for brine exploration and for water supply. At Nantwich the valley has been proved to be three feet only above the Ordnance datum line. At Newbridge, near Winsford, it is no less than 150 feet below that level, and at Leftwich, near Northwich, 196 feet below it, so, that were it not for the drift, an arm of the sea would extend into Cheshire up this ancient valley, which possibly passed eastward of Northwich instead of west as now, a boring at Rostherne Mark having only reached the rock at eighty feet below Ordnance datum. These facts do not stand alone, as both the Dee and Mersey, both in Cheshire and Flintshire, flow over old buried valleys of great depth. The buried valley of the former Weaver entirely separates the Northwich and Winsford salt districts, the rock-salt beds tapering off to nothing towards the ancient valleys. It is possible that the southerly thinning out of the Northwich salt beds, which was noticed by Ormerod in 1847, was due to original deposition of maximum quantities in particular areas, and comparison of the sections of the different portions of the district point to separate basins of deposition. The brine pumped at Winsford is natural brine from the "rock-head" or upper surface of the upper bed of rock salt. That obtained at Northwich is chiefly derived from the artificial or "excavation brine," resulting from the access of fresh water from cracks on the surface to drowned workings in the lower bed of rock salt. The drowned mines are largely under very old workings in a top bed of rock salt, which was given up on the discovery of the lower bed of better quality. The surface over these is now covered, which at intervals enters, and replaces the brine pumped out by the extension pumps of the Salt Union, Limited, and Messrs. Brunner, Mond and Co., the conditions of brine-pumping at Northwich and Winsford thus geologically and commercially being entirely different.

NATURAL HISTORY SOCIETY OF GLASGOW.—The eighth and concluding meeting of the forty-fourth winter session was held in the society's rooms, 207, Bath Street, on April 30th last.—Mr. Robert Kidston, F.R.S.E., F.G.S., vice-president, in the chair. Professor M'Kendrick, M.D., F.R.S., was elected an honorary member, and Mr. J. T. Marshall, Torquay, and Dr. R. Broom, Taralga, New South Wales, corresponding members. Fifteen gentlemen were admitted as ordinary members, and six others as associates. The hon. librarian laid on the table a newly-prepared catalogue of the society's library; and a hearty vote of thanks was moved to Mr. Duncan Mackinnon, of London and Calcutta, for his kindness in defraying the entire cost of printing 500 copies of this catalogue for free distribution to members. Gifts to the library of scientific works were intimated, and donations from Rev. J. E. Somerville, B.D., Mentone, and two others, with which to inaugurate an illustration fund in connection with the "Transactions." Professor Thomas King, the president, exhibited specimens in spirit of the gulf-weed, *Sargassum bacciferum*, Agardh, from the North Atlantic. It belongs to the Fucaceæ, its globular air-bladders having led to the specific misnomer *bacciferum*, and it forms the home of countless marine animals of remarkable habits. Colonel J. S. Stirling, of Gargunnock, exhibited, on behalf of the chairman and himself, specimens, from Stirlingshire, of the newly-determined pond-weed *Potamogeton bennettii*, Fryer, considered to be a hybrid between *P. crispus* and *P. obtusifolius*, and he offered some remarks on this difficult genus. Mr. A. Somerville, B.Sc., F.L.S., submitted specimens of the scarce burr-weed, *Sparganium affine*, Schnizl, obtained by him near Lagg, in the Island of Arran, and not previously recorded as occurring in the county of Bute. Mr. James Campbell, C.M., read a paper on "The habits of wasps," as observed by himself while painting in the open air. Wasps living near roads or dwellings act differently from those in fields or woods, becoming familiar, and, if encouraged, coming daily to share your lunch. They will sit on the easel or arm, and, after confidence is established, will not resent being stroked with the finger. A popular paper, entitled "The Gulls and their Neighbours," by Dr. David Robertson, F.L.S., F.G.S., was read. The reading of this paper also was followed by an interesting discussion. Two papers—viz., "On the Anatomy of a Four-winged Chick," by Dr. R. Broom, B.Sc., and "A Note on *Mergulus alle*, L.," by Mr. W. Craibe Angus, were held as read. Intimation was made of the excursions of the society to take place during May, and that Rev. G. A. Frank Knight, M.A., had accepted office on appointment as summer secretary.

ROYAL METEOROLOGICAL SOCIETY.—At the meeting held on May 15th, Mr. R. Inwards, F.R.A.S., President, in the chair. Mr. G. J. Symons, F.R.S., and Mr. G. Chatterton, M. Inst. C.E., read a paper on "The November Floods of 1894, in the Thames Valley," which they had prepared at the request of the Council of the Royal Meteorological Society. Mr. F. J. Brodie also read a short paper "On the barometrical changes preceding and accompanying the heavy rainfall of November, 1894."

# NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

SUBSCRIPTIONS.—Subscriptions to SCIENCE-GOSSIP, at the rate of *6s. 6d.* for twelve months (including postage), are now due.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

ALL communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to JOHN T. CARRINGTON, 1, Northumberland Avenue, London, W.C.

## CORRESPONDENCE.

J. BURNS (Swansea).—The contents of tube were dead and putrid, impossible to identify.

DEAL.—The plant is Common Alexanders *(Smyrnium olusatrum)*.

## EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

LIVING HELIX POMATIA.—I will present a couple or more of living specimens of H. pomatia to anyone who wishes to study their habits, so long as I have specimens remaining. Send small tin canister and return postage on addressed label. Any specimens of cleaned and named British land or freshwater shells, with localities and dates, gratefully received for distribution among beginners.—John T. Carrington, 1, Northumberland Avenue, London, W.C.

WANTED, No. 1 "Naturalists' Journal"; cash or foreign stamps offered.—Chas. Mosley, printer, Huddersfield.

BUTTERFLIES.—Australian butterflies offered in exchange for others.—Mrs. G. J. Waterhouse, Ellerslie, Waverley, Sydney, N.S.W.

WANTED, eggs of cuckoo with those of foster parents; good exchange in other eggs.—W. Wells Bladen, Stone, Staffordshire.

WANTED, to exchange foreign marine shells (mostly South Australian) for foreign marine shells not in my collection.—Lewis Shackleford, Ripley, Derbyshire.

PERIPATUS TRINIDATIS, of Sedgwick; recently collected specimens. What offers?—H. G. Hart, Botanic Gardens, Trinidad, W.I.

OFFERED, New Zealand ferns, carefully dried and correctly named. Wanted, foreign shells, marine, land, or freshwater.—L. Shackleford, Ripley, near Derby.

LARVÆ of carpini in exchange for others, also imagos of belgiaria (grey scalloped var.), unset.—A. Binns, Dean Lane, Sowerby, Sowerby Bridge.

OFFERED, SCIENCE-GOSSIP, parts for 1881, 1888-9, 1890-4. Wanted, British Lepidoptera, any stage, or offers.—A. H. Shepherd, 81, Corinne Road, Tufnel Park, London.

OFFERED, birds' eggs, British and foreign shells, dragonflies, lepidoptera, reptiles, zoophytes, skins of ermine and squirrel, etc. Wanted, books on entomology, ornithology, botany, etc.—W. Harcourt Bath, Ladywood, Birmingham.

WANTED, good field-glass or telescope, also few good specimens of fossil oak from Derbyshire; will give Alston Moore minerals in exchange.—William Hetherington, Nenthead, *viâ* Carlisle.

TWELVE superior objects, ready for mounting, and especially suited to the binocular microscope, offered in exchange for foraminiferous material or two good micro. slides.—A. Earland, 10, Glenwood Road, Catford, S.E.

WANTED, mounted coal sections, diatoms and marine zoological specimens; in exchange for botanical and zoological (rabbit, frog, tadpole, chick, Anodon amphioxus, earthworm, etc.) slides.—N. Walker, 14, Broomfield View, Leeds.

# THE ARIA GROUP OF BRITISH PYRI.

WITH A NEW SPECIES OR VARIETY.

BY THE REV. AUGUSTIN LEY, M.A.

NOTWITHSTANDING the admirable work accomplished by the late Dr. Boswell and others, and the diligent researches more recently made by Mr. N. E. Brown, in this interesting group, the plants comprehended in it are perhaps hardly yet fully understood; hence a few observations upon the most prominent forms found in Britain may be permitted.

1. *Pyrus aria*, Ehrh. This, the well-known white-beam, is decidedly the most common and the most widely-distributed of the group. It is native in limestone woods, and on mountain cliffs; occurring

THE LESSER WHITE-BEAM, *Pyrus minima*, Ley.
Reduced to half natural size.

also, occasionally, in hedges, and planted often in plantations, less often in gardens. Usually readily known from all the following by the snow-white felt of the under-surface of its broad unlobed leaves, by the cream-coloured anthers of its stamens, and by its large red fruit.

The var. *rupicola*, Syme, which differs somewhat conspicuously in extreme states by its narrower, obovate leaves, is connected with the type by a series of gradations, and is, I believe, identical with it in flower and fruit-characters. It is the more usual plant on mountain rocks, but grows also, with the type, in the limestone woods of lower districts.

2. *P. rotundifolia*, Bechst. This form stands well apart from *P. aria* in the direction of *P. torminalis*, Ehrh., which it also approaches in stature, being, when full-grown, a tree of thirty feet high or more. Besides the leaf-characters, it differs from *P. aria* also in its fruit, which is, when fully ripe, of a light orange yellow, mealy and tasteless, and ripens later; in West Gloucester, in November.

The var. *decipiens*, N. E. Br., is perhaps hardly worth distinguishing. Specimens further from the type than the Nightingale Valley plants attributed to this variety occur, with the type, in woods near Symond's Yat, West Gloucester, and, I believe (also with the type), at the Wynd Cliff, Monmouthshire.

3. *P. intermedia*, Ehrh. This (excluding the Arran plant next mentioned) is clearly as much a native tree as any of the other forms mentioned here, and will be found, I believe, more widely spread than has been supposed. I have seen it growing in Somerset (Nightingale valley), West Gloucester (Symond's Yat, and near Chepstow), Monmouth (Piercefield Park), Hereford (Great Doward), Brecon (Craig Cille), Montgomery (Craig Breidden), and Denbigh (Cefn Fedw). Its range of distribution therefore seems to be just that of *P. aria*, though a far less abundant form. This plant has only of late years been recognised in Britain as a distinct form; the Piercefield Park plant having been referred to *P. latifolia*, Boswell (*P. rotundifolia*), by Mr. J. G. Baker, in 1878; the Great Doward plant to *P. aria*, by Dr. Boswell, in 1882; and the Denbigh plant to *P. rupicola*, by the authorities of the Exchange Club, in 1891. Yet all these are clearly *P. intermedia*, Ehrh. The less dense, less snow-white, rather silky felt of the leaves, their lobed margins, and less crowded veins usually separate *P. intermedia*, without difficulty, from *P. aria*. The flowers are larger and more showy, and the anthers of the conspicuous stamens are of a rather bright pink, the fruit round, bright-red, ripening earlier than in *P. aria*.

Plants occur in which the leaf-characters are far less marked than as described above, but which possess the pink anthers characteristic of *P. intermedia*. Further observation is needed to determine whether these are better placed under *P. aria* or the present plant.

4. *P. minima*, n. sp., or n. var. A small spreading shrub, height ten to twenty feet; much branched, with slender branches. Leaves, linear-oblong, *shallowly pinnatifid*, with three to four principal lobes, which are usually deepest at the middle or upper part of the leaf, the lowest one-third or quarter being without lobes; side veins five to seven, making a *very acute angle* with the midrib, prominent on under, grooved on upper surface; under surface with grey felt, which persists until the leaf falls.

Flowers produced early in June, in loose corymbs which are not flat-topped, small, resembling those of *P. aucuparia*, Gaertn.; petals cream-coloured, round; stamens exceeding petals; anthers on the first opening of the flowers cream-coloured, then pinkish, soon dark brown; calyx erect and prominent on the unripe fruit, persistent until the fruit is ripe. Fruit *small, globose, bright coral-red*, bitter; ripening in the beginning of September; perfume in the flowers resembling that of *Cratægus oxyacantha*.

*P. minima* is very near the *P. scandica* of Boswell (in Bot. Exchange Club Rep., 1872-4, page 21), but differs in the leaves being narrower, with a more linear outline; and much shallower lobes except upon the young leading shoots; and in the fruit being globose, small, bright red, and bitter.

From *P. intermedia*, Ehrh. (of Piercefield Park, etc.), it differs by the slender branching habit, by the greyer felt of the smaller and much more linear leaves, which have the lobes terminating in a sharper point; by the flowers being less than half the size; by the colour of the anthers; and finally by the small fruit. *P. intermedia*, Ehrh. has long, thick, nearly undivided branches, very showy flowers, larger than in *P. aria*, Ehrh., with long stamens and rather brightly pink anthers, and large fruit.

Locality.—On a limestone mountain cliff, called Craig Cille, near Crickhowel, Breconshire; also on limestone rocks at Blaen Onnen, two miles westward from Craig Cille. Undoubtedly native, and in great abundance at the former station, where the shrubs clothe the limestone cliff to its head at nearly 2,000 feet; seedlings also being frequent. *P. aucuparia*, Gaertn., *P. intermedia*, Ehrh., and *P. aria*, Ehrh., var. *rupicola*, also occur on the same cliff; but the very distinct habit and fruit of the present plant, as well as other reasons, forbid the idea of hybridity.

5. *P. scandica*, Ascherson, and Boswell (?). (Bot. Exchange Club Rep., 1872-4.) By this name I intend the plant of Glen Eis-na-vearach, Arran, still, as when Dr. Boswell wrote its description in 1875, unknown as a native plant in any other British locality. This is surely distinct from *P. intermedia*, Ehrh., by the almost buff-coloured

felt of the under-surface of the leaves and by the smaller ellipsoidal fruit. The outline of the leaf is also different, being, as a whole, more obovate, and the sides of the lobes less rounded. It would be very desirable to have more details respecting the size of the flower, the colour of the anther, and the shape, size, and colour of the ripe fruit, in the Arran plant; with regard to which points Dr. Boswell's and Mr. Duthie's observations in the Bot. Exchange Club Rep., 1872–4, page 21, seem at present the only available ones. Mr. Duthie reports that the flowers have "rather a pleasant odour, resembling that of the mountain ash," and that "the fruit is sweet-tasted." Dr. Boswell adds to this that the fruit is "about the size of that of *P. rupicola*." Shrubbery and plantation specimens of *P. scandica* are not, at least by leaf-characters, distinguishable from the wild Arran plant.

Further observation and cultivation are necessary to determine whether *P. minima* would not be better placed as a variety of *P. scandica* than as a separate species.

6. *P. fennica*, Bab. I feel compelled to accept Dr. Boswell's view expressed in the Bot. Exchange Club Rep., 1872-4, page 22, and to regard the plant of Glen Catacol, Arran, which he describes under this name, as distinct from *P. scandica*. The surface and clothing of the leaf, as well as its cutting, differs in the two plants. In the present plant the leaf is sub-pinnate at the base, and becomes nearly glabrous with age. The flower and fruit of the two, so far as can be judged from dried specimens with unripe fruit, seem to bear a close resemblance. Dr. Boswell asserts that *P. fennica* is common as a shrubbery plant. I have never met with it as such, nor seen specimens; nor do specimens of such shrubbery plants exist in the Boswell Herbarium. The allied shrubbery plants which I have seen are to be referred either to *P. scandica* or *P. pinnatifida*.

7. *P. pinnatifida*, Ehrh. This is only known in Britain in shrubberies, where, however, it is rare. It is easily distinguished from the last, by its longer leaves with a linear outline; the base of the leaf pinnate, the long upper part only shallowly pinnatifid. It forms a small tree, with handsome flowers and large red fruit. I have seen an old tree of this form in the garden of the vicarage at Alstonfield, Staffordshire, since unfortunately destroyed by a storm; small trees in a shrubbery at Wastdalefoot, Cumberland.

I wish to acknowledge the great debt which I owe, in writing the above notes, to the work of Mr. N. E. Brown (Eng. Bot., Ed. iii, Supplement), a debt which is none the less real that I am unable always to accept his classification or conclusions. With regard to the plates accompanying his work, I may be permitted to make one or two observations in conclusion.

Plate 484a (*P. intermedia*), so far as the leaves are concerned, is a very good representation of the Piercefield Park plant; but the flowers are too small, the filaments of the stamens too short, and the anthers are represented as yellow, instead of pink. The fruit of the Piercefield Park plant is large and round, instead of, as represented in this plate, small and ellipsoidal. Does the fruit here represent that of the Arran *P. scandica*?

Plate 485a (*P. pinnatifida*). Leaves of the flowering stem here represented are just those of the *P. scandica* of Arran. The free leaf is that of *P. fennica*, the fruit is a good representation of that of *P. minima*. I am unable to criticise the flower; in length and colour of the stamens it is not like that of *P. minima*.

Plate 485b (*P. semipinnata*). The leaf and fruit here are a very good representation of *P. pinnatifida*, Ehrh. I am again unable to criticise the flower. Do any of the British forms exhibit the *yellow* anthers represented in all these plates?

*Sellack Vicarage, Ross, Herefordshire; June 4th, 1895.*

## HABITS OF SPIDERS.

BY J. BEECHAM MAYOR, L.R.C.P., M.R.C.S.

DR. W. H. DALLINGER has recently written a paper dealing with the constructive ingenuity of spiders, from which we may conclude that they not only inherit, but also acquire, useful and beneficial habits, or modify those inherited. For instance, the triangle spider (*Hyptiotes cavatus*), of America, so called from constructing a web that is only a segment of a circle, makes the web not only a snare but also a gin, *i.e.*, a stratagem or contrivance closing suddenly upon the snared victim. When, from position or other circumstances, it has been found necessary to keep the web constantly extended and drawn taut, it is often found that the circular-web spiders will attach a weight to the end of a line connected by cords with the framework of the whole of the web. An instance of this adaptation to environment has recently come under my notice. A lead water-supply pipe runs along the ceiling of a cellar, and from it depended a piece of twisted string, about eight inches in length. The end of this string was drawn upwards by the spider with a strong silken strand attached to the ceiling some little distance away from the leaden pipe, so that the string formed a perfect curve. In the space thus bounded by the ceiling, the string and the silken strand, joining the two latter, a perfect circular web had been constructed by the ingenious spider, the string acting as a weight or counterpoise to keep the web firmly stretched, as well as forming a necessary boundary to it for the attachment of strands.

*2, St. Alban's Villas, Heaton Chapel, Manchester.*

# FASCINATION BY SNAKES.

By Harold S. Ferguson, F.L.S.

No error is apparently more rooted in the human mind than that which attributes to snakes a peculiar power called "fascination," which they are believed to be capable of voluntarily exercising. By this power they are said to be able so to paralyze their victims that they are rendered utterly incapable of movement, and wait for the attack of a snake, or even go forward to meet it, in fear and trembling, but without any power of retaliation. Now anyone who watches the behaviour of small animals placed alive as food in the cages in which snakes are kept in captivity, in the hope of seeing this marvellous power in operation, will be grievously disappointed; chickens, rats, guinea-pigs, rabbits, all move about with an utter absence of fear of the snakes. It may be said that all these are more or less domesticated animals, and have no hereditary dread of their natural enemy; but wild rats, placed in the cage of their particular pursuer, the rat-snake of India *(Zamenis mucosus)*, exhibit an absence of fear.

How, then, is it possible to account for the existence of the belief in the possession by snakes of the so-called power of fascination? It may have arisen from several causes. An observer may come on the scene and find a number of birds mobbing a snake just as they will mob an owl or kite. The dashes of the birds towards the snake and their fluttering round it may easily be put down to the effect of the snake's glance, while they are, in reality, merely the attempts of the birds to drive off the intruder. A mother bird whose young are attacked will almost certainly behave in this way, and may herself fall a victim, not to the power of fascination in the snake, but to the force of her maternal feelings. Then again it has been noticed that a hen placed in a snake's cage will often go towards it and make a determined peck at the snake's tongue. Dr. Stradling has also seen a frog doing the same thing. Were this seen to occur in a wild bird it might easily be put down to fascination. With regard to snakes that kill their prey by the injection of poison, it is even more easy to account for the appearance of the power, for they bite once and once only. The poison does not kill at once; the victim flutters on to a branch, it may be, or runs a short distance and stops, the snake watches it, the poison does its deadly work, and the bird falls. Anyone who comes up not having seen the attack might in this way be readily deceived into imagining that it was the glance of the snake and not the poison that caused the victim to fall. It may be then the approach of an insectivorous bird or mammal who, taking the movements of the snake's tongue for those of a worm or insect hopes to secure a meal. It may be the mobbing of the snake by the companions of a victim that has been seized, or of a mother whose nest has been robbed; it may be simply the effect of poison already injected before the observer has come upon the scene, or it may be simple curiosity.

These explanations should suffice to satisfy all those whose minds are not so filled with the love of mystery as to make them prefer to believe in the possession of this power, simply because it is mysterious, and therefore to refuse a common-sense explanation. In ninety-nine cases out of a hundred one or other of the above causes has been at work. What then of the hundredth case, and what about the fascination exercised on man, cases of which have undoubtedly been recorded? The explanation lies in the probability that it is a case of hypnotism; it may be said, however, this is giving up the whole argument and admitting that a snake can fascinate, only it is calling the power by another name and saying that it can hypnotise. But this is not so. The snake does not hypnotise, the person is self-mesmerised; the action is purely subjective. Everyone knows the schoolboy trick of holding a cock with its beak pressed against a table and drawing a chalk-line from the tip of the beak along the table. The bird will remain in the position it has been placed in though perfectly free to move. Now the snake no more exercises the power voluntarily than does the chalk-line; position and tactile impression here produce hypnotism, and visual impression can produce it likewise. It is an error to suppose will power has anything to do with the effect. The matter has been taken up scientifically by the medical profession, especially in France, and it has been found that the hypnotic state of sleep, or trance, or whatever it may be termed, can be produced by looking fixedly at the operator, or at a coin or at the tip of one's own nose; it is not necessary to go into the question of how the result is brought about, but there is a physiological explanation. What happens then in the hundredth case is that the man or the animal may be self-hypnotised by gazing fixedly at the snake, the subject, being thus thrown into a sort of trance, making no attempt to move out of danger, unless roused by some exterior influence.

We may conclude then that the attribution to snakes of the power of fascination is due to faulty observation, and the drawing of conclusions from incorrect premises.

*Trevandrum, Madras; April 29th, 1895.*

# SUBSTITUTES FOR PLANT PRODUCTS.

By W. E. Ord.

IN the mysterious processes which constitute the life and growth of plants, there are produced many chemical substances of great value to mankind. Certain sugars, for example, are elaborated in the growth of fruits, from which they may be obtained by comparatively simple methods. But the dependence upon the cultivation of fruits for our supply of sugar necessitates the expenditure of much time and labour, which might possibly be more profitably devoted to other kinds of industry, and the question arises whether such substances, hitherto only obtained from plant life, cannot be produced by some more direct artificial means. Even though the artificial process may be very difficult and intricate, yet any method which will replace the tedious growth and laborious cultivation of plant life will be deserving of attention. The production of these so-called organic substances was at one time regarded as possible only in the exercise of what was termed "living force," but the many efforts which have been made to prepare or build up such bodies from materials occurring in the inorganic world have now been crowned with startling success. Great progress has been made in this direction in recent years, until now, so far from such artificial formations being impossible, it is considered that when the constitution of an organic substance is thoroughly well known, the means of artificially preparing it may reasonably be expected to be discovered.

In the case of many organic bodies, however, the difficulty is to obtain an adequate knowledge of their constitution. The chemical compounds found in the mineral kingdom usually contain comparatively simple proportions of the elementary bodies, and their preparation is not, as a rule, difficult; but the organic compounds are generally not so simple in character and, indeed, the constitution of many familiar substances is so alarmingly complicated as to resist all attempts to analyse them satisfactorily. The chemical changes by which they are naturally produced, and also many of those changes which are continually taking place in the life of plants, are, moreover, very imperfectly understood. In thousands of cases, however, the artificial formation in the laboratory of the simple organic compounds is now quite easy of accomplishment. The chemist can prepare, for example, the well-known tartaric acid, the acid of unripe grapes, and occurring in the crystalline crusts of tartar, deposited in the fermentation of grape juice; also, citric acid, which gives the sourness to oranges and lemons, and oil of mustard—the cause of the pungent properties of mustard paste; besides many other compounds not so well known in ordinary life. Earnest investigations are being pursued in the endeavour to analyse and prepare the more complex organic bodies met with in nature, with the hope of discovering an easier and cheaper method of production.

Probably in no field has chemical research been so fruitful as in that of the coal-tar products. From this substance have been prepared valuable compounds, which have entirely replaced many of the natural dyes formerly to be obtained only from plants. The beautiful dye known as alizarin, or madder, is an interesting case of this kind. It is largely used by the calico printer and turkey-red dyer, and produces a red or violet colour according to the substance with which the fabric is mordanted; it also forms the insoluble coloured compounds known as "lakes." At one time it was obtained exclusively from the root of the madder plant, which was extensively cultivated for this purpose in India, Persia, and the Levant, and the trade in the natural product was, until recent years, carried on in France, Italy, and Turkey. The growth of the plant requires a rich soil, and occupies several years. The chemist, however, has discovered a very much cheaper and more expeditious method of obtaining this valuable dye. In 1868, it was observed that when heated with zinc dust, it yielded the substance anthracene, one of the coal-tar products, and this observation led to the discovery that alizarin itself could be prepared from anthracene. Though the artificial alizarin was for some time difficult to obtain in a state suitable for its industrial application, further attention to the means of preparing it overcame this difficulty, and its manufacture for commercial use, now carried on on a large scale, has entirely replaced the importation of the natural product.

Many other valuable dyes and important chemical compounds are now obtained from coal-tar, which, at one time an almost valueless bye-product in the manufacture of illuminating gas, has proved a veritable "happy hunting-ground" to the chemist. The valuable blue dye, indigo, suitable for woollen fabrics, and known as a dye for thousands of years, is still prepared from the indigo plant, which is grown abundantly in Africa, the West Indies, and South America. Indigo has now, however, been prepared from coal-tar, though the process is not yet cheap enough to admit of the artificial indigo being used instead of the natural product in the colour industry. Aniline also, which gives colouring matters of incomparable richness, can be prepared from indigo, but is now got directly from coal tar. Of the aniline dyes so obtained may be mentioned rosaniline, or aniline red, which gives the beautiful magenta, and which was discovered owing to the deep red colour produced by the action of nitric acid on aniline.

The chemist has succeeded in preparing many of the odoriferous products of plants, such as bitter almond oil, used for scenting soaps, and a flavouring agent in cookery; the oil of mustard, already mentioned, obtained from the mustard plant, and occurring also in the root of the common mignonette; and the sweet smelling principle of the meadow sweet. Salicylic acid, formerly obtained from the winter-green plant, is now artificially produced on a large scale. It is largely used as an antiseptic, and is useful for the preservation of articles of food, being free from taste and smell. The artificially prepared vanilla, the familiar flavouring agent in chocolate and confectionery, will probably replace the natural substance, which is obtained from the pods of orchids. Some of the alkaloids, the valuable compounds used in medicine, have also been artificially prepared—atropine, occurring as a constituent of belladonna, which exercises a characteristic effect on the pupil of the eye; and coniine, the active principle of hemlock. The constitution of the alkaloid nicotine, the poisonous oil of stupefying odour occurring in tobacco, is also very well understood, and the attempt to prepare it artificially will probably be successful.

Lastly, two varieties of the sugars, that interesting class of bodies so useful to mankind, and to the production of which from plant life so much land and labour are devoted, have recently been artificially obtained. These are the glucose, or grape sugar, contained in most sweet fruits, and forming the solid and crystallizable part of honey; and the sweeter lævulose contained in grapes, cherries, figs, and gooseberries. There is now used, to a certain extent, in lieu of the natural sugar the substance saccharine, manufactured from a derivative of coal-tar.

It is impossible to foresee how far the art of the chemist may be successful in the artifical formation of the innumerable organic substances occurring in nature, and to what extent our foods even may in time be provided by chemical processes in the laboratory. In view of the increasing populations of the globe, and the struggle for existence, the importance to mankind of such investigations cannot be over-estimated, while apart from their value as a means of affording easier conditions of existence, it is interesting to find the marvellous processes of nature so successfully imitated.

*45, Comley Bank Avenue, Edinburgh;*
*January 22nd, 1895.*

## BERLIN NATURAL HISTORY MUSEUM.

Museum work being a branch of natural history that demands increasing attention, as its importance is more fully realized, it may interest the readers of Science-Gossip to see the following notes on the "Museum für Naturkunde," in Berlin. Though not nearly so large or complete as the Natural History Department at South Kensington—the whole collection open to the public consisting only of ten galleries—there are many particularly important specimens and series. Perhaps the most remarkable of all the exhibits is the famous *Archæopteryx*, that lizard-like fossil bird which has excited and still is exciting so much discussion among palæontologists. Beside it is a cast of the London specimen, so that the two may easily be compared and studied. In the same room is a single feather of another species of *Archæopteryx* (*A. lithographica*). Although there is nothing to correspond to the large central introductory hall at South Kensington, with its splendid educational examples, one cannot help being struck with the number and excellence of the educational models distributed throughout the rooms. For instance, there is a series of twenty-two models illustrating the development of the frog's ovum, another series illustrating that of the trout's ovum. In all departments we find simple and artistic models of the circulation, muscular system, digestive apparatus and others, with all the parts clearly named. Among other interesting models are those of the labyrinths of ears, of mammalian brains, a series showing the different positions used in the flight of a seagull, a realistic oyster bed, a coral reef, and a series showing the different forms of Echinoderm larvæ. The birds are not arranged in the artistic manner as at South Kensington. There are two collections: the first, native; the second, a systematic collection of birds; and the same system is used for the mammals. In both these rooms there are a great many skeletons with the names plainly marked, so that each bone is clearly recognizable. The insect room has a particularly interesting and beautifully got up series of the various plant-lice, aphides, gall-flies, etc., which injure plants, showing the harm they effect. The Lepidoptera are all kept in glass cases and not protected from the light at all, but they do not seem to have suffered in consequence, their colours retaining their brightness well; the same may be said of the dragon-flies. The Echinodermata and Cœlenterata are very well represented. At present there are no guides published to the museum, which is a great loss. The botanical collections are not kept in the same building, but in a museum in the Botanical Gardens.

Catherine A. Winckworth.

*11, Old Steine, Brighton May 22nd, 1895.*

# AN EXAMPLE OF ASCIDIA.

By John T. Carrington.

WE have received from Mr. F. Holt, Park View Nursery, Hollins Lane, Accrington, a curious case of abnormal growth of a cabbage-leaf, found on June 13th last. The midrib on the underside, as will be seen from the drawing we reproduce, has divided at about three-fourths its length, and the lower portion formed itself into a stalk of about three inches in length. At the end of the stalk is a perfectly symmetrical funnel-shaped cup, of material similar to the leaf-substance, but somewhat thinner in texture. From the point of division the "stalk" is pendant, the whole growth forming an elegant deviation from the usually inartistic shape of a cabbage-leaf. Dr. Maxwell Tylden Masters, F.R.S., in his valuable work upon Vegetable Teratology, published by the Ray Society, in 1869, figures a similar instance on a lettuce-leaf. It is a case of enation or supplementary outgrowth from another growth previously formed.

Abnormal Cabbage-Leaf.

This monstrosity is not so rare as many people may imagine, and it appears that the various species and varieties of a cabbage family are especially subject to enation.

Dr. Masters groups it under "Formation of Tubes" in a section of his book devoted to deformities. In his figure the cup on the lettuce-leaf is about the same shape as that on Mr. Holt's cabbage-leaf, which is figured on this page. These cups are termed ascidia or pitchers, which are formed from the cohesion of the margins of one or more leaves. Dr. Masters refers in his work to the investigation of the Belgian Professor, Charles Morren, who divides these structures under two heads, according as they are formed from one or more leaves. The former are termed Monophyllous and the latter Polyphyllous. In the first group, Professor Morren gives a list of twenty-eight species of plants in which monophyllous ascidia occur. Instances of polyphyllous formation are evidently less common, for in this division he mentions but three species of plants; Triphyllous, or formed by the union of three leaves, is only instanced once, when it occurred on a leaf of *Paris quadrifolia*.

The case we figure on this page hardly comes under the above grouping of varieties of ascidia formed from the union of one or more leaves, but seems to be the result of a peculiar excrescence or hypertrophy of the leaf. Cases of this kind, according to Dr. Masters, occur occasionally on the leaves of cabbages, lettuces, aristolochia, etc. The term hypertrophy serves as a general one to comprise all the instances of excessive growth and increased size of organs. Here it is intended to indicate more a variation than a deformity.

# GALL FORMATION.

By Sophia Armitt.

THE birds know better how to find the life that is inside galls than do human beings. In November and December they are searching among fallen oak-leaves for the cherry-galls, and opening them for the fat grubs that lie therein. An observer who is interested in the habits of birds, and had been watching them in the woods in December, 1893, brought in a lot of these cherry-galls and placed them on moss inside a Dresden china cup in the family sitting-room, to see what would come of them. In the course of a few days, quiet readers were frequently disturbed by the settling of peculiar flies upon them in a markedly unpleasant manner, causing involuntary and spasmodic starts. Upon investigation it was found that the gall-flies were emerging from the galls, and the bird observer was requested to remove those galls to a different place. This circumstance was calculated to arouse curiosity. Were gall-flies really maturing and emerging in winter? If so, how would they get along till the summer came and there were new oak-leaves for them to put their eggs in?

Dr. Adler's book, reviewed in your last volume, page 88, entitled, "Alternating Generations: A Study of Oak-Galls and Gall-Flies," solved these questions. These flies (*Dryophanta scutillaris*) do emerge, in any case, in winter from the cherry-gall. It may be in nature they appear in January or in February, but always after a frost, for a thaw destroys the gall which is their home. They are in this generation of only one sex, and they live only a few days. These flies search for little adventitious buds on the stem of the oak-tree wherein they place their eggs. In April the leaves from the buds pricked by the flies produce new galls that are quite different from the cherry-galls from which the flies emerged. These galls are dark violet and velvety, and are known as those of *Spathegaster taschenbergi*. In May and June the perfect flies of this new generation leave their galls. They are half the size of the mother or winter-fly, and of two sexes. In a few days the females begin searching for the youngest and tenderest leaves, to prick the underside of the veins, and place there their eggs. In each pricked spot, when the egg hatches out as a grub, will begin to grow a new cherry-gall, exactly like the one in which the grandmother passed the months which ended in the few days only of open-air existence.

The life story of the spangle-gall (*Neuroterus leuticularis*) varies from this. Everyone knows the pretty spangles beneath the oak-leaves in July and onwards. They fall in autumn on the leaves, but the life inside does not die with the leaf, it lives on through the winter, and the fly comes out in April or May. The gall-fly immediately begins to examine buds carefully with its antennæ; when satisfied with a suitable one, it pushes its ovipositor deep therein, a long and difficult business, and lays one egg. When the bud expands, a small round sappy gall is seen either under a leaf or on a male flower-catkin. This is the currant-gall (*Spathegaster baccarum*), smaller when on the flower than when on the leaf. From these the flies emerge in early June, male and female this time. The young, tender leaves are then sought for, and inside their under surfaces eggs are placed from which spangle-galls will form, serving as a home for their tiny inmates, through summer and winter, till the next year's new growing-time.

Much of Dr. Herman Adler's interesting book treats of the insects. There are minute descriptions of their forms and stages of life history. I have drawn the purely botanical parts together in the following paragraphs.

Galls occur on buds, leaves, flowers, bark or root; but wherever they are, they originate always from the same parent tissue, from the formative cells that are called the cambium ring. A layer of this tissue extends through every plant from the finest root fibres to the most distant leaves. All vegetable life springs from the cambium layer; its cells are the theatre of actual metabolism, and yet they are not differentiated into a stable tissue. It is from these cells that all gall-formation proceeds. When a gall-fly pierces the cambium layer and deposits an egg there, gall-formation does not certainly follow, it only begins when the larva emerges from the egg.

In this statement Dr. Adler differs from Sir John Lubbock and others, and he limits it to the action of oak gall-flies, having observed that flies producing willow galls pour into the wound a secretion which causes new cell-formation in the course of a few hours. On the oak-tree, procedure is different; it is only when the larva breaks through the egg-case and touches the surrounding cells with its tiny mandibles that rapid cell-growth is set up. Once begun, however, it goes on so quickly that while one end of the larva is still in its egg-case, a wall-like mass of cells has risen up in front of it. This rapid cell-growth is due to the irritation of the biting grub upon the highly formative cells of the cambium, which possess every condition for growth.

One gall-fly (*Trigonaspis crustalis*) pricks the leaves in May; it drives its ovipositor into the vein of the leaf, leaving always a distinct mark. Months pass before any gall-formation can be seen, it is not till September that the egg hatches out, and the delicate mandibles of the larva start the active cambium cells into gall-formations. A gall is not parasitic in the surrounding tissue, it is of the same elements, only substituting itself for them by faster growth and still growing proportionately to the growth of the cellular layer around it. In a leaf-gall the formation begins in the layer of formative cells on the under surface. Those of the upper surface having already become stable, they can undergo no further change, and therefore respond to no irritation; they are incapable of forming new cells. At first the cell-growth only affects a small zone around it, but as it acquires a vascular system of its own it begins to grow as an independent structure. It is different when the eggs are laid in a bud, then the biting larva touches rudimentary leaves consisting of still unmodified cells, all equally capable of development whether of upper or under surfaces. Then both surfaces take part in gall formation, and when the leaf comes to be unfolded it is found that there is an absence of leaf tissue, and that the resulting gall grows through the leaf substance.

Again, it is different when eggs are laid in the cambium layer of the bark. Here the cells which first form round the larva, cannot be distinguished from adjacent cambium tissue, but in later growth there is a great contrast. The outer zone of the cambium ring produces the cells of the bast parenchyma, while the central zone of the cambium produces the wood parenchyma, and in these galls there is, too, a soft zone of sappy parenchymatous cells, and a hard central zone of wood parenchyma. In all bark-galls the woody centre penetrates into the woody tissue of the tree, while the soft fleshy circumference proceeds from the bark. New cell-growth is arranged in concentric layers round the larva, accompanied by changes in cell contents. The cells next the larva swell out, the cell contents become cloudy, and a multitude of starch granules appear. The rudimentary gall draws its first nourishment from the surrounding tissue, later it is more independent, for a new element comes in. From the spiral vessels lying in the cambium ring, processes are driven into the rudimentary gall; the entrance of these vessels occurs at a definite spot on the lower surface of the gall, whether it is connected with the parent tissue by a broad base or a small stalk. The gall has now become an independent structure and is practically withdrawn from the direct influence of the cellular area around it, from which it sprang. Its individuality of organisation is shown by complicated transmutations of cells originally alike, especially in the cells of the exterior, which develop peculiar pigments and hairs of various kinds, both in great variety of forms. It is the value of these different structures, as protective contrivances, which has secured their evolution by the gall. Sometimes the hairs exude a sticky sap which keeps off parasites. Even smooth galls, like *Aphiloterix sieboldi*, secrete a juice which attracts ants, these protect the galls, like sentinels, driving other insects off and often constructing a protective mantle of earth around them. If the larva perishes before the gall is mature its formation is stunted. The influence of the larva is necessary not only for the commencement but for the completion of the gall. When a roundish inner gall is found undeveloped, parasites are always present. A gall pricked by parasites grows in an anomalous manner. Galls contain not only the larvæ that form them, they are often taken possession of by insects that are called "inquilines" or lodgers of the oak-gall flies. These creatures enhance the natural difficulties of observation of gall-formation; they are so nearly related to the true gall-flies that they can only be distinguished by the minutest characteristics. It is not doubted that they have been developed from the true gall-flies. By the use of a gall already formed the prosperity of their progeny is more certainly ensured. Unfortunately, these lodger-flies are more easily reared and collected than the true gall-makers. The gall-fly proceeds with great care in the choice of tender leaves, or terminal buds, or flower buds, but in spite of its care galls often fail to appear where eggs have been laid. The greatest number fail in the buds where only one egg is laid. Species emerging in summer can only prick winter buds which are waiting the coming of the next growing period, and in many seasons a premature and anomalous development of winter buds may be absent. This is not the only reason; the egg must be placed exactly in the cambium ring, which lies like a fine seam in the base of the bud, and if the egg is not laid in this fine seam, it perishes without forming a gall. Considering the difficulty to be overcome in placing the egg in precisely the right spot, it is not surprising if many eggs are laid amiss. Failures occur less frequently in leaf-galls pricked in bud, because the fly has choice of much wider territory—the whole of the rudimentary leaves in the bud. Failures are not usually observed at all where the fly pricks the surface of bark or leaf, because the cell region to be struck is always at one uniform depth below the surface. Gall-formation is dependent on the growing period of the tree, and ceases at its close. Most galls mature in the space of a year. Those which require two years are bark-galls; the first year the rudiment is formed and then development ceases till the next spring, when it is resumed with the new period of vegetative activity.

Dr. Adler's book is beautifully illustrated; all the galls he experimented upon are portrayed in colour. The greater part of the volume is occupied by a detailed account of his years of experiments and observations on the oak-galls and their inmates. The life cycle of each gall-fly is made up of two generations, each one of which produces its own sort of gall different from the other. One generation consists of two sexes, the other of one only. The life of the gall-fly is generally very short, of days only, while the life of the insect inside the gall may be months or years. These facts seem to be common to all the gall-flies investigated. Many of the life stories are more curious than the two I have only touched upon as being perhaps the best-known galls. There are the artichoke-galls, the oak-apples, and the marble-galls; but your readers will doubtless prefer to have the best part of an interesting book to study for themselves.

*Ambleside; June, 1895.*

## AQUARIUM FOR MICROSCOPIC LIFE.

By James Burton.

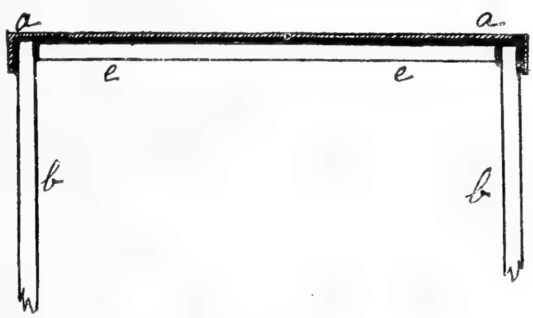
EVERYONE engaged to any extent in the study of microscopical pond-life is aware how interesting, and, indeed, almost indispensable, is some kind of aquarium for watching the development of, and having ready to hand, the various minuter forms of animals and plants. In the "Notes of a Home-Naturalist," which have appeared in the new series of Science-Gossip, we see how fascinating is this study, and also how well observation may be carried on even with such simple apparatus as a glass jam-bottle. Though vessels of this or some similar kind answer the requirements of their living inhabitants very well, having the advantage of cheapness and being easily procurable, yet everyone who has used them knows that it is practically impossible to make satisfactory observation of the more minute forms in them, owing to the distortion caused by their shape and irregular surface. The want of clearness of the glass also helps to prevent the use of the ordinary pocket-lens, or other means of magnification.

On the other hand, an aquarium of the usual type, but suitable size, with flat glass sides, must either be bought, and that cannot always be readily done, or made at home. Against these drawbacks, however, must be placed the immense advantage that a lens can be brought into action on such a vessel, if requisite. Even, by some special arrangements, the lower powers of the compound microscope are available, and the contained organisms may at all times be watched with ease and pleasure. Anyone who has not tried this form will be greatly surprised on their first experience of its clearness and general superiority, while the endless amusement and profitable observation as well, are increased a hundred-fold.

One of the greatest disadvantages of small aquaria made in the usual way is their liability to leak, but this tendency is quite overcome without extra difficulty of construction in the form I propose to describe. I have two in use, home-made, on this plan, which answer admirably. Of course any size that suits the purpose or taste may be chosen, but for simplicity's sake I will describe one which, when finished, is six inches long by six inches high, and about two and a half inches through from front to back, as this seems a very convenient measurement. A strip of sheet zinc should be obtained eighteen inches long and three inches wide. Six inches from each end draw a line across, which can be done with a sharp nail, three-sixteenths of an inch from each side draw a line from end to end. Where this line crosses the others a small right-angled piece is to be cut out. Now bend the edge of the sheet up to a right angle along the lines drawn near the sides. This is best done with a small hand vice or broad pair of pliers. Next bend the strip where marked across, so that the ends stand up at a right angle with the middle portion, this will make the frame of the aquarium. Two holes should be made in the middle portion through which brass screws should pass into a piece of board about seven and a half inches long, by four inches wide, to form the stand. It is better, if it can be done, to soft solder over the heads of the screws and neighbouring parts of the zinc bottom. The bottom corners of the frame may also be soldered with advantage, and a strip of zinc about half an inch wide across the top at each side from end to end is also an improvement, but may be dispensed with. In order to get the glass the exact size, it is a good plan first to cut a piece of cardboard to fit in the frame where it is to go. Two pieces of glass about six inches by six inches will be required for the front and back. Put these in their places and then cut a piece to fit closely at each end of the frame, within the ends of the front and back pieces. Of course the glass in this position cannot be seen through, because it fits against the zinc ends, but it makes a very strong joint, retains the other pieces in place, and prevents all danger of leakage. When these ends are fitted in, a piece should be cut to fit the bottom; this, when in position, will lie inside both the front and back, and two ends, and will make a sound joint there, where it is most important.

The cement, or "stopping," as it is called, for fastening the glass, is made from ordinary white lead as sold at the paint shops, and red lead which is sold in powder. As much of this should be worked up with the white lead as is possible without making it too stiff, about the consistency of putty or dough is right. A few drops of gold-size or varnish added will make it work more easily and dry better. Some of this should be spread round the turned-up edges of the zinc frame, and the front and back glasses be put in, just as a glazier puts a square in a window, taking care to bring the glass as close to the frame as possible. Next spread some of the stopping evenly all over one side of the end-pieces, for which purpose it should be made rather softer, and then squeeze them close to the zinc ends. In the same way spread the glass for the bottom, and squeeze it into its place. Any stopping that is pressed out should be scraped off, and the joints be neatly smoothed.

I have drawn a sectional plan of one end of the finished aquarium, which shows how the glass at the end makes a kind of double joint with the sides (the bottom piece does the same in its place) which very effectually prevents the water getting through. *a a* is the zinc frame; *b b* the back and front glasses, forming the sides of the vessel; *e e* the end-piece fitting between them, and the black line shows the cement.




SECTION OF ONE END OF AQUARIUM.

The aquarium, when finished, should be left about a week for the stopping to harden, and then it should be ready for use. A piece of wood eight and a half inches long and five inches wide, fastened by two screws under the stand, as already described, improves the appearance, and makes it firmer. The wood and zinc ends may be painted any desired colour, for which purpose enamel paint is very suitable.

*West Hampstead; June*, 1895.

# RAMBLES ON A HIGHLAND PEAK.

By C. H. BLAKISTON.

THERE are few places where the distinctly alpine flora of Great Britain is more easily attainable than in the neighbourhood of Pitlochry, in Perthshire. Ben-y-Vrackie, one of the offshoots of the Grampian range, rises almost immediately behind the village, to a height of 2,787 feet. The record of what we were able to accomplish in the course of two separate afternoon walks, may prove of interest to others, who, like ourselves, as residents in the South of England, have but few opportunities of examining in their native habitat, the plants of the higher latitudes. The following notes include only those species which are not to be found in more southerly districts.

The first mile out of Pitlochry, up to the little village of Moulin, did not produce anything worthy of remark, excepting that any lover of flowers could not fail to be attracted by the beauty of the festoons of the scarlet-flowered *Tropæolum speciosum*, which climbed in abundance up every cottage-wall. This plant, so capricious in most places, was growing here like a weed. After passing the last house, the path leads through a gate into a narrow ravine, where the evidences of the storm of November, 1893, were shown by the numerous uprooted fir-trees. Emerging from this glen, we entered upon some wet fields, and here we lighted on our first find, *Saxifraga aizoides*, which we afterwards found most plentifully, whenever a certain elevation was reached. Here also, on a bank, *Gentiana campestris* and *Habenaria viridis* were growing in profusion, the latter mostly gone to seed, as it was late in August; *Pinguicula vulgaris* was abundant everywhere. A little further onward the open moor was reached, from which we could look back on Pitlochry and the Tummel Valley, with the crests of Farragon beyond. The track (which was as often as not a watercourse) led up a long heathy slope, and amongst the stones, we found, amongst other mosses, *Bryum filiforme* and *Bartramia ithyphylla*. On reaching the crest of the ridge, we saw the cone-shaped top of Ben-y-Vrackie in front of us, on the further side of a swampy depression. The several boggy pools, though looking likely spots, did not give us anything beyond the ordinary bog-plants of lower levels. The final ascent was first a steep stony slope with little on it but heather, until we reached a little rill by the side of which were growing *Saxifraga stellaris*, *Carex dioica* and *Alchemilla alpina*. As we ascended, a careful search was rewarded by the discovery of *Saxifraga nivalis*, *Poa alpina*, and *Polygonum viviparum*. From the top of the mountain there was a magnificent view of the Grampian Range, and along the valley of the Tummel, over Lochs Tummel and Rannoch to the hills of Glencoe. Intending to descend to the Kirkmichael Road, we crossed a spur of the hill, and followed another rill some little distance. Here we found *Thalictrum alpinum*, *Selaginella selaginoides*, *Saxifraga oppositifolia*, *Juncus triglumis*, *Carex rupestris*, and a few leaves of *Rubus chamæmorus*, but no fruit, which, however, we found and enjoyed a few days later on Schiehallion and Ben-y-gloe; the acid berries being of more than botanical interest in the middle of a hot day's walk. Our time did not allow us to carry out our intention of descending by this route, and we had to make the best of our way back by the path on which we came up.

On a second occasion, intending to explore the summit more thoroughly, we pushed on until within a few hundred feet of it. Then, turning off the track, we clambered over the loose stones and grassy slopes, where we were fortunate enough to find *Cerastium alpinum*, *Gnaphalium supinum* and *Astragalus alpinus*; a little further on we gathered *Potentilla sibbaldii*, and then a mist made it advisable for us to descend. Amongst the loose rocks on our way down, was growing *Polystichum lonchitis*, of which every frond that we found had been nibbled by some animal. The last plant that we lit upon was a *Hieracium*, which proved on examination to be *H. nigresscens*, var. *lingulatum*. Both these walks were in the afternoon, each only taking between four and five hours. Had we had more time at our disposal, our list would probably have been considerably extended.

*Exwick, near Exeter; March 12th*, 1895.

## EXPERIMENTAL AGRICULTURE.

THE subject of Technical Education is one in which all Englishmen who wish their country to hold its own against foreign nations, should be interested. Our County Councils are doing some work in framing schemes of agricultural and horticultural education, and in training instructors to give practical men the kind of information they lack. But there is great fear that the work done by the County Councils may fail to reach those practical cultivators for whom it is intended. In addition to the experimental farms established, foreign countries are continually publishing the latest results in the form of leaflets, which are distributed to farmers, market gardeners and horticulturists. One cannot expect farmers and fruit or flower growers to attend evening lectures, but it has been found that they will come to an experiment station and see practical results. The County Councils might easily establish small experiment stations and issue journals.

## BACTERIA AND FILTRATION.

IT was pointed out in a recent lecture by an eminent scientific man that so far as ordinary filters were concerned, many kinds were little better than culture beds for various species of disease-producing bacteria. Examination showed that filters which permitted any particles to pass would admit the microbes to the water which was supposed to be pure. This has been a source of grave difficulty with sanitary officials, who found the bacteria were in the water after passing through the filter. Mons. Pasteur, the eminent bacteriologist has, however, so perfected the invention of his colleague, Dr. Chamberland, that it now seems to be impossible to conceive the smallest bacilli passing with the water. The "Pasteur Germ Filter" is made in the form of a long narrow, hollow tube, constructed of porous earths blended and baked into a strong hard substance, like porcelain in appearance. Although highly porous, the interstices are so fine that no solid substance, be it ever so small, can pass the outside. To clean this tube it is only necessary to sponge or brush the outside to remove whatever has become attached, when the filter is again ready for work, so lasting practically "for always." It seems, in face of the modern knowledge of bacteria, almost hopeless to expect to get rid from the water of all these dangers to human life and happiness; but we have in the Pasteur Filter, certain safeguard, if the water be soon used and not allowed to stand until an outside supply of bacteria can again infest it.

Some interesting particulars as to the action of filters in stopping those bacteria which infest water were published in the "British Medical Journal" of December 29th last. The article deals with the report of investigations, then recently concluded, into the action of every known filter. This examination was conducted at the Research Laboratory of the Royal College of Physicians and Surgeons, in London; and other investigations on filters are referred to which took place in the Public Health Laboratory of the University of Edinburgh. Those of our readers who have not had opportunity of reading that article will find much that is highly suggestive of danger in taking water which has been imperfectly treated, or even made unsafe through being nominally filtered by an imperfect medium. In some filtering media, which have not been frequently changed, masses of bacterial jelly have been found with sufficient disease germs to have killed half the inhabitants of a large city.

The sizes vary with the necessities of the users of the Pasteur Filter, as they are made to treat different quantities of water, of from two gallons per day to hundreds of thousands of gallons in a like period. These filters are supplied in England by Defries and Sons, Limited, of London, and cannot be too widely known.

# THE GOAT-MOTH.

By Edward Ransom.

As is well known the larva of *Cossus ligniperda* is an internal feeder, and its habits are, therefore, difficult of observation. The eggs are laid in the crevices of the bark of poplar, willow, ash, and other trees about the middle of June. As soon as the larvæ are hatched they commence eating their way into the interior of the tree, driving their tunnels upwards, right up into the larger branches. As they remain for three years in the larval state, the damage they cause to the timber can well be imagined, especially if they are present in any numbers. I do not think, however, that they impair the vitality of the trees in which they feed. I have two poplar trees in my garden which for years have been infested with these larvæ, and also with the larvæ of *Aromia moschota* and sometimes, too, I believe, with the larvæ of *Trochilium apiformis*. Nevertheless, these trees are most luxuriant in growth. I have a piece of one of the larger branches, which I cut from one of these trees, showing the burrows of one of these larvæ, and there is not the least appearance of decay. When a tree is pre-disposed to decay, or if the wet can find entrance to their tunnels, then undoubtedly they help to hasten the end. Probably they also weaken the tree so that its branches are more liable to be blown down in a heavy gale. Even when a tree is very far advanced in decay these larvæ may still be found feeding on the half-rotten wood. There is an old ash tree not far from here the trunk of which is entirely hollow, leaving only part of the outer portion standing, in which these larvæ may still be found in all stages of growth. This tree is somewhat of a curiosity, as some of the upper branches, being evidently unable to obtain sufficient nourishment in consequence of decay of the parent stem, have themselves thrown down roots into the débris collected below in the hollow trunk. These roots are hanging down inside the trunk.

The presence of the larvæ of goat-moths in a tree may often be detected by the peculiar odour emanating from their tunnels, and also by the appearance of a sort of sawdust (if I may so call it) collected below, on the ground, around the trunk. This wood-dust may be found also on the upper sides of the branches, where it falls as it is pushed out of the tunnels by the larvæ as they carry on their depredations. The larvæ are full fed in the autumn, and they then either spin a cocoon composed of small pieces of wood gnawed from the tree not far from the outlet of one of their tunnels, or, quitting the tree, burrow below the ground. I believe that they pupate below the ground far more often than is generally supposed. My own experience shows that their usual habit is to do so. The reason that the pupæ are so seldom found by entomologists when pupa digging, is in consequence of their wandering a considerable distance from the tree in which they have been feeding before burrowing. I have never found them at a less distance than about ten feet from the trunk, and I have occasionally seen the larvæ wandering fully one hundred feet from the nearest tree, evidently in search of some suitable spot in which to burrow. I could not ascertain any reason why they should be so far away, as the ground was sufficiently soft for them to burrow to a considerable depth quite close to the trees. I have never known them burrow so near to the tree that the branches could in wet weather afford them any shelter. Possibly they require more moisture than some species; if so, it is a probable explanation of this habit. Whatever be the reason, most of us have, at one time or other, noticed these larvæ marching along a country lane, or garden path, quite a distance from any tree where they could have fed.

When *Cossus* burrow below the ground they spin a very tough cocoon composed of earth and small stones. I have one in my collection measuring two inches in length, being only a trifle longer than the pupa. Although they leave the tree in the autumn and immediately burrow, they do not always spin the cocoon at once. I have known them pass the winter in the larval state and not commence to spin a cocoon until the middle or end of March, or perhaps later. As the imagines emerged in the following June, for so large a moth they remained in the pupal state a very short time. At other times the larvæ are known to spin their cocoons in the autumn.

When searching for the pupæ I find the following plan very successful. In the early autumn I dig over the ground round some tree in which I know the larvæ have been feeding. I commence digging about four feet from the trunk and continue digging as far away as practicable. If I am unsuccessful I go over the same ground again after about a fortnight's interval, and continue to do so at regular intervals until the commencement of winter. By this means I often find the larvæ before they commence to spin their cocoons. The cocoon so much resembles a small clod of earth that it is easily overlooked, and it is quite impossible to search so large a portion of the ground as thoroughly as when digging for pupæ in the usual manner.

*Sudbury, Suffolk; March, 1895.*

## THE "FRENA" FILM-HOLDER.

MESSRS. R. and J. Beck, of 68, Cornhill, London, have added to their well-known "Frena" Camera a Film-holder, which will be most useful to naturalists and others whilst travelling. It can be

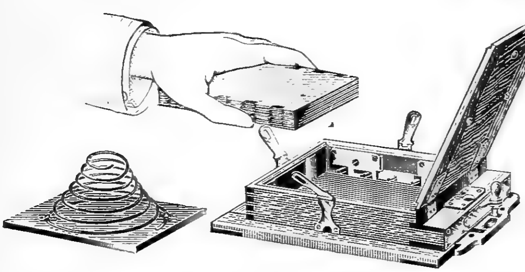


Fig. 1.—Filling the Magazine.

fitted to any tripod-camera, like an ordinary dark slide. It carries twenty cut-sheet celluloid films, and changes these automatically. Fig. 1 represents the holder open, ready for filling; fig. 2, closed. and complete for use, This holder consists of two parts, the magazine and the receiver, each being about half as thick again as an ordinary dark slide. The exposure is made with this apparatus in the same way as with a dark slide; that is to say, by inserting the magazine in the slide-rails of the camera, withdrawing and replacing the shutter of the holder, as shown in fig. 3. By this action the exposure has been made, and the foremost film transferred from the magazine to the receiver. The exposed films stored in the receiver may be removed and developed singly or as a pack. The great advantage of films generally, is their lightness when compared with dry plates of glass.

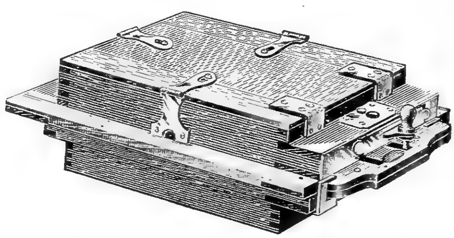


Fig. 2.—The "Frena" Film-Holder. Complete.

The prices of the complete apparatus is £2 10s. for quarter-plate, and £3 for half-plate sizes. Sensitised Films, for use in the "Frena" Film-Holder are supplied in packs, arranged in the order in which they are to be inserted into the magazine. There is an ingenious arrangement of notches, which ensure the correct use, in turn, of each of the films.

## VALUE OF SPECIMENS.

ON June 11th, Mr. L. C. Stevens sold at his Great Rooms, Covent Garden, the collection of Lepidoptera formed by Mr. J. E. Robson of Hartlepool. The rank and file of the collection sold for rather low prices, but the best varieties reached, as usual, high figures. A *Colias hyale* suffused with black as far as the central spot, which specimen has been figured in Mr, Barrett's book and Mr. Mosley's "Illustrations," sold for £4 10s. A specimen of *Lycæna icarus* £5 10s. Twenty *Vanessa urticæ*, including one variety like Newman's fourth figure of this species, reached £4 8s. *Argynnis aglia*, a suffused variety accompanied by ordinary forms, reached £9. Another fine collection of Lepidoptera is to be sold during July, made by F. D. Wheeler, M.A., LL.D., F.E.S., of Norwich, being very rich in Fen species. This collection is a good example of the necessity for long series of some insects, to show the range of variation. On June 25th, an egg of the great auk was sold at Mr. Stevens' rooms. It is that figured in the Memoirs of the Société Zoologique de France, in 1888, plate 6, fig. *C.*, and further notes on its history appeared in the "Bulletin" of the *Société* in 1891. The figure is far too highly-coloured, the bright green patch on the plate being no more than indicated on the egg. The egg is interesting on account of its granular texture and very light-coloured markings. It was taken in Iceland about 1830, by a shipowner of St. Malo, who bequeathed it to the Count Raoul de Beracé, whose collection was purchased by that celebrated oologist, Baron D'Hamonville, from whose collection it was now offered, he having still two others. The egg is slightly cracked. It was sold to Mr. Jay, of Regent Street, London, for 165 guineas, and is, we are told, to form a kind of advertisement at his mourning warehouse. At the same sale a wall-creeper's five eggs and nest sold for 14 guineas.

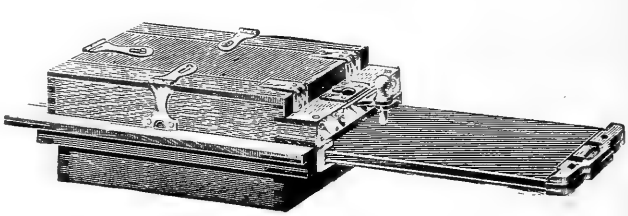
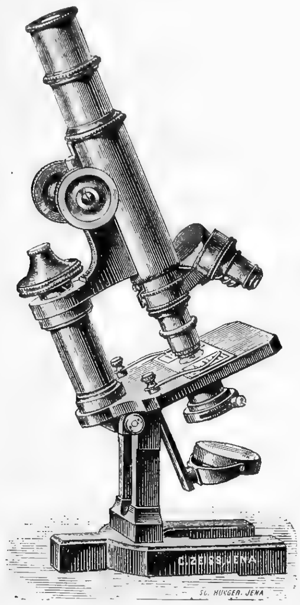


Fig. 3.—Film-changing.

## A STUDENTS' MICROSCOPE.

WE illustrate a useful instrument manufactured by Carl Zeiss, especially suited to naturalists on account of its portability. When packed in its box the instrument only occupies 12 inches × 7¼ × 6¾ inches. The case contains fittings, sliding boxes for tubes, slides, etc., also sliding blocks for cover-glasses and objectives, with other blocks for reagents. The price of the stand is £6, and objective




CARL ZEISS STUDENTS' MICROSCOPE. Stand VIA.

styled "A," costs 24s., and "D," 42s. each. They are equal to ⅔-inch and ⅙-inch, or the ordinary student's objectives. These stands are very solid and steady, so that no student need wish for a better working instrument than the one now submitted for our examination.

## THE FOREST OF FRANKFORT.

FRANKFORT has its forest as London has Epping Forest. The one at Frankfort is a little larger than Epping, being roughly 8,000 acres against 6,000 acres. Like Epping it is under the management of the City, but is close at hand being only separated by the river Main. The trees are naturally mainly beech and oak, but early in the fifteenth century, conifers, chiefly Scotch pine were introduced, and now the woodlands present a very varied appearance of mixed species of trees. In extent it reaches about eight miles long by three miles broad, being divided into two circles, Oberwald and Unterwald. In the former beech predominates on the limestone soil. It is needless to add that the naturalists have at their doors a beautiful observation and collecting ground.

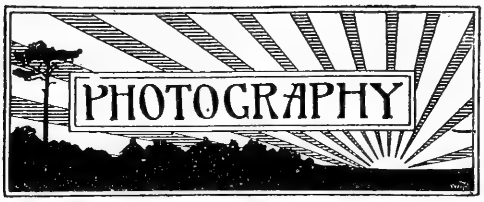
## THE EVOLUTION OF THE EYE.

CAPTAIN Abney has been making some rather remarkable observations on the development of the eye, and it may perhaps interest readers of SCIENCE-GOSSIP to hear some of his opinions on the subject. The evolution which the eye has undergone may be expressed as follows: (1) the appreciation of light; (2) black and white; (3) form; (4) colour.

Captain Abney gives examples to illustrate his theory. The *Arca*, for instance, is a mollusc which has no palpable head and yet it possesses an organ which enables it to distinguish between light and darkness. The limpet has an eye which is rather more advanced in development, and the next stage is a depression which acts as a retina. Then we may take the eye of a snail which has an orifice covered with a transparent membrane. Then we come to the eyes of the higher cephalopods which can distinguish black and white, and form, but not colour. Lastly we have the human eye with its appreciation of light, chiaro-oscuro, and colour. Captain Abney thinks there is little doubt that the first colour-receiving apparatus which was evolved was that which enabled the eye to appreciate blue, next came green, and finally red. A full report of Captain Abney's paper will be found in the "Journal of Camera Club" for February. While on the subject of the eye it may be interesting to refer to the artificial spectrum top, recently brought out by Newton's, of Fleet Street. A card containing black and white bands are rotated and distinct colour-bands are seen. It is of interest to note that this discovery was anticipated by Mr. S. N. Stewart, of Manchester. In the Proc. Roy. Soc. Edin., xv., he states that he found certain colour-phenomena were caused by intermittent stimulation with white light.

M. Hugo Magnus, Professor of Ophthalmology at Breslau, in Germany, in a recent paper on the "Sense of Colour in Man," appears to think that man's organ of vision will become more and more perfect as he accustoms himself to analyze his sensations, and that in the future the human retina will be capable of seeing colours which, at the present time, do not act upon it at all. Primitive man, according to M. Magnus, at first saw no colours: he could but distinguish light, shade and form. Then, as he grew more civilized, he saw red and yellow. This can be proved, says our author, for "neither in the ancient hymns of the Vedas nor in the Old Testament is there mention of a blue sky, and neither Homer nor Ezekiel appear to have been sensible of nearly all the tints of the rainbow." The truth seems to be, that the ancients saw as many colours as we do to-day, only they had not words to describe all they saw.

*Kensington.* HERBERT C. FYFE.




Sections from Mountain Limestone.—Of all the sedimentary rocks forming the crust of the earth none have been so fully investigated as the carboniferous, owing to the importance of coal and limestone to an industrial country like England.

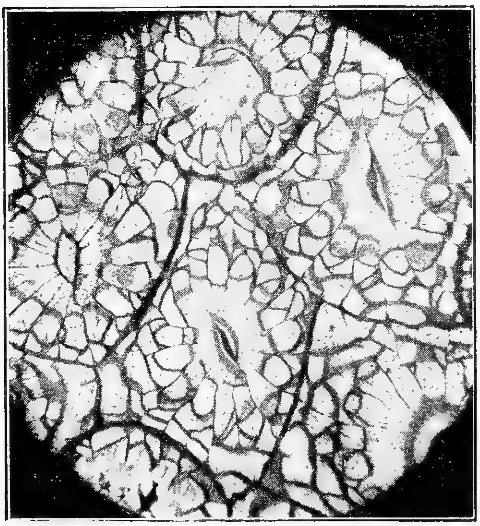


Fig. 1.—L. portlocki (Horizontal Section) × 15.

One of the most striking features of the mountain limestone is the wonderful perfection, both of symmetry and detail, in which nature has preserved through such a long period the organic remains of which it is composed. In some of the corals, the spines of Echini and Foraminiferæ, indeed, the calcareous remains are as sharp and clear in character as in recent types. Visitors to museums must often have been struck with this fact in examining the shells, corals and other organisms of which it is built up. If, however, they find this to be the case with the unassisted eye, how much more is it so when the help of the microscope tells the story of their composition and structure? Many are familiar with the fossil corals, *Lithostrotion basaltiformis* and other species of this genus. As an instance of the interest attaching to their closer examination I submit photo-micrographs of *Lithostrotion portlocki* × 15 dia., fig. 1 being a horizontal section cut through a mass, which reveals the star-shaped corallium very distinctly. The coralites vary somewhat in size, are prismatic in shape, and united by their thin outside walls. The chalice is divided into from twenty-two to thirty-six septa, very unequally developed, thin, slightly flexuous, the principal ones extending almost to the columella, which is compressed and prominent. Fig. 2 is a vertical section from the same piece, and shows that in the exterior zone of the coralites the vesicular septa form two or three longitudinal series, and are much inclined inwardly; that the tubulæ are well developed, raised centrally and divided exteriorally. The width of the coralites is about a quarter of an inch. The specimen from which they were cut is from the Peak district of Derbyshire. In the volume of the Palæontological Society for 1852, will be found H. Milne Edward's monograph of the fossil corals of the permian and mountain limestone, with the beautiful plates he prepared. This species, though not so widely distributed as *L. basaltiforme*, has been found at Castleton, Bristol, Craigbenayth, Wellington, Corwen and Llangollen, in North Wales, and, according to Col. Portlock, at Kildress, and at Kesh, in Ireland.—*W. W. Midgley, F. R. Met. Soc., Museum, Bolton.*

Photography in Colours. — To succeed in obtaining the colours of nature in a photograph, or photogram as some would have it, is the desire of every photographer, amateur or professional. Mr. F. E. Ives, of Philadelphia, has succeeded by his system of composite heliochromy in giving us coloured pictures which can be viewed on the screen. Now Dr. J. Joly, of Dublin, has obtained as good effects as Mr. Ives did, without a tithe of the trouble or expense. At the Royal Society's Conversazione, on June 12th, Dr. Joly showed some of his colour photographs, which are a realization of composite heliochromy in a single image. The method of composite heliochromy requires three images superimposed by projection. In these photographs the colour analysis and synthesis are carried out in the one image. The colours are the natural colours as they registered themselves upon the plate, and in no case altered after reproducton. The specimens shown are first attempts, produced with rough apparatus. The grained appearance of the image is avoidable with proper appliances. The process of taking and reproducing these photographs differs in no way from ordinary photography upon the dry plate, save that the sensitive plate is in the camera

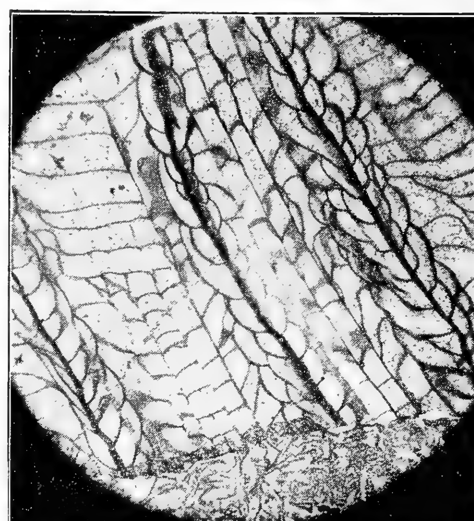


Fig. 2.—L. portlocki (Vertical Section) × 15

exposed behind a screen lined in particular colours. The positive is subsequently viewed through a screen lined with three other colours; the three "fundamental colours," which upon the three-colour theory of vision are supposed to give rise to all our colour sensations.

# BOOKS TO READ

*The Moon: a full description and Map of its principal Physical Features.* By THOMAS GWYN ELGER, F.R.A.S. 181 pp. royal 8vo, illustrated by maps of the moon. (London: George Philip and Son, 1895.) Price 5s. net.

Although this book is chiefly intended for the use of lunar observers, it is nevertheless written in such a manner as to be acceptable to those who would like to know what is known of the moon by astronomers. The author, who is director of the Lunar Section of the British Astronomical Association, and an ex-president of the Liverpool Astronomical Society, has for some time past given special attention to the investigation of the moon's surface. This is admirably delineated on a map which is divided into four sections, produced in the well-known accurate style of Messrs. Philip and Son. An important feature of these maps is the substitution of names for reference numbers; so that the uninitiated may at a glance obtain a general idea of the moon's superficial configuration, as the mountains, craters, seas, etc., are designated by their names. The letterpress fully describes the maps, giving the height of the mountains, the widths of the craters, and much general information. The word "seas" thus used is of course an ideal word, brought forward from the early selenographers, and the spaces should be rather called old sea-beds, for it is well known no existing sea or lake of water has ever been found on the moon's surface through even the best telescopes. Although this work is a scientific dissertation upon our satellite, it will rank among the best popular books in that section of astronomy. J. T. C.

*Finger-Print Directories.* By FRANCIS GALTON, D.C.L., F.R.S. 130 pp. demy 8vo, with 9 plates. (London and New York: Macmillan and Co., 1895.) Price 5s. net.

This is a remarkable book on a remarkable, though by no means new subject. It deals with the identification of persons through the marks left on white cards by their finger-tips, after being pressed on ink which proof is found to be unerring. The author states that it is probable no two finger-prints in the world are so alike that an expert would fail to distinguish between them. The first portion of the book is devoted largely to an examination of the Report of a Committee appointed by the Home Secretary to enquire into the best means for identifying habitual criminals, which was presented in February, 1894. The report deals with finger prints among other means of identification. Mr. Francis Galton points out how rapidly persons may be identified from a directory of finger-prints, and instances one made by himself, which refers to 2,632 different persons. The average time needed to find one of these persons' names is less than three minutes. From the point of view of the scientific reader, the latter portion will be found of most value, as it deals with the classification of finger-prints, and is profusely illustrated with examples, there being nearly 200 figures. This system of identification is now fully acknowledged by the police authorities of most States, including our own department at Scotland Yard. The study of finger-prints was initiated by Sir William J. Herschel some forty years ago, but Mr. Francis Galton is without doubt the present authority on the subject. No longer in its experimental stage, there is future importance for its study. We trust this book will be a warning to some of our friends who borrow our books, and return them with marks of their identity on the margins of the pages.

*A History of British Butterflies.* By the Rev. F. O. MORRIS. Crown 4to. Parts i, ii, and iii, seventh edition. Publishing in six monthly parts, with 79 plates coloured by hand. (London: John C. Nimmo, 1895.) Price 2s. 6d. net, per part.

This book is too well known to need any description. The seventh edition now appearing is practically a reissue of the earlier book with some new additions, the scientific nomenclature used being that of half a century ago. The publisher would add a useful appendix, when the work is finished, by printing a page extra containing the ordinary synomic list of British butterflies, which has now for years past been in use in this country among scientific entomologists. References to the pages in the work would then enable persons who do not know butterflies to identify the plates and letterpress with the species with their accepted names.

*Methods of the Art of Taxidermy.* By OLIVER DAVIE. 178 pp. royal 8vo, with 90 full-page engravings, (Columbus, U.S.A.: Han and Adair. London: H. T. Booth, 38a, Upcerne Road, Chelsea, 1894.)

We have received a subscription copy of this splendid work by Oliver Davie, who is the author of another upon the nests and eggs of North American birds. This book on Taxidermy has been prepared with most painstaking care, and if it gets into our public libraries will give an impetus to the preservation of specimens in an intelligent manner. The engravings are well drawn and printed. They are chiefly by Dr. Theodore Jasper, and include about 500 figures illustrating the modes of procedure in bird or quadruped stuffing. With the aid of these drawings and the accompanying letterpress, anyone ought very soon be able to practice taxidermy as an art. Mr. Davie commenced work on this book in April, 1882, so it is not a hurried compilation for the book market, but well written and produced in the best possible style, the drawings being from specimens in process of preservation. Chapter v, "The making up of Birds' Skins" is a useful one to our readers, as it indicates the proper way of preparing a collection of birds' skins for scientific reference, without having to occupy a large space with birds "set up" in cases. It is an old system, but one which will always be the best. All the author's instructions appear to be imbued with common sense, and less unnecessary apparatus is described than is usual is books of this class. We are unable to give the price of this work, but full particulars may be obtained from the English Agent, Mr. H. T. Booth, 38a, Upcerne Road, Chelsea, London, S.W. J. T. C.

*The Story of the Plants.* By GRANT ALLEN. 232 pp. foolscap 16mo. With 50 illustrations. (London: Geo. Newnes, Limited, 1895.) Price 1s.

This is one of a popular series of books upon scientific subjects issued by the Newnes Company, which ought to do much good in popularising the branches of science on which they treat. The first thought of many who pick up this book will be why should a novelist have been selected to write "The Story of the Plants"? It must not be forgotten, however, before his earlier work was overshadowed by his successful fiction, Grant Allen wrote in his Canadian home many popular magazine and other articles upon plants and plant life. In this little volume, as he states in his preface, he gives "a short and succinct account of the principal phenomena of plant life," in language suited to the comprehension of unscientific readers. He, however, treats them as having ordinary intelligence and not as children. His facts are quite up to date and based upon the theory of evolution. This is really his text, and a distinctly useful one it is, for we have plenty of text-books dealing with the technicality of botany. This is just the work to found in the reader a lasting love for plants and their ways, without frightening in the earlier stages of the knowledge by dry technicalities and unfamiliar words. The headings of his chapters are suggestive, such as "How plants began to be," "How plants came to differ from one another," "How plants eat," "How plants drink," "How plants marry," "How plants club together," and other interesting not to say "catchy" titles. This is a good if inexpensive present for any intelligent person with a taste for enquiry, whether young or old. J. T. C.

*The Structure and Life of Birds*. By F. W. HEADLEY, M.A., F.Z.S. 432 pp. demy 8vo, and 78 illustrations. (London and New York: Macmillan and Co., 1895.) Price 7s. 6d.

The object of this book is to set forth the evidence of the development of birds from reptilian ancestors, traced by the modifications in their anatomy, as they have advanced to a more active life than their earlier ancestors. A further portion of the book deals with the subjects of song, instinct and reason, migration, the principles of classification, and the best methods of studying birds. The author, feeling that it is exceptional for ordinary students of birds to acquire a specialist's knowledge in every department of ornithological physiology, or anatomy, has produced this book, so that they may readily grasp the whole recent knowledge of the history of birds and bird life. It is, however, not the work of the professional compiler, but of one who has studied his subject, supervised by specialists in various departments. His language is free from pedantry and quite suited to the ordinary reader who wishes to increase his knowledge, without having to constantly refer to a dictionary of scientific terminology. The illustrations are by Mr. Prendergast Parker and are generally well drawn. Altogether, it is a work which every ornithologist should possess, as it contains much information on subjects which have been sadly neglected hitherto by the "bird collector." It is a book which should go into all the public libraries, rather than the out-of-date picture books too often to be found in them. J. T. C.

*Rambles in Alpine Valleys*. By J. W. Tutt, F.E.S. 216 pp. 8vo, with 5 plates. (London: Swan, Sonnenschein and Co., 1895.) Price 3s. 6d.

This is a pleasant account of a passing visit to the Italian side of the Mont Blanc range, written by an observer of nature, who tries to interest others in the district, and "the scientific bearings of some of the many facts which came under my notice." Entomology is the leading feature of his pages—after scenery; the five plates being from photographic views. A good deal of the book applies to observations which may be made in other places than in the Alps, so that those who have not opportunity to pay them a visit, need not be deterred from reading the author's chatty science.

*The Horticulturist's Rule Book: a Compendium of Useful Information for Fruit-Growers, Truck-Gardeners, Florists, and Others*. By L. H. BAILEY. Third Edition, revised and extended. 302 pp., 8vo. (New York and London: Macmillan and Co., 1895.) Price 75 cents (3s.)

This is quite an encyclopœdia of horticultural knowledge, with instructions how to practically apply some of it so as to save the disappointment so frequently associated with gardening. Although written for the American Continent, it will be found useful to our readers in Europe who are likewise gardeners. The author wastes few words, as will be gathered from the following epigramatic paragraph, with which the book opens: "The results obtained from the use of any insecticide or fungicide depend upon the operator. *Timeliness, thoroughness* and persistence are watchwords of success. It is easier to keep an enemy away than to drive him away. The worst foes are often the smallest ones, and the injury is often done before they are detected. Be ready, and begin early."

*Wild Nature Won by Kindness*. By Mrs. BRIGHTEWEN. 230 pp. 8vo, illustrated. (London: Fisher Unwin, 1895). Price 1s. 6d.

Mr. Fisher Unwin now issues the sixth edition of Mrs. Brightewen's series of stories of pet animals. It is a charming book to read to children, and one likely to found in them a healthy love of living things, which cannot fail to have a good influence on them in later years.

*A Handbook of the British Macro-Lepidoptera*. By BERTRAM GEO. RYE, F.E.S. Vol. i., Part 2. 8 pp. large 8vo, with two hand-coloured plates, drawn by MAUD HORMAN-FISHER. (London: Ward and Foxlow.) Price 2*s*. 6*d*.

We noticed this handsome work on the appearance of the first part (SCIENCE-GOSSIP, vol. i., N. S., page 275). The excellence of the drawing and colouring of the plates is fully maintained, and we are pleased to observe that the artist has overcome the lithographer, for there is a much greater softness in the figures than in Part I. The letterpress is also improving, being more full and descriptive. We trust Mr. Rye and Miss Fisher will receive good support in this work, and so be encouraged to make it the success it promises to become. One plate in this part is devoted to *Pieris napi* and *P. daplidice*, and the other to *Euchlöe cardamines*, of which eight figures are given.

*Birds, Beasts and Fishes of the Norfolk Broadland* By P. H. EMERSON, B.A., M.B., M.R.C.S., etc. 416 pp. demy 8vo. Illustrated with 68 photographs, by T. A. COTTON. (London: David Nutt, 1895.) Price 15s.

The publisher and the Ballantyne Press have produced a handsome book, but Mr. Emerson's style is disappointing and often misleading. The following is a quotation from page 96: "When the yellow leaves have dropped like great pale dead butterflies through the low grey skies of autumn, and the canker-riddled cauliflowers and budding sprouts are eaten up, and the millman's garden is a slippery morass of decaying vegetation, and dripping branches lie naked to the sky, the hawfinch deigns to visit the Broad district at rare intervals, and he is generally to be found in a deserted garden," etc. The etc. containing twenty-six more words to complete the sentence. Dead butterflies dropping through the skies is a new feature in the history of those insects. It would be unfair to infer that the whole book is of that style, but there is far too much of it. Was it a "little bird" which drew our attention to page 96? If so, it surely must have been a starling, retaliating for what the author thinks about him. He says: "The starling is a dirty bird — dusky-skinned, gaily-spotted like a dung-fly, fruit-thieving and imitative. A hanger-on to the borders of civilization, he has learnt all the petty meannesses of the Broadsman and none of his noble qualities; he is a filthy pariah, a lover of warm chimney-corners and animal droppings, and his song, now thrush-like, now recalling some finch, is stolen; he is a born plagiarist, a dirty, sordid little creature and full of the citizen's cunning." The photographs add greatly to the appearance of the book, but have evidently been taken from birds in "glassen boxes," as the author tells us "the Broadsmen contemptuously call 'set up' specimens." A few of our readers who care to expend money on "local" books may find in this that they have their money's worth, for in it there is much Broadland dialect and some quaint stories. J. T. C.

*On certain Phenomena belonging to the close of the last Glacial Period, and on their bearing upon the Tradition of the Flood.* By JOSEPH PRESTWICH, D.C.L., F.R.S., F.G.S., &c. 98 pp. demy 8vo, some illustrations. (London and New York: Macmillan and Co., 1895.) Price 2s. 6d.

It is not alone to geologists that this work of the veteran professor of that science will appeal, but to every educated person. He deals with it purely from the present terrestrial evidence. With regard to the theological tradition of the Flood, its possibilities or impossibilities, he says, "that has been fully dealt with by other writers," and he confines himself to the question whether geology furnishes evidence in support of a flood of the magnitude and disastrous consequences of the one typified in the ancient narratives. His conclusions are well worth studying, and may be summed up in his own words, "There is, however, I consider, sufficient evidence to warrant the inferences I have drawn from the facts described, as well as reason to believe that the tradition could not have had its origin otherwise than in an event of very exceptional and extraordinary character—far more so than any that could have resulted from ordinary river-floods." Professor Prestwich has examined not only the Biblical tradition of the Flood, but every other available tradition, and in an Appendix he quotes the Rev. Professor Sayce at length, on the version of the deluge from the Babylonian Tablets. This is, of course, a far older version than the Hebrew narrative, being polytheistic, and one upon which our Biblical history was doubtless founded. The author's opinion is, that the submergence which gave rise to the tradition occurred within 8,000 or 10,000 years ago, and was within the time of palæolithic man. J. T. C.

*Nature in Acadie.* By H. R. SWANN, 82 pp. crown 8vo, with frontispiece. (London: John Bale and Sons, 1895.) Limited to 250 copies. Price 3s. 6d.

This is a series of pleasantly-chatty impressions on nature and living things on a first visit to Nova Scotia, or "Acadia," as the French called the country, from the Micmac Indian word, "äkăde," meaning "abundance." We do not see that Mr. Swann refers to this interesting origin of the name of his book, which derivation does not seem to be commonly known. The chapters indicate the author's faculty for observation, and are very readable. J. T. C.

*Guernsey Society of Natural Science and Local Research: Report and Transactions for 1894.* 67 pp. 8vo (Guernsey: Bichard, 1895.)

The Hon. Secretary is Mr. William Sharp, 2, Ross Place, Guernsey. We note, on the authority of Mr. E. D. Marquand, the President, that hedgehogs, which were introduced into the island fifty years ago, are now comparatively common. The black rat occurs in Herm, Sark and Brechon. There are several good papers in the "Transactions," including branches of fauna of the island, they are "Aculeate-Hymenoptera," by W. A. Luff, "Land and Fresh-water Shells," by E. D. Marquand, "List of the Spiders of the Channel Islands," by Rev. Fred. O. Picard-Cambridge, "Algæ of Guernsey," by Mr. Marquand, and also the annual presidential address by the same gentleman, which is full of local interest with regard to natural science. J. T. C.

*The Migration of British Birds, including their Post-Glacial Emigration, as treated by the application of a new Law of Dispersal.* By Charles Dixon. 327 pp. crown 8vo, and six coloured maps. (London: Chapman and Hall, Limited.) Price 7s. 6d.

With evident care and much labour, the author has written a speculative book on the origin and continuance of migration of birds, mammals and plants. It is probable that some of the arguments on which his "new law" is founded, will stand the criticism of time, but that criticism is sure to be severe. Whatever the result, it is plain Mr. Dixon is in earnest, and his book should be read by every thoughtful ornithologist and naturalist interested in geographical distribution of animals and plants. The work is divided into two parts, the first treating on the physical and climatic changes which have affected the birds visiting, from prehistoric times, what is now the British Archipelago. The second part deals with the migration of birds within the same area, and the phenomena connected with seasonal flights and irruptive visits. The book is pleasantly written and forms excellent reading. J. T. C.

*Object Lessons in Botany: From the Forest, Field, Wayside and Garden.* (Book II., for Standards III., IV. and V.). By Edward Snelgrove, B.A. 310 pp. 8vo, illustrated by 153 figures. (London: Jarrold and Sons, 1895.) Price 3s. 6d.

This is a compilation for the teachers' aid, being a systematic course of one hundred elementary lessons in botany, for boys and girls. The author has followed the best of plans for impressing the lessons on his scholars, by making them participate in the work for its own pleasure. He expects the children, if possible, to gather, in a state of nature, the objects to illustrate each lesson. This is far better than imperfectly drawing on a blackboard the leaf of a dandelion, and writing beneath it "runcinate." The taste formed in many of the scholars, whilst gathering and pressing their small collections in connection with these lessons, will, in many instances, be abiding, and bear good results in after years. The whole tone of the book is in good taste and it is nicely illustrated. J. T. C.

## METEOROLOGICAL

Rainfall in London.—Since the middle of November, 1894, there has not been any month, and not more than one fortnight, in which the rainfall of London has been equal to the mean. It is true that on December 14th there was a fall of eight-tenths of an inch, and during that month there were fifteen days on which some rain fell, but the total fall for the month was less than two inches, and was short of the mean by 0·17 inches. Again, in January, we had, from the 12th to the 25th, a run of a fortnight in which rain fell more or less on almost every day, and in which half an inch fell on one day (19th); but the total fall for the month was only 1·87 inches, and was short of the mean by a quarter of an inch. The months since then have been all dry—a few days in March and a few more in April being the only ones in which there was any approach to a showery spell, In each case, however, the fall for the whole month was much below the mean, and in the end it turns out that, from the middle of November to the middle of June (a period of seven months) we have had a total rainfall of only 7·3 inches, whereas, if we had received the mean amount, the fall would have been 13·8 inches, or nearly double the quantity actually recorded. This is, to say the least of it, a most serious deficit, and, in view of the length of the period, one which cannot be made up without a lengthened period of very wet weather. It is of great importance and is somewhat cheering that, before this long dry period set in, October and the first half of November in 1894 had furnished us with such abundant rain as they did. Their immediate effect in the Thames and some other river valleys was, indeed, at the time disastrous, but many parts of our midland counties were saved from most serious consequences, as the streams, wells, and canals were rapidly drying up, and we in London have now great reason to be thankful for the abundance which then fell. There is another point worth noticing, and of importance to the country at large, namely, that the deficiency of rain in London has been exceptionally large. The drought has, indeed, been serious over England generally, but London has been passed by in a remarkable manner by several of the rain systems which have passed near to it—some to the northward and eastward, some to the southward.

Thunder-storm of May 30th.—The storm on the evening of May 30th, 1895, was very remarkable. A low, flat, dark cloud covered the south-western horizon at Cheadle, Staffordshire, while from behind and immediately above it was seen a semicircular white cloud, the edge being almost as perfect as that of a rainbow though much smaller at first. Almost every electrical flash for fully an hour appeared to issue from the centre of the circle, and all of them had an upward tendency. The flashes were incessant, and increased very gradually in intensity until its first climax about midnight. The white cloud also increased in size quite as gradually as the storm.—*F. Harrisson, Cheadle, Stoke-on-Trent; June 5th,* 1895.

## IN MEMORIAM

Dr. Valentine Ball, F.R.S., died, after a lengthened period of failing health, at his residence in Dublin, on June 15th. Born July 14th, 1843, he had thus nearly completed his fifty-second year. His death is sadly premature, but he contrived to do more useful work in his short lifetime than many do when completing their natural span. Dr. Ball was reared in association with scientific thought, being the second son of the celebrated Dublin naturalist, Dr. Robert Ball, who died in 1857. His elder brother is Sir Robert Ball, F.R.S., the talented astronomer. In his boyhood, Valentine Ball met at his father's house, which was then the centre of scientific culture in Dublin, most of those who were worth knowing at that period, and either inherited or imbibed a life-long lasting love for the investigation of natural history. He was educated first at Chester, under Dr. Brindler, and, later, at Rathmines, by the Rev. Dr. Benson. He entered Trinity College, Dublin, on leaving school, and at about the same time obtained a clerkship at the Four Courts of Justice in that city. The consequence was that, having the two occupations, his university career was uneventful, closing with an ordinary degree. In 1864, at twenty-one years of age, Valentine Ball received an appointment in the Geological Survey of India, then under Dr. Thomas Oldham, one of his father's former friends. With that service Valentine Ball was associated for seventeen years, when on the resignation of the Professorship of Geology in the University of Dublin by the Rev. Dr. Houghton, he was appointed his successor. To Dr. Ball's long residence in the jungles of India, where he thoroughly did his work under the most trying conditions of climate, may be traced the enfeebled health which carried him off so early. On taking the Chair of Geology in Dublin, Dr. Ball soon attracted attention for his energy, and was elected a F.R.S. in 1882. In May, 1883, Dr. William Edward Steele died whilst Director of the National Museum of Dublin, and in the following September Dr. Ball was appointed his successor. Having resigned his professorship at the University, he threw his whole energy into developing the Museum, with the result that it now stands among the foremost in Europe. Dr. Ball had had some experience of museum work in the Imperial Museum in Calcutta, and had formed a great taste for that branch of scientific work in which he afterwards proved so competent. His interests did not end with the museum in Kildare Street, for he was equally the active spirit of the affiliated institutions, the National Library, the Botanic Gardens, and the Arts School. As secretary of the Royal Zoological Society of Ireland, the Zoological Gardens near Dublin received his fostering care. Dr. Ball leaves his widow and four young children to mourn, with every cultured person in Dublin, his early loss. Dr. Valentine Ball's chief literary works are: "Economic Geology," "Manual of the Geology of India," "Diamonds, Coal and Gold of India," "Jungle Life in India," etc. J. T. C.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| *Sun* ... | July 1 | 3.49 | 8.18 | 6.41 | 23° 8′ N. |
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| | ,, 21 | 4.9 | 8.3 | 8.2 | 20° 29′ |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| *Moon* ... | ,, 1 | 7.39 | 12.3 | | |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| | ,, 8 | 9.38 | 1.46 | | |
| | ,, 15 | 10.59 | 6.35 | | |
| | | *Souths.* A.M. | *Sets.* P.M. | | |
| | ,, 22 | 12.26 | 8.38 | | |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Mercury* ... | ,, 10 | 3.20 | 11.5 | 6.23 | 18° 43′ N. |
| | 20 | 2.46 | 10.41 | 6.34 | 20° 23′ |
| | ,, 30 | 2.51 | 10.55 | 7.24 | 21° 38′ |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| *Venus* ... | ,, 10 | 3.10 | 10.10 | 10.23 | 10° 55′ N. |
| | ,, 20 | 3.3 | 9.40 | 10.56 | 6° 33′ |
| | ,, 30 | 2.52 | 9.7 | 11.24 | 2° 12′ |
| *Mars* ... | ,, 10 | 2.12 | 9.43 | 9.25 | 16° 28′ N. |
| | ,, 20 | 1.57 | 9.16 | 9.49 | 14° 24′ |
| | ,, 30 | 1.42 | 8.49 | 10.13 | 12° 11′ |
| *Jupiter* ... | ,, 9 | 0.8 | 8.18 | 7.17 | 22° 26′ N. |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| | ,, 23 | 3.20 | 11.27 | 7.30 | 22° 1′ |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| *Saturn* ... | ,, 9 | 6.48 | 12.7 | 13.57 | 9° 20′ S. |
| | ,, 23 | 5.53 | 11.8 | 13.58 | 9° 29′ |
| *Uranus* ... | ,, 30 | 6.21 | 10.59 | 14.54 | 16° 17′ S. |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Neptune* ... | ,, 30 | 0.28 | 8.31 | 5.5 | 21° 26′ N. |

MOON'S PHASES.

*Full* ... July 6 ... 11.29 p.m. *1st Qr.* ... July 14 ... 3.31 a.m.
*New* ... ,, 21 ... 5.32 a.m. *Last Qr.* ... ,, 28 ... 8.36 p.m.

THERE will be a large shower of meteors on July 28th, the radiant point being $\alpha$ 339° $\delta$—12°.

THE "Scientific American," of June 15th, prints a drawing of a number of sun spots, observed through a three-inch telescope at Springfield, Mass., on May 19th. The two larger spots are very typical.

GARRETT P. SERVISS is writing a series of popular articles on the "Pleasures of the Telescope" for the "Popular Science Monthly," of New York. In the June number appears his fifth, entitled, "In Summer Star-Lands." It is illustrated by three maps.

LORD ROSSE delivered a lecture at the Royal Institution, on May 31st, on the radiant heat from the moon during the progress of an eclipse. Speaking of the heat given off, he said that in the total eclipse of January, 1888, he had found there was a great decrease in its amount some time before the first contact. During the total phase the heat radiated was a mere trifle, and it had not regained more than eighty per cent. at full moon, an hour and a half after the first contact.

WE understand that Professor E. E. Barnard and Professor Burnham have been appointed to posts in the new Yerkes Observatory, at Lake Geneva, some seventy miles from Chicago.

THE death is announced of Theodor Brorsen, aged seventy-six. He discovered in all five comets, one with a period of about five and a half years, which bears his name, was discovered by him in 1846. It duly returned for four periods up to 1879, but has not been found since that visit.

MERCURY will be at its greatest elongation, west, on July 22nd, and Venus at its greatest eastern elongation on the 11th. Jupiter is too near the Sun for observation; he will be in conjunction on the 10th. Both Saturn and Uranus are getting very low in the west by the time it is dark, and Neptune does not rise till about midnight.

DR. PERCIVAL LOWELL is making ready for an astronomical campaign in December, 1896, when the next opposition of Mars will take place. He intends to mount a new telescope of twenty-four inches aperture at some favourable place in Mexico or else in Africa. It will be remembered that a short time ago Dr. Lowell set up an eighteen-inch telescope at Flagstaff, Arizona.

THE British Astronomical Association has now published the long-promised Report of the Section for the observation of Mars. In the chart accompanying the report have been combined together, so far as possible, the results expressed in the entire set of eighty drawings which the members of the Section supplied. Mr. E. Walter Maunder was the director of the Section.

DURING a thunderstorm, on June 19th last, the Observatory on the summit of Ben Nevis in Scotland, was struck by lightning which damaged a telegraph instrument and set fire to the wood and felt lining of the building. The flames were fortunately subdued by the staff and visitors sheltering at the time, before any serious damage occurred. A feature of the storm was that it was accompanied by a thick fall of snow and a reduction of temperature of the air to freezing point.

IN the "Scientific American" for June 1st, Sir Robert Ball, F.R.S., contributes a long and interesting article entitled "The Moon's Story." He treats his subject from the point of view of the Moon's influence on the tides. The story is told with that facility so characteristic of Sir Robert Ball, and which has won for him so many admirers. He reminds his readers of the greater rapidity with which the earth formerly turned on its axis, and the consequently more frequent tides than now. This leads up to their effect on the physical appearance of the earth's surface.

THE great forty-inch lens for the Yerkes telescope has been completed by Mr. A. E. Clark. This magnificent telescope is the largest in the world, and eclipses all, not only in size, but in focal range and power. The lens alone, when it came from Paris in the rough, cost £8,000, and since then an enormous cost has been incurred by the grinding and polishing of the lens, which have been going on for two years. The preliminary tests have been carried out by Professor T. J. Lee, who states that the stars came out through it with startling brilliance and clearness, the division between the rings of Saturn was plainly visible, and the satellites shone forth like little moons in the midnight sky.

# SCIENCE GOSSIP

It was stated that at Aldershot, during the second week in June, water was found frozen in the open air one morning.

The American Association for the Advancement of Science, will meet this year at Springfield, Mass., from August 26th to September 6th.

Our correspondent, Mr. Edward Martin, has compiled a list of the various editions of Gilbert White's Natural History and Antiquities of Selborne. He gives no less than two dozen different forms of this work, by different editors.

The Vienna Botanical Exchange Society is desirous of exchanging or purchasing rare herbarium plants from all parts of the world. Particulars may be obtained from Herr. J. Dörfler, 7, Burgring, Vienna. The annual catalogue of the Society was recently issued.

Lord Kelvin, it is understood, will resign the presidency of the Royal Society shortly. Rumour points to Lord Rayleigh as the new president, but whether the choice will fall on the discoverer of Argon remains to be seen. An interesting sketch of Lord Kelvin appears in the "Pall Mall Magazine" for July.

Prof. A. Cornu, of Paris, delivered a lecture on "The Physical Phenomena of the Atmosphere," at the Royal Institution, on June 7th. He showed some interesting experiments, giving an ingenious reproduction of the "Alpine glow," sometimes seen in the Bernese Oberland and elsewhere, and also, with the help of M. Weyher, an exhibition of an artificial waterspout.

Mr. R. Lloyd Praeger, the Hon. Sec. of the Irish Field Club Union, sends a really nicely prepared and illustrated synopsis of the Galway Conference and eight days' visit to Connemara, including a general description of the district. The party will be limited to 100, and the cost from Dublin for the round trip appears to be £4 17s. 6d. We wish the party fine weather and a successful visit.

The naturalists of Ireland are evidently making themselves a power in the land, as there are frequent indications of their activity. The Belfast and Northern Counties Railway now issues, apparently gratis, a small handbook, written by Professor Grenville A. J. Cole, on the scenery and geology of co. Antrim. The subject is entirely treated from the geological point of view, and is well, if popularly, written.

Among the unexpected static phenomena discovered by ballooning and in mountain observatories, M. Cornu instanced three, namely, the facts that many clouds which had generally been regarded as consisting of vapour were composed of minute crystals of ice; that at different heights the direction of the wind was different; and that the temperature did not get steadily lower as the earth became more distant, but that alternate layers of hot and cold air were encountered.

In the "Irish Naturalist," of June, Miss R. Hensman draws attention to the recent discovery of the disintegration of shells caused by certain marine algæ.

Death is making sad blanks in the list of our elder scientific men. We now hear that Dr. W. C. Williamson, F.R.S., the Emeritus Professor of Botany at Owen's College, Manchester, has passed away.

We may mention the discovery of a new substance in the alcoholic extract of orris root. It has been named Irone. It is a retone having the formula $C_{13}H_{20}O$, and will be of great value to perfumers and others.

Dr. T. A. Chapman, of Hereford, has completed in the "Entomologists' Record" an important paper on "The Classification of Butterflies," based on the structure of the pupæ. It is a distinct step in the direction of scientific entomology.

A system of testing gems has been discovered by flotation on certain dense liquids such as methylene, iodide, which are far denser than water. This density is reduced by benzine to the right flotation point for each species of gem.

The recent publications of the Division of Ornithology and Mammalogy of the United States Department of Agriculture include a monographic revision of the Pocket Gophers, family Geomjidæ, known as the pouched rats and mice of North America.

Principal Peterson, who succeeds Sir William Dawson at the head of the McGill University, Montreal, graduated at Edinburgh in 1875, and afterwards gained an open scholarship at Corpus Christi, Oxford. He was appointed first Principal of University College, Dundee, in 1882.

M. Berthoumieu is publishing in the "Annales de la Société Entomologique de France" a very complete monograph of the family Ichneumonidæ, of the tribe Entomophaga or "insect-eaters," of Europe. It has been calculated that there are not less than 4,000 to 5,000 known species of ichneumons, the females of which deposit their eggs in or upon the bodies of larvæ of other insects, in which the ichneumon larvæ feed, avoiding the vital parts until they have reached maturity.

Henry Moore, R.A., who died on June 22nd, was an ardent entomologist for many years, often collecting in company with the editor of this journal. The conceptions of several of his greatest pictures were formed during his collecting expeditions. As a painter of landscapes and seapieces, Henry Moore had few equals. He was born at York, in 1831, his father being a drawing master. There were four brothers, who were trained to art by the father, Henry becoming a Royal Academician. We think Albert should have been elected one also.

The Natural History Society of Birmingham was founded in 1858, and the Philosophical Society in 1876. These two societies have now been amalgamated under the title of Birmingham Natural History and Philosophical Society. The "Proceedings" (vol. lx., part i) have just been issued and contain interesting papers on "History of the Method of Weighing the Earth," by Professor Poynting, "Early Iron Working in the Highlands of Scotland," by Dr. Tilden, and "Morphology of the Sensory Canal System in some Fossil Fishes," by W. E. Collinge.

## SCIENCE ABROAD

The Canadian Entomologist (London, Ontario; June, 1895). The subject of beetles inhabiting Canada, is treated in three articles, that dealing with *Notes on Collecting and Names New to the Canadian List*, by J. Alston Moffat, and another by Mr. John D. Evans on *Coleoptera of the Sudbury District*, are contributions to local faunæ. The tenth article is reached by Mr. H. F. Wickham on *The Coleoptera of Canada*, which is illustrated; it includes part of the Dytiscidæ.

American Philosophical Society's Proceedings (Nos. 143 and 145, 1894). The first of these parts contains an account of the "Proceedings" commemorative of the 150th anniversary of the foundation of this society. Among the papers printed in this volume are *Tertiary Tipulidæ*, by Professor S. H. Scudder; *The Transformations and Anatomy of Lagoa Crispata, a Bombycine Moth.* In No. 145, Mr. R. M. Bache writes on *The Secret of Brownian Movements*, describing some of his experiments on the movements of particles in aqueous suspension, and Professor E. D. Cope writes on *The Lungs of the Ophidia*, illustrated by several drawings.

La Nature (Paris, May 25th, June 1st, 8th, and 15th, 1894). In the issue for May 25th, is an article by H. Déheram on *Sarcopsylla penetrans*, commonly known as the jigger, an African flea, which makes itself very obnoxious to man. M. G. Pellissier writes on *The Origin of Kites and their Application to Military Arts.* The inventor of the first kite was probably the Chinese general Han-Sin, who flourished B.C. 206. The "Photautographe," an invention of M. Ferrer for taking automatic photographs is described, and in the same number M. Ch Brongniart brings to a close his series of articles on *Fossil Insects of Primary Times.* In the issue for June 1st, M. Fraissinet described the work of the Observatory of Paris. M. Oustalet writes on *Some New Birds of Paradise recently discovered in New Guinea.* Another article deals with the scientific balloon expedition, which will take place during the Paris Exhibition of 1900. In the issue for June 8th, a description is given of the Observatory of the Vatican. M. Bourdariat writes on *The Renewed Activity of Vesuvius.* In the issue for June 15th, M. Villon writes on *The Production of Artificial Alcohol.* Mr. Ord's article in this number of Science-Gossip (*ante* page 117) does not mention the discovery of synthetic alcohol a little while ago by M. Berthelot, the great French chemist. Now that Professor Lewis has shown us how to produce acetylene both quickly and cheaply (see Science-Gossip, N.S., vol. 1, page 278), it is expected that artificial alcohol may be produced with the aid of acetylene in our laboratories, and that this alcohol, which will be considerably purer than ordinary alcohol, may supersede the latter. An interesting article appears in this number on *The Flying Powers of Carrier Pigeons*, with particular reference to the possibility of their conveying information as to shipwrecks.

Naturæ Novitates. (Berlin: Friedländer and Sohn. January, February, and March.) This useful compilation is published once a fortnight, and includes titles and particulars of literature of all nations on Natural History and the Exact Sciences. The price is four shillings per annum including postage.

Reports of Observation and Experiments in the Division of Entomology. (Washington, 1894.) This is Bulletin No. 32 of the department, and contains several articles on Economic Entomology. One on *Insects Injurious to Forest Trees* is by Mr. A. S. Packard; this is encouraging as regards the ravages in certain regions in the State of Maine, of insects among the spruce forests. Other reports of interest are printed from various States.

Insect Life. (Washington: Government Printing Office. Vol. vii., parts 2, 3 and 4. (1894-5.) This is the well-known organ of the Division of Entomology of the U.S. Department of Agriculture. It is now edited, since the retirement of Professor Riley, by the Government Entomologist, Mr. L. O. Howard, with the assistance of the other members of the Divisional Force. "Insect Life" is almost entirely devoted to Economic Entomology and the bearing of insects upon mankind, whether from the point of view of usefulness or otherwise. Part 2 has 150 pages occupied entirely with a report on the Sixth Meeting of the Association of Economic Entomologists, held at Brooklyn, in August last, the attendance being twenty-five persons. There are reprints of some of the papers read on that occasion. One of the most interesting is by Mr. L. O. Howard, on *The Rise and Present Condition of Official Economic Entomology.* He describes the first meeting of this now important association, which was held in 1889, nominally at Toronto, but really "upon a wooded knoll at a landing called Scarborough Heights, overlooking the waters of Lake Erie. Professor Cook, who presided, occupied a dignified position astride a fallen log. Professor Smith, who acted as secretary, had climbed with difficulty to the top of a tall stump and took his minutes on his knee." The commencement of the acknowledgment for services of an entomologist to the State, in America at least, appears to have been so recent as 1842, Dr. Thaddeus William Harris being the recipient between that period and 1852 of the sum of $175, from the State of Massachusetts. Still it was the beginning of what is now a model institution at Washington, with independent branches in many of the States; a model which might well be followed in this or other European country. The new era in this work commenced, really with the appointment, in 1878, as Government Entomologist, of Professor C. V. Riley, who, with an interval caused by change of administration, until last year guided so successfully the investigations. During that period Professor Riley published twelve annual reports, thirty-one bulletins, two special reports, six volumes of "Insect Life," and a large number of circulars of information. Altogether Mr. Howard's paper is admirable and one from which a starting point may be made by those who desire to take up the important study of Economic Entomology. In No. 3 is an illustrated article on *The Maple Pseudococcus*, by Mr. Howard, which is practically its life-history. It, *Pseudococcus aceris*, occurs in England, and was noticed by Mr. J. W. Douglas, in May, 1889, in crevices on the stems of lime trees.

# BOTANY

Romance of Plant Life.—On June 7th, Dr. D. Morris, of Kew, delivered the first of two lectures at the Royal Botanic Society on this subject. Dr. Morris discussed some of the most striking features of the vegetation of the Canary Islands. Chief among these were the dragon trees, which were closely related to trees distributed over widely separated parts of Africa. Fossil remains were found at the present day of an old African flora in Africa, Canaries, etc., which had been gradually driven out and replaced by more tropical plants.

Development of Plants.—In an article recently contributed to a contemporary, Mr. Charles T. Druery remarks that there is far too great a tendency to stigmatise the abnormalities met with in the field of natural science as mere "monstrosities." He is convinced that in the long history of evolution the "sports" or "special creations" among plants and animals may have largely contributed to diversity of type as well as the slow moulding of changing environment. Mr. Druery mentions that at Dartmoor a simple "sport" of *Asplenium adiantum-nigrum* occurred, the spores of which yielded a large number of individuals of the same type which gradually dispossessed the normal and took its place, and this would prove the possibility of new forms becoming permanent by natural selection only. All readers of Science-Gossip should look out for "sports" or "monstrosities," and should send particulars to the editor, for it is only by mutual co-operation that we can hope to unravel the mysteries of nature.

The Epidermis and Cuticle.—In most of those plants that grow on dry and exposed situations, such as downs, heaths, sandy moors, etc., either the size or quantity of the stomata, or both, are greatly augmented, as in *Ophrys*, *Aceras*, *Arenaria verna* and *Orchis mascula*. Often upon the epidermis, especially of the latter, there is a continuous striate hyaline pellicle called the cuticle; or the walls of the epidermal cells may be thickened, which, in either case, obviously assists in protecting the subjacent tissues from the increased heat of the sun in those situations. The effect of this cuticle undoubtedly corresponds in these plants of temperate climates to the increased number of layers of the epidermal tissue in the plants of tropical and other hot countries, though in a diminished degree. On the other hand, those plants growing in damp and humid places have fewer and smaller stomata than those living in dry situations; as examples of the former, *Lamium galeobdolon* and *Melampyrum pratense* may be cited. However, *Epipactis latifolia*, *Hydrocotyle vulgaris*, and the *Equisetæ* appear to be exceptions. "The terms 'Epidermis' and 'Cuticle' would be far better if used in the reverse sense, that is cuticle for the epidermis, and epidermis for the thin pellicle mentioned above, as used by Dr. Carpenter in 'The Microscope'" (page 444, note).—*Henry E. Griset, Holloway, N.*

Fasciated Asparagus.—I take the liberty of sending you a photograph of some asparagus now being exhibited in the window of Mr. A. Cockerill, of this town, taken from his garden at Abington, near Northampton.—*Geo. Nichols, 36, The Drapery, Northampton; May 24th*, 1895.

[The photograph represents eight fasciated stems of asparagus. Fasciation is by no means uncommon in cultivated asparagus (*vide* last volume S.-G., page 159). It may be caused by the cutting-knife injuring the growing buds under the soil (*vide ante*, page 44).—Ed.]

Impatiens fulva on the Thames.—I can give another locality for the plant which your correspondent refers to on page 80. Specimens of *Impatiens fulva* may be found in blossom, during August and September, on the right bank of the Thames for about three quarters of a mile above Teddington Lock. The plants grow close to the water's edge and are not readily observed from the towing-path, as they are for the most part hidden by plants of much larger growth. Other interesting species, for instance, *Cichorium intybus*, *Spiræa ulmaria*, *Lysimachia vulgaris* and *Acorus calamus*, as well as many commoner species, may be found along the same reach.—*A. O. Rowden, 33, Richmond Road, Kingston-on-Thames; May 17th*, 1895.

Pellia epiphylla.—Quantities of this interesting member of the Hepaticæ grow in a ditch on the borders of Hampstead Heath and are now in full fruit. I have never previously seen them so prolific as they are this year. It is strange that the study of this order is not more taken up by microscopists than appears to be the case, as it has very many points of interest, and examination is not difficult. About two years ago, there was a spot quite close to the Heath where *Marchantia polymorpha* covered the ground with its fronds, and freely produced its peculiar receptacles, but the spot is now, alas, given up to bricks and asphalte. Notwithstanding the "preservation" of open spaces these *Feræ naturæ*, like their animal relations, always seem to retire before advancing civilization.—*J. Burton, 9, Agamemnon Road, West Hampstead; April 16th*, 1895.

Shrubs killed by Frost.—The cold of last winter seems to have been extremely fatal to gorse, *Ulex europæus*, in many places, as mentioned in your columns last month (*ante* page 108). In May, 1893, the East Hill, Hastings, was one mass of flowers. For quite a distance round, the blaze of gold was conspicuous and the air heavy with the scent. This year on a visit about the same time, instead of the wealth of golden blossom, I found the gorse nearly all dead and withered; here and there were a few straggling blossoms, and that was all. Fortunately in many cases, young shoots were just appearing at the base of the old woody stems. On the journey home, along the South-Eastern Railway embankments, the same thing was noticed. The gorse on the West Heath, Hampstead, too, has suffered greatly, much of it being killed; and on a common a few miles beyond, near Northwood, a similar state of things exist, although in these latter situations the plants were sheltered considerably. In all these instances it was noticeable that the broom *Sarothamnus* was scarcely if at all injured, and yet from its more succulent and less woody growth one would have expected it to be more tender than *Ulex*. I fear it will take several years for the gorse to recover its former size and beauty.—*Jas. Burton, June*, 1895.

FORCED GERMINATION OF SEEDS.—I have heard that by some application of an acid, the seeds of plants may be made to germinate quickly. Can any of your readers tell me anything about this, if it be a fact?—*Geo. Nowers, Blackpool Street, Burton-on-Trent.*

GREEN PETUNIA FLOWER.—Mr. Dorothy, the head gardener of our public gardens, has just picked from a petunia bed a remarkable flower which I send you. The centre is purple and the margin which is usually white, is green of exactly the same tint as the stem and leaves.—*E. Henwood Teague, Penzance; June 12th*, 1895.

[The chlorophyll of the leaves seems to have invaded the flower and produced a curious effect of colouration. On inquiry, this form seems to occur at times in this country, but is almost established as a race in some parts of Germany. The florists, however, who are, like the tailors and drapers, our masters in fashion, discourage the growth of these green flowers.—ED.]

DRY-ROT.—I beg to enclose a piece of fungus cut from a mass about a yard square and an inch thick, growing under my drawing-room floor. The room under which this was found was re-boarded twice during the past seven years, and it is now to be done again. The house forms one of a row of four, all of which suffer in a similar way. Can any of your readers help me, through your columns, to get rid of this pest?—*William Hodgson, The Sycamores, Poulton-le-Fylde; June 13th*, 1895.

ARTIFICIAL DEVELOPMENT OF FLOWERS.—Some interesting lectures have been delivered at the Royal Botanic Society during the month. On May 31st, the Rev. Professor George Henslow lectured on "A Century of Progress in Floriculture." He exhibited specimens of the original wild plants from which some of our most admired garden flowers have been developed, illustrating with numerous diagrams the various stages in the way of cultivation and hybridization through which they passed before reaching the perfection of to-day.

VARIETY OF BEECH FOLIAGE.—When staying at Wastdale Head, Cumberland, at Whitsuntide last, I noticed in the very beautiful woods of Wastdale Hall, close to the shore of the grand mountain lake of Wastwater, a peculiar variety of the beech tree, the leaves being divided into narrow segments, giving the tree a beautiful appearance of fine and thin foliage. What I wish to mention is that one branch, and apparently one only, had, for a small portion, gone back to the typical form of leaf, thus having the strange effect of two totally distinct shapes of leaf on the same branch. Nature's effort to revert back to original, or at least to well-established forms, was very marked.—*Horace Pearce, F.L.S., Stourbridge; June 18th*, 1895.

WILD HYACINTHS NEAR LONDON.—The wild hyacinth still grows in profusion in all that remains of old Fernham Wood, between here and Streatham. It may perhaps be worth noticing that some cut specimens which were placed in water in the middle of May developed, in some three weeks' time, seed capsules, somewhat similar in shape to the seed of the nasturtium. It was also noticeable that whereas the blossoms, as they faded, turned, as most blue flowers do, more or less white, those petals which surrounded the swelling ovaries still retained the blue colour, even after they had become withered and dry.—*Edward A. Martin, Thornton Heath; June*, 1895.

# MICROSCOPY

VORTICELLIDANS ON DAPHNIA PUBEX.—Sherren, in his recently-published book, "Ponds and Rock-Pools," refers to an impression being current that the above Entomostracon is never infested by parasites, owing to its secreting a slimy film which covers the body. Last April, from a pool on Wimbledon Common, I took a plentiful supply of *Daphnia*, almost all of which were infested with *Epistylis digitalis*. Although I have frequently found *Cyclops* covered with parasitic *Vorticellians*, this has been the only time I have taken *Daphnia* so infected.—*George G. Harris, 33, Lindore Road, Clapham Junction, S.W.; June 17th*, 1895.

CRYSTALLINE LENS OF COD FISH.—If Mr. Tomlinson boils a lens until it is quite hard and opaque on the surface, he will find (*ante* page 81) that he can, after removal of the exterior opaque layers, tear off fine fibres flat and riband-like. These fibres all end in the antero-posterior axis, and the lens viewed from before or behind has the appearance of a globe marked by lines of longitude. The margins of the fibres are united by minute interlocking serrations, which differ considerably in different fishes, and form beautiful objects for mounting. The serrations are larger and coarser in the conger eel than in most other fish.—*Norris F. Davey, Havering House, Abergavenny; May 17th*, 1895.

INCINERATED LEAF OF DEUTZIA.—The "Microscopical Bulletin" states that at the annual exhibition of the Department of Microscopy of the Brooklyn Institute, Mr. Geo. M. Hopkins, of the "Scientific American," exhibited a beautiful preparation of Deutzia leaf, which seems to have the merit of novelty. The leaf was reduced to white ashes, leaving the star-like hairs *in situ*. Some of the hairs were blackened by the carbon of the leaf, others were white, with pearl-coloured nodules ranged along the rays of the star, like so many real pearls. Mr. Hopkins' method of preparing this object is as follows: a small piece of the dried leaf is placed upon a thin, flat copper plate, and another flat copper plate is laid upon it to keep it straight. Strong pressure is not required. The plates are now heated slowly over a flame until they become red hot; they are then allowed to cool, and the upper plate is removed. The piece of leaf is found to be carbonized and considerably shrunken. Without replacing the upper copper plate the lower plate with the carbonized leaf is again brought to a red heat, and lastly the flame is brought into actual contact with the leaf, thus removing the last trace of carbon, leaving nothing but the stars and the white ash. The object is very tender, but it may be handled with proper care and may be mounted dry. If it is desired to secure the stars separate from the ash, one or two incinerated leaves may be placed in a small metallic box and shaken up until the leaf is disintegrated, when the stars may be picked out.

# NOTES & QUERIES

HELIX NEMORALIS AS ORNAMENT.—Near the close of the fifties, or the commencement of the sixties, necklaces composed of shells of *H. nemoralis*, similar to those described by Mr. Welch (*ante* page 109), were sold in large numbers at Southport, in Lancashire.—*J. Potter Briscoe, Public Library, Nottingham.*

HELIX NEMORALIS AS ORNAMENT.—Referring to Mr. Welch's note (*ante* page 109), it was the custom a few years ago for the children on the island of Iona, West Highlands, to sell strings of these and other shells to tourists for a few pence. I am not sure if this is still done, as I have not visited the island for eight or nine years.—*J. MacNaught Campbell, F.Z.S., Kelvingrove Museum, Glasgow; 11th June*, 1895.

CLOUDED YELLOW BUTTERFLIES.—There are several indications that the coming autumn may make 1895 another "clouded yellow year," and those anxious to take this beautiful butterfly should be on the watch for them in the neighbourhood of clover and lucerne fields. Several pioneer females of *Colias edusa* have been taken in the south of England this spring, and the dry hot weather has been favourable to their progeny. There seems to be little doubt that all the fresh specimens of this butterfly in Britain are the descendants of the year, from foreign immigrant females. The butterflies from the first home-bred brood of the year should be expected late in July.—*John T. Carrington.*

CADDIS-WORMS.—In reply to Mr. Binns' enquiry (*ante* page 109), the rearing of caddis-worms in aquaria is difficult, for some species impossible, running water, sometimes of high velocity, being essential. The larvæ should be quite isolated from fish, and also from dragon-fly and beetle larvæ. Give abundance of lower aquatic life as food-supply, a pebbly bed to aquaria, and *Anacharis* and other water-plants. Separate the species. Much good work remains to be done in describing and figuring. I presume Mr. Binns' query about literature is intended to refer to British Neuroptera only. For these the best, and, in fact, the only, papers are Dr. H. A. Hagen's, in the long-discontinued "Entomologist's Annual" (Gurney and Jackson, Paternoster Row, price 2*s*. 6*d*. each year), on Dragonflies, 1857; Planipennia, 1858; Trichoptera, 1859 to 1861; Psocina, 1861; Ephemeridæ, 1863. A "Revision of British Libellulidæ" occurs in the "Annals and Magazine of Natural History," vol. xviii. (1846), and another of Psocina, in the "Entomologist's Monthly Magazine," vol. iii., and yet another on Ephemeridæ in the last-named periodical for June and July, 1888. My own papers on Perlidæ (SCIENCE-GOSSIP, O.S., February and March, 1892), are the only recent ones in English. There is also a series of papers by me in the same periodical, from June to October, 1894, inclusive, on the "British Dragon-fly Larvæ." The Entomological Society's "Catalogue of British Neuroptera" (1*s*.), though rather out of date, will furnish most useful information, too voluminous to be given here.—*W. H. Nunney, Bloomsbury; June 6th*, 1895.

NEWSPAPER NATURAL HISTORY.—The following example of science as she is sometimes written is too charming to be lost in the ephemeral columns of an evening paper. It appeared in the form of a letter headed "Butterflies," in the "Pall Mall Gazette" on May 27th last, and was signed by "A Moderate Collector" (very moderate!). The italics are ours. "In your issue of to-night [May 23rd], is a letter assuring lovers of butterflies that the *large tortoiseshell* and large copper is not extinct, but *unwisely naming* a locality where one of the two species is abundant. That these rarities are still to be found everyone rejoices, but their existence is doomed if facilities are given to the omnivorous collector to exterminate them with insatiable hand. At one of the principal post-offices one of the employés showed me about a dozen large tortoiseshells the other day that he had bred from the chrysalis, and was not ashamed to tell me that *he had dug up about eight hundred larvæ* of the same rare insect in the New Forest *last autumn*. Surely butterflies of rare occurrence should be protected as much as birds, and *two or three specimens should be the limit allowed to any collector at the same time*. It has always been a matter of regret to me that the writers of the best books on butterflies and moths should have boasted in their books of enormous captures of particular species in some locality or other; *no one requires more than two or three specimens*, and the example to young collectors is surely of the very worst type." It is needless to point out to our entomological readers the absurdity of this, but others may be reminded that even a post-office official cannot "dig up" the larvæ of *Vanessa polychlorus*. The other butterfly, *Polyommatus dispar* has not been caught anywhere since 1848, but the large tortoiseshell butterfly is commonly found in many parts of England, and "eight hundred larvæ" would make no impression on its numbers in some localities in Eastern Essex. Series of two or three specimens of butterflies would be useless to the scientific entomologist studying the distribution of variation. J. T. C.

GEOLOGY AT THE NEW THAMES TUNNEL.—The tunnel now being made by the London County Council will pass under the Thames from Blackwall to Blackwall Point, on the Greenwich marshes. The material excavated up to the present on the north side has been chiefly river gravel; on the south side the work has passed through a thick bed of peat, full of roots, with a small quantity of black gravel, and then enters the London clay. All the rest of the tunnel is expected to pass through the last-named formation. The new road forming the southern approach has been made chiefly of the "spoil" excavated, but last autumn I noticed lying about, several fossiliferous blocks from the Oldhaven beds. These can scarcely have come out of the tunnel itself, as the Oldhaven beds must be many feet below the lowest point reached. The most probable explanation of their presence seems to be that they have been dredged from the bed of the river lower down, with sand and shingle, of which large quantities are brought up for concrete, etc. From these blocks the following fossils were obtained:—*Protocardium semigranulatum*, Sow.; *Protocardium* (*sp.*); *Axinæa terebratularis*, Link.; *Axinæa* (larger *sp.*); *Panopæa intermedia*, Sow.; *Meretrix orbicularis*, Edw.; *Trophon* (*sp.*); *Pirula nexilis* (?); *Stenothyra parkinsoni*, Mor.; *Aporrhais sowerbyi*, Mant.; *Ampullina subdepressa*, Mor.; also a few sharks' teeth and one or two shells not yet determined. Mr. G. F. Harris, F.G.S., of the British

Museum, who kindly identified the above for me, says that *Pirula nexilis* has not been previously recorded as British. Can any correspondent throw any light upon the origin of these Oldhaven blocks?—*J. E. Cooper*, 93, *Southwood Lane, Highgate, N.; May*, 1895.

GROWTH OF RATS' TEETH.—In Buckland's "Curiosities of Natural History" there is a description of a rat's tooth which had grown into a perfect circle, and, no doubt, caused the animal's death. Similar deformities are occasionally met with. I send you a photograph of each side of the skull of a rat, showing that the right upper incisor has grown into a spiral of one turn and a half, whilst the left has grown into part of a circle and has perforated the roof of the mouth, being broken about its centre, probably by the efforts of the rat to masticate. The nasal bones are twisted to the right, showing that the teeth had been growing in this position for a considerable length of time.

RIGHT UPPER INCISOR OF RAT.

The left lower incisor has grown to three or four times its normal length, evidently in consequence of the upper tooth having curved out of its way, so that they do not antagonise. The rat was a tame white one, and the deformity was no doubt due to the absence of hard substances in the food by which the natural rapid growth of the teeth would be worn away as fast as it was produced, the growth of the teeth in the rodents being very rapid. In this instance the animal was starved to death from mere inability to masticate, although it was

LEFT LOWER INCISOR OF RAT.

well taken care of. Even in the human subject those teeth which have lost their antagonists gradually rise above the level of the neighbouring teeth, partly because they are not worn away by attrition. In man the rate of growth is so slow that no serious results ensue, whilst in those animals whose teeth grow rapidly the breaking of a tooth may cause death by permitting the opposing tooth to grow until mastication is no longer possible.—*D. Bradley, L.R.C.P., S.E., The Wren's Nest, Weston-super-Mare; June 1st*, 1895.


ROYAL METEOROLOGICAL SOCIETY.—The last meeting of this Society for the present session was held on June 19th, at the Surveyors' Institution, Westminster, Mr. R. Inwards, F.R.A.S., President, in the chair. Mr. R. H. Curtis, F.R.Met.Soc., read a paper on the "Hourly Variation of Sunshine at Seven Stations in the British Isles," which was based upon the records for the ten years, 1881-90. Falmouth is decidedly the most sunny station of the seven, having a daily average amount of sunshine of $4\frac{1}{2}$ hours. This amount is half an hour more than that recorded at Valencia, and three quarters of an hour more than at Kew. Of the other four stations, Aberdeen, the most northern, but at the same time a coast station, with 3·64 hours, has more than either Stonyhurst or Armagh, both inland stations, whilst Glasgow, with only 3 hours, or about a quarter of its possible amount, has the smallest record of the seven, a result to some extent due to the nearness of the observatory to the large manufacturing works with which the city of Glasgow abounds. At Valencia, Kew, Stonyhurst and Armagh, the maximum duration is reached in May, the daily mean amount varying in the order named from $6\frac{3}{4}$ to 6 hours. At Falmouth and at the Scotch stations the increase goes on to June, when the mean duration at Falmouth reaches $7\frac{1}{2}$ hours; at Aberdeen, $6\frac{1}{4}$ hours; and at Glasgow 5·6 hours. January and December are the most sunless months of the year. The most prominent feature brought out at all the stations is the rapid increase in the mean hourly amount of sunshine recorded during the first few hours following sunrise, and the even more rapid falling off again just before sunset. Mr. H. Harries, F.R.Met.Soc., read a paper on "The Frequency, Size and Distribution of Hail at Sea." The author has examined a large number of ships' logs in the Meteorological Office, and finds that hail has been observed in all latitudes as far as ships go north and south of the equator, and that seamen meet with it over wide belts on the polar side of the 35th parallel.

NORFOLK AND NORWICH NATURALISTS' SOCIETY.—A meeting was held at the Castle Museum, on May 27th, the President (Mr. H. D. Geldart) in the chair. Mr. G. H. Harris read his "Notes on the Flora of the Yarmouth District." The principal object of the paper was an attempt to estimate the gains and losses to the flora of Yarmouth and district since Sir James Paget's time—an interval of about fifty years. Of the gains, *Claytonia perfoliata*, an introduction from America; *Ranunculus auricomus* (goldilocks), on the confines of the district; *Adoxa moschatellina* (the moschatel), a woodland plant; an orchid, *Spiranthes autumnalis* (ladies' tresses), were the chief. A willow herb, *Epilobium roseum*, the seeds of which were contained in sand brought from the Thames; one of the snowdrop tribe, *Leucojum aestivum*; and thrift, *Armeria maritima*, all of which had recently occurred, were probably only casuals or escapes. Amongst those plants whose increase was most perceptible were an umbellifer, *Smyrnium olusatrum*, common Alexanders; a composite, *Helminthia echioides*, and the woodland plants, *Anemone nemorosa* (wood anemone), *Sanicula europea* (wood sanicle), and *Oxalis acetosella* (wood sorrel). The losses included the fine yellow poppy (*Glaucium luteum*), the poisonous but interesting henbane *Hyoscyamus niger*, whilst there was a very obvious decrease in the numbers of plants frequenting salt marshes, and of certain uncommon clovers found on the South-denes. These vicissitudes were brought about from (1) the very probable increase in the timber of the district, owing to the planting of copses, which encouraged the growth of woodland plants; (2) improved engineering and scientific agriculture, which drained the marshes, prevented tidal overflows, and made new soils; (3) the isolation of the South-denes, and the artificial changes in its herbage induced by importation of strange soils and seeds. Attention was also drawn to the peculiar divergence gradually being brought between the flora growing respectively on the North- and South-denes. Plants originally common to both had, in some instances, disappeared entirely from the latter. A plea was put in that the *Viola canina* (dog violet), growing on the Denes, should be raised to the dignity of a variety. The restricted area of the clary (*Salvia verbenaca*), which was confined almost entirely to the churchyards of Gorleston and Great Yarmouth, was suggested to be due to its being an importation for medicinal purposes by the monks. For this a parallel might be found in the case of *Aristolochia*, or birthwort. The Hon. Secretary (Mr. W. A. Nicholson) read a short note on "The High Tide on the East Coast on May 16th," which, by an inrush of salt water into the rivers, had caused the destruction of hundreds of fish in the Bure, Thurne, Yare, and Waveney, especially pike, bream, bream-flats, and tench. Great numbers of fresh-water mussels also were killed. Mr. Patterson read some "Notes from Yarmouth, for February, March, April and May." He mentioned that a fine specimen of the thornback crab was given to him on April 9th, the first, he believes, recorded for the county. Two twait shads were taken in a draw-net on that date, measuring eleven inches and nine inches in length. On April 13th, a smack, trawling in the vicinity of the sunken steamer Elbe, took as many fish in three hauls as the crew sometimes secured in ten days, which Mr. Patterson described as a gruesome fact.

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s.* 6*d.* for twelve months (including postage), are now due.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

G. Woomald (Acton).—Common lousewort.

R. Tollunst (Beckenham).—It is "the wasp-beetle"; *Clytus arietis*, one of the longicornes.

Mrs. Hett (Shoreham, Kent).—The plant appears to be common sorrel *(Rumex acetosella)*. The flies are the dipterous *Melanostoma scalare*, which have, perhaps, succumbed to an epidemic of the parasitic fungus *Empusa muscæ*. You will find a similar group of flies of the same species found dead on grass, figured in the last volume of Science-Gossip (Vol. 1, N.S., p. 33).

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Gleocapsa.—Will any reader kindly send living specimens of this? Pellia, Prasiola, or similar exchange returned.—J. Burton, 9, Agamemnon Road, West Hampstead, N.W.

Wanted, two or three specimens of Testacella mangei and T. scutulum (living); shall be glad to give duplicate land and freshwater shells in return.—Lionel E. Adams, 77, St Giles' Street, Northampton.

Wanted, living specimens of Testacella haliotidea in exchange for eggs of Fulman petrel and others.—J. Macnaught Campbell, F.Z.S., Kelvingrove Museum, Glasgow.

Wanted, any back numbers of "Natural Science"; scientific books offered in exchange or cash.—T. C. Maggs, 56, Clarendon Villas, West Brighton.

Wanted, British Lepidoptera, Coleoptera and other orders in exchange for duplicates and a few good store boxes.—Send lists to the Curator, Chadwick Museum, Bolton.

Wanted, to exchange with collectors of minerals.—G. Penrose, 17, John Street, Truro, Cornwall.

Offered, good microscopic slides and scientific books. Wanted, good microscopic slides; also "Lieberkühn" for low-power microscopic objective and Zeiss aprochromatic lower-power objective.—W. Pratt, Cavendish Hill, Sherwood, Nottingham.

Polished geological specimens, thin sections of ditto (for micro mounting), minerals, fossils, British and foreign shells, curiosities, etc. What offers?—A. J. R. Sclater, 43, Northumberland Place, Teignmouth.

Wanted, a correspondent in the neighbourhood of Sandhurst (Berks) who would be willing to send pond-water once or twice a month from some particularly good collecting ground there in exchange for slides of Rotifera or other pond organisms.—C. Rousselet, 27, Great Castle Street, London, W.

Offered, first vol. Science-Gossip (New Series); also first two vols. "Nature Notes" (last two Nos. of second vol. missing). Wanted, natural history books.—P. A. Wood, Keen's Road, Croydon.

"Journal of Royal Microscopical Society" for 1891, 1892, 1893; also zoological, botanical and other science text-books, Hounsell's "Flags of all Nations" (coloured plates). Offers.—H. W. Parritt, 8, Whitehall Park, N.

Foraminifera material—dredgings or fossil—and slides, material or literature on the subject, desired in exchange for large variety of named mounts of single species or type-slides, with from 10 to 50 specimens, with catalogue.—F. S. Morton, 158, Cumberland Street, Portland, Maine, U.S.A.

Animal Hairs.—A good series of about 40 offered in exchange for 6 micro. slides. Two-third-inch objective wanted; exchange surgical instruments.—A. H. Williams, 8, Mount Street, Hythe.

Offered, Science-Gossip, 1868 to 1874, bound, 1875 to 1880, unbound, Nos. 295 to 344; "Naturalist's Note Book," 1867-8-9, bound; "Bee-Keeper's Journal," Vols. 1 and 2.—G. E. Seville, Glodwick Road, Oldham.

Wanted, eggs of cuckoo with those of foster parents; good exchange in other eggs.—W. Wells Bladen, Stone, Staffordshire.

Offered, "World's Inhabitants," or "Mankind, Animals and Plants," by Bettany, in 15 parts, clean, for natural history specimens, books, etc.—C. Wood, 245, Norwood Road, London, S.W.

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

SOME years ago, when giving attention to the subject of leaf-arrangement in trees and plants, I was led to consider that since all branches originate from leaf-buds, and that these leaf-buds are, in the ordinary course of things, formed only in the axils of leaves, it would follow that whatever be the order of arrangement of leaves on the stem of any given tree or shrub, such may be expected to be the arrangement of the branches of that tree or shrub. In practice, however, I found that the order of leaf-arrangement can rarely be traced in the position of the leading branches of trees, and I was accordingly led to enquire why it should be thus.

The answer to the question was soon found in the fact that some only, not all, of the buds on the primary stem of a young tree give rise to branches, whilst others remain dormant, and that thus the original order is lost. But I was led at the same time to perceive that not one only, but a variety of causes combine to produce the peculiar mode of branching and the general features which characterize our different forest-trees. I therefore set myself to trace these out as well as I could.

In this pursuit I could find little help from books, and I have had to reiy almost entirely on my own observations continued through a series of years, and, although often interrupted, never wholly laid aside. As a result, my endeavour in the present paper is to trace out the life-history of the different trees, so far as their branching is concerned, and to show how the peculiarities of their mode of branching result in the general form and outline which distinguishes one from another and enables us to recognise them even in winter. Also how dependent upon the mode of branching is the massing of foliage, and the consequent arrangement of light and shadow which the artist recognises and seeks to depict. Although the study of the distinctive forms of tree-branching is, in the first place, a matter of botanical interest, I think it may be well worth the while of the painter of woodland scenery to give some attention to it. It should help towards a correct and intelligent recognition of the physiognomical differences in trees, and should lead to the avoiding of any such mistakes as were sometimes made by the older landscape painters, and which have been so unsparingly exposed by Mr. Ruskin.

First, I think it will be best to enumerate the different causes so far as I have been able to discover them, with just enough of illustration to make clear my meaning; and, secondly, to show how these causes come into play in the case of different trees.

1. Arrangement of Leaves.—First and foremost must certainly come the arrangement of leaves on the stem, for, as all botanists are aware, this is by no means after an irregular and haphazard fashion, but is regulated by definite laws. These laws are not indeed observed with mathematical precision, for we must not expect to find this in natural history, but laws which nevertheless are found to prevail in the greater number of instances. Leaves, then, in our common deciduous trees are placed either oppositely or alternately on the stem. Opposite leaves occur in the case of the ash, the sycamore and the maple, and there is little variety in the arrangement. Each pair of leaves, when regularly grown, stands at right angles to the pairs next above and below it, and buds, towards the close of the season, are formed in the axils of these leaves. These buds give rise in the following season to branches or branchlets standing opposite to each other and at right angles to those above and below them as the leaves had done. This, however, is liable to be interfered with by some of the buds remaining dormant.

In the case of alternate-leaved trees there is much more difference of arrangement. The simplest case is when the third leaf stands directly over the first, two ranks of leaves and consequently of branches being thus formed. We find this arrangement in the lime, the elm and the beech. In all cases where the leaves are solitary, and not in pairs or whorls, it is found that a line drawn round the stem so as to pass from leaf to leaf will describe a spiral. The number of leaves which intervene between that from which we start and that which begins a new circuit, by standing directly over the first, is found to vary in different species, although tolerably constant in the same species. Thus, whilst as above stated, the line connecting the bases of the leaves in the lime, beech and wych-elm passes only once round the stem before the third leaf is reached and the circuit completed, in the oak and the apple the line passes twice round the stem before the leaf which stands immediately over the first is reached, the number of intervening leaves being in these cases five, a fresh cycle beginning with the sixth leaf. It would be out of place to attempt to enter further on this matter; full details may be found in any good introductory work on Botany, such as Henfrey's "Elementary Course" or Balfour's "Class-book of Botany," by those who wish to pursue the subject.

2. Position of Flowers.—After the arrangement of leaves on the stem nothing is of so much importance to the character of the tree as the position of the flowers. A leafy shoot can go on lengthening indefinitely, but all lengthening is at an end at the point where a flower is formed. All further growth from that point must take place in a new direction, and hence the importance to our subject of the position of the flowers. The flower, or group of flowers, constituting the inflorescence, may be either terminal or lateral: terminal, as in the sycamore and maple, which leads to a bushy growth; lateral, as in the elm and ash, in which case the branches lengthen year after year from the terminal bud. Then the inflorescence may spring immediately from the ripened wood of last year, as in the elm and ash, and in many willows; or else it may spring from the green and growing shoot of the present season, as in the lime. In all cases, however, there is no further leafy growth where the bud has given rise to flowers. In the lime-tree, however, and in the case of the fertile flowers of the oak, there is generally formed a fresh leaf-bud by the side of the peduncle, which leaf-bud will give rise to a branchlet in the following season. Thus there will be no interference with the order of the branching as originally determined by the position of the leaves.

3. Angle of Growth.—The angle which each branch makes with the stem or branch from which it springs will be found to vary with the species. There is, speaking generally, for each kind of tree a certain normal angle at which the branches are given off, producing an effect on the general appearance and character of the tree which we can recognise perhaps even better in winter than in summer. This normal angle is best seen in the younger branches and spray wood. Not only do the larger limbs become bent downwards by the weight of branches and foliage, but in various cases it would seem that the earlier and leading branches of the tree have a greater tendency to ascend and approach the main stem, thus making a smaller angle with it above the point of junction, than do the smaller branchlets with the branches from which they spring. In the case of the ash, the branches show a tendency to come off at an angle of about 40° with the stem above their point of departure; the younger branches approximate more closely than this. In the wych-elm the ultimate branchlets make, generally speaking, an angle larger than a right-angle with their parent branch. The main branches seem, in the first instance, to come off at a smaller angle, but they very frequently, at the distance of a foot or two from the stem, become bent downward and drooping.

Extreme examples of these differences in angle are seen in the Lombardy poplar on the one hand, with its upright branches, and the weeping ash, or weeping elm, of nursery gardens and shrubberies, on the other hand.

Besides the angle at which a branch approaches or diverges from the main stem, it is sometimes the case that the branches are set on obliquely, not following the direction of a straight line from the centre of the parent stem or branch through their point of origin, but rather the direction of a tangent to some point in the circumference of the stem. This is seen in the crack willow (*Salix fragilis*, L.), as was pointed out by Smith in "The English Flora."

I may also draw attention to the peculiar directions assumed by the lesser branches in different trees, or even in different individuals of the same kind of tree. These branchlets often choose to assume a direction of their own instead of that taken by the branches from which they spring. In vigorous-growing forms of the wych-elm (*Ulmus montana*) for instance, the lateral branchlets generally preserve a horizontal growth; in the more slender-growing forms of the same tree they are often pendulous, whilst in the small-leafed elm (*Ulmus campestris*) they show a strong tendency to turn upwards towards the sky, and this, as will hereafter be shown, has an important bearing on the general outline and aspect of the tree. No cause has, so far as I know, been assigned for these differences, nor for the even more strongly marked tendency to bend downwards which we see in the weeping ash and weeping elm.

4. Length of Internode.—The comparative length of the internode, or space between leaf and leaf, affects also the aspect of a tree, causing, as it does, the leaves, and consequently the branches, to be more crowded in one case and more widely separated in another. Thus the length of the internode or joint in the ash is, in the vigorous, quickly-grown branches, which are only bearing leaves, as much as three inches; in the branchlets, which produce flowers, it is much shorter.

In the beech, the distance from leaf to leaf varies from one inch to two and a quarter inches, In the wych-elm I have found it vary from five-eighths of an inch to one and three-quarter inches; in the small-leafed elm, I believe it is commonly less than this. In the sycamore it varies from three-quarters of an inch in the weaker shoots to two and three-quarter inches in the more luxuriant ones. In the maple I have found it from half an inch or less to one and a half inches.

5. Comparative Thickness or Diameter of Yearly Shoots.—There is much variation in this respect. In the beech, for example, the young shoots of the year are often only one-sixteenth and rarely more than one-eighth of an inch in diameter. In the ash they are very commonly from one-quarter to three-eighths of an inch. The result is the stiff

ascending growth of the ash and the more pendulous habit of the beech. In the wych-elm one-eighth of an inch is a common thickness of the year's shoot. In the small-leaved elm (*Ulmus campestris*) it is commonly less than this.

6. Relative Force of Development in Buds. This, especially in terminal compared with the axillary buds, has also much to do with determining the general form of the tree. It varies in different individuals of the same species, as, for example, in the younger and more free-growing states of the wych-elm, compared with the aged or less vigorous growing examples of the same tree. In the former case the last bud on the shoot, although not strictly terminal, takes the lead of the others and prolongs the branch in the original direction. In the latter case one or more of the lateral buds takes the lead, and changes the direction of growth. The same thing occurs in the oak. In the sessile-fruited oak the terminal bud is more frequently than in the peduncled oak the strongest, or has most force of development. Thus we see the branches more commonly prolonged in one line than in the other case. In the beech the terminal bud almost always takes the lead.

7. Formation of Spurs.—These give rise, season after season, to flowers and fruit from their terminal bud, and thus scarcely lengthen at all. We see this in the beech; and as some individual trees are much more given than others to the formation of spurs, there is a corresponding difference in the amount of leafy growth.

8. Suppression of Buds and Death of older Branchlets.—It often happens, as already mentioned, that the buds on the earlier part of the last year's shoot, continue dormant and eventually die; the buds nearer the point of the shoot absorbing the nutriment and continuing the growth. Thus those earlier parts of the yearly shoots eventually become bare and naked parts of the branch. Moreover, many of the smaller branches which once were active and vigorous eventually perish, by the younger growth gradually depriving them of nourishment. We see this in the sycamore, the limbs being naked for some distance from their origin, but bearing towards their extremity a mass of bushy growth.

Such are the chief causes which, so far as I have observed, contribute to give to each tree its characteristic mode of branching. It is very probable that there may be other causes which have escaped me, and I am well assured that on the whole question there is much more to be known than I have yet been able to recognise.

*Alstonfield Vicarage, Ashbourne; June 26th, 1895.*

## THE VALUE OF A HOBBY.

By John T. Carrington.

Under the above title our contemporary "The Spectator," of June 30th, publishes an article, written in its lighter vein. It is founded upon the gift by Mr. G. F. Watts, the Royal Academician, of £1,000 to the Home Industries and Arts Association, a society for cultivating hobbies among busy people, as a relaxation in their leisure hours.

It is now generally conceded that there is much hygienic value in a perfect change of thought and occupation for the mind, at intervals, from our daily routine of necessary work. Even in our own times we can remember the school of mercenary persons who discouraged any deviation from the strict line of business. People who spoke contemptuously of young men, who, after office hours, laboriously worked for a knowledge of higher things than the columns of figures with which they had been engaged all day. "He is no good, he spends his time in fly-catching and gathering herbs," was often, and we may say is still to be heard, about some rising botanist or entomologist. Public thought has, however, of late years changed greatly in favour of the scientific hobby. Men have found that from those who devoted their leisure to scientific investigation, have arisen celebrated chemists, electricians, geographical explorers and others, who have made discoveries of immense value to the human race. When actual monied results became visible from the labours of these people, then the purely money-loving business man began to look with favour upon their hobbies.

The writer in the "Spectator" places natural history third in the list of recommended hobbies, giving preference to music and sketching. We very naturally consider that writer all wrong in his judgment, and will endeavour to show reasons why natural science should take first place.

Especially for the young of both sexes, is the study of any of the natural sciences of the utmost value. Leaving aside the application of the old motto about Satan finding mischief still for idle hands to do, a physically and mentally healthy occupation during the growing period of youth, lays a sound foundation for a strong lifetime to follow. It is a matter for serious doubt whether the present system of educational cramming with superficial knowledge for passing examinations, is good for the future man or woman. Mentally, both boys and girls are kept at high pressure with scant physical exercise, generally in the form of games with evanescent interest. The knowledge which is lasting is that which is slowly absorbed, and taken in with personal interest in the subject for its own sake. If we take any branch of natural history where there is a tendency in the student for a taste in that direction, the object will take the young person into fresh air, among rural surroundings, with ample bodily exercise. The entomologist, botanist, microscopist or geologist, sees interest in every surrounding. Dulness disappears from life, there is never any need to find a subject for thought, especially if the subject is pursued intelligently and scientifically, rather than by a mere collector. It may be that the interest at first is diffuse and wanting in direction, but as the student begins to realize the impossibility of knowing everything about every subject, he will settle down with some one or two branches of study, and maybe become a specialist of wide renown. The great men of science, almost without exception, commenced with small beginnings, but by systematic work, and the systematising of the work of others, soon rose to positions of authority. There will always be vacancies in the ranks of the leaders, and for those who will work steadily and intelligently the rewards are within easy reach.

The range of subjects in the allied natural sciences are inexhaustible. So long as man remains on this earth will there be something to learn about nature. Allowing the impossible, that mankind collectively can know everything, there will always be more to learn; for the earth and its animal and vegetable inhabitants are continually changing their physical conditions. If we review what is not known at the present time many persons would be astounded at the length of the list. Even the commonest things around us are still enigmas: What is life? What is light? What is heat? What is cold? What is electricity? And so on, we might fill one of these pages with similar unanswered questions. The scope for those who take up science as a hobby is practically limitless.

The "Spectator," as we have said, places music and sketching prior to natural history. In discussing the relative values of these subjects for hobbies we must not overlook the natural aptitude of the individual. We know some people, though very good amateur naturalists, who would be sorely taxed if called upon to warble even the tune from hearing which an old cow is said to have died, and would find equal difficulty in depicting in a drawing the cow herself. This applies on the other side, as regards natural history among many successful musicians and artists. What we claim is, that in guiding young people in want of a hobby—which all are the better for possessing—the study of the life and physical conditions around us forms the best, the healthiest, most easily attained, and most satisfactory as a rule, in later years. It is devoid of the drudgery of music and sketching, and there is less chance of drifting into a mediocre performer. The advance in knowledge in natural history is more rapid, while the collections accumulated during its study are a never-failing source of interest and pleasure. Take for instance the case of the lately deceased owner of a collection of moths and butterflies, which was recently sold by auction, realizing no less than some £500. This was the result of the leisure-time hobby of a man who had to daily earn his living, with no holidays more than fell to the lot of the ordinary London workman. His collection was but the sordid side of his hobby. The amount of genuine healthy recreation, instruction, and honour gained among his fellow-workers in natural history was the true reward.

To return to Mr. Watts' generous gift of a thousand pounds. We have not the pleasure of knowing anything about the society to which he has given it, but the title strongly commends itself to us. If their rules and funds will permit, we would recommend its Executive to consider the claims of many working naturalists in our towns and country places. Mr. Smiles discovered Tom Edward, of Banff, and wrote a very charming book about him. He delineated only a well-known type, one which exists all over the United Kingdom. In London and other great cities it abounds. It represents one of the most respectable sections of society, generally self-educated, modest, earnest and intelligent. Such men can be helped by the Association very materially. Loans to obtain scientific instruments, an entomological cabinet, books, and in many other ways. These loans might be repaid in instalments, and it would be found a rare exception for the Association to lose by its generosity. Again, such men might be assisted with small grants toward an annual holiday, which would be spent in investigating their special subject in a state of nature, or collecting objects for winter's study. Some would greatly value a week or two at one of the increasing number of biological laboratories, where they would learn to investigate in a scientific and methodical manner. Unfortunately the tendency among the wealthy is to aid the shiftless and neglect those who practice self-denial and self-help. If our suggestions were adopted, we feel sure that many who are interested in science from the point of view of its study elevating the student, would gladly aid such a society, but who either do not know of its existence, or have not had any interest aroused in its work.

# AN OAK SEEDLING.

## The Structure and Development of an Oak Seedling.

By Sophia Armitt.

THE autumn of 1893 brought an unusual number of acorns in the woods round Harrogate, as elsewhere in England; the ground under the trees was covered and concealed by them. In the lake country, further north, they were not quite so numerous, but still much more abundant than I had known them before. I had been reading, about that time, some pleasant little books of Mrs. Brightwen's, "Wild Nature won by Kindness," and "More about Wild Nature," wherein she tells that she had acorns and beech-mast collected for the winter feeding of the many wild birds she enticed to her garden and windows, by supplying them with suitable food. There was little or no beech-mast that year, even for the squirrels that haunted the beech-trees and raced round the house from the trees on one side to those on the other, sometimes taking a peep in at the windows as they passed. I gathered together a pile of acorns and stored them for similar use. I don't know how Mrs. Brightwen managed, but no birds ever came to my acorns, the rooks even did not take them; yet we have successfully fed many small birds through many winters: robins, chaffinches, hedge-sparrows, blackbirds, blue-titmice, great-tits, cole-tits, and even once a marsh titmouse. There have always been certain birds in sight of the windows that have never been tempted by human offerings, the tiny wrens that search the outside crevices of the window-frames for spiders, and sleep in the verandah nooks, will not notice bread, or fat, or grain. Thrushes, too, will turn over leaves under laurels within sight of the window in search of food, without approaching further. This has always puzzled me, as in towns thrushes are comparatively tame, and will often feed upon scattered crumbs with other birds. There are the long-tailed tits and the bulfinches and others, but I am running on too long about the birds, I must apologise and return to the acorns which the birds would not accept. As I picked up the acorns I noticed that some had already split their shells and that a tiny radicle was emerging. When I turned over the pile later on to throw some to the birds, I found that many of the lower ones had sprouted and sent out radicles an inch, two inches, and some even six inches long. This was rather surprising, as I had thought that these large fruits lay dormant all winter, while necessary changes took place in their stored-up food-stuffs, but here were many acorns with long protruded radicles, some two months after my picking them up from under their parent tree. I thought this a good occasion to watch the unfolding embryo life of a great tree, and placed some of the finest of the germinated acorns in the little acorn glasses that are like miniature hyacinth glasses, with the young root in water, and placed them in a sunny window. So situated, I watched their development with interest for nearly a year. The books certainly say that in a state of nature the acorns lie on the ground among the fallen leaves during winter without any apparent change. That they may even lie so for nearly a year, that they require a period of rest before the oxygen of the air and the moisture of the soil are effective in making them germinate, that some molecular or chemical changes must take place in the living cells before further activity, is possible. It has been supposed that until certain ferments have been prepared in the cells, the protoplasm is unable to make use of the stored-up food materials, and therefore to initiate the changes necessary for growth. Then, it is usually said, as the temperature rises in the spring, the embryo in the seed absorbs water and oxygen and swells, the radicle drives its tip through the ruptured investments of the seed, and turning downwards, plunges into the soil. This must, of course, be the case usually, but in the autumn of 1893, things went

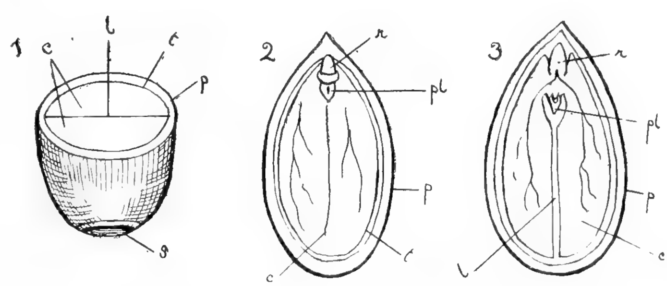



Fig. 1.—Sections of acorns in three places, at right-angles to one another. 1, transverse; 2, longitudinal in the plane of the cotyledons; 3, across the plane of the cotyledons; *c*, cotyledons; *t*, testa; *p*, pericarp; *s*, scar; *r*, radicle; *pl*, plumule. The embryonic tissue is at *r* and *pl*. The dots in 1 and the veins in 2 and 3 are the vascular bundles. *(Copied.)*

a little differently; perhaps the unusually hot summer had abbreviated the normal course. Be this as it may, early in November I gathered acorns already sprouting, and in December about half of the piled-up acorns in a shady corner of the verandah, without any spring warmth, without any moisture, and without any soil to penetrate, had already long radicles, and the finest of them, set to grow in the glasses, throve well all through the summer of 1894, till the end of October, when inexorable circumstances parted me from them.

Many of the acorns of 1893 were of unusual size, quite an inch long, and proportionately broad. They fell, some with and some without the cup or cupule, which is no part of the fruit itself, but only a mass of hardened bracts of the floral envelope. The acorn is a polished dark brown or leather-coloured, egg-shaped fruit. Its broad flat end that lies in the cup is marked by a large round scar, the remains of the attachment of acorn and cup; the scar is rough from the breakage of the little pipes or vessels which traversed the cupules from the stem to the fruit. The free end of the acorn is pointed with a little knob, the remains of the stigma of the past and gone flower of Spring. The polished hard coat of the acorn, marked with fine longitudinal lines, is the covering of the fruit, the pericarp; inside this is a papery membrane, the inner pericarp. In the ripe fruit both are dead structures, existing as protecting coverings to the seed within, which is now loose and free from them. On shaking it may be heard to rattle about; it was at first attached by the broad end by the same connecting pipes that ran through the cup from the twig. The pipes too are shrivelled and dead and broken across, their use being past. The seed is not much smaller than the fruit which it fills up loosely, of the same shape, and covered with brown papery membrane, its own coat or testa. It is horny and hard, and is made up of two halves lying closely pressed together, face to face, from the top of the acorn to the bottom. These two halves or cotyledons are not quite separate or free from each other, they are united to a tiny body lying embedded and pressed between them at the pointed end of the seed, a body that is of itself so small that it is easily overlooked. The larger end of this small embryo is the radicle pointing upwards to the apex of the acorn; the smaller end turned down is the plumule, the origin of the stem and leaves of the oak, as the radicle is the origin of its root system. Each cotyledon is united to the tiny embryo by a minute stalk. Thus the testa of the large seed is filled up by two immense cotyledons, a tiny radicle and a tinier plumule, the tip of the radicle lying just inside the membrane covering the seed and pointing outwards.

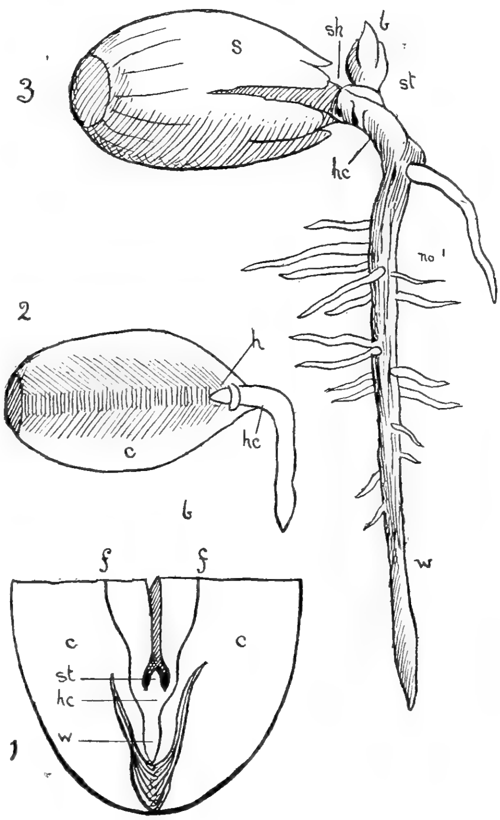



Fig. 2.—1, section of half of embryo; 2, germinating embryo with one cotyledon removed; 3, advanced stage of germination; *s*, pericarp; *sh*, testa; *b*, plumule; *st*, petiole of cotyledon; *hc*, hypocotyl; *c*, cotyledons; *f*, vascular bundle; *w*, primary root. *(After Lachs.)*

Thin sections of this seed placed under the microscope display polygonal cells of thin walls tightly packed with granule-like contents. The whole embryo consists almost entirely of this fundamental tissue. Surrounding the embryo and following all its shape is a layer of flattened cells fitting close round it as a glove, and this is the outer layer of the young plant, the epidermis. Where the sections are cut across the cotyledons, or radicle, or plumule, there are seen certain minute specks, the cut surfaces of fine cords of long and narrow cells, which are the vascular bundles. One set of them runs up the centre of the radicle, starting from its tip; they pass into the cotyledons, there branch and run to the remoter parts. The cells of the fundamental tissues of the cotyledons are packed with starch grains of oval shape and pearly lustre, lying embedded in proteids and tannin, with some little fatty substance. The starch grains are stores of food containing carbon, hydrogen and oxygen; the proteids contain nitrogen and certain mineral salts. The vascular bundles are the pipes along which this stored-up food will travel to the radicle and plumule, as soon as germination begins. The young epidermis has no part in the storing or conducting of food-material; it is simply a covering, and will extend with the growth of the young plant inside it. When the swelling seed splits its hard investments, the little radicle lengthens and comes out first, turning downwards and entering the soil slowly; it wants to get firm hold of the ground and to absorb water. The cotyledons remain in the acorn, and the developing root draws its growing material from their richly-stored cells. They nourish the young plant for months, and may even not be entirely exhausted at the end of two years. The cotyledons play a threefold part; they are store-houses of food, they are protective to the rudimentary tree pressed closely between them, they also perform the task of thrusting out of the seed-case the tiny plant-germ, that its members may elongate in the two directions. The last two duties are much more quickly performed than the first. In my young oaklings of six to eight inches high, grown in water, the cotyledons were still in the seed-case. I have a young oak pressed in its second year of growth with the cotyledons erect and separate. I suppose the enclosing case simply rotted away during the winter, and so set them free. They are a good deal shrunk, but still much thicker than a foliage leaf. Eventually they get entirely emptied out, die off and disintegrate, so that the place of their connection with the stem can scarcely be discovered. The germination of the beech, which I have often watched, is very different. The cotyledons, though thick and fleshy, are folded up tightly like a fan; they are drawn out of their nut-like covering very early, and then expand and rise till they are thick but flat and green leaves, as oak cotyledons never seem to be.

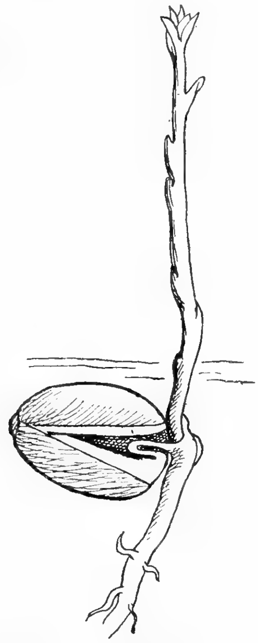


Fig. 3.—Germinating acorn, showing the manner of emergence of the primary shoot and the first scalps. (*After Rossmässler.*)

When the radicle of the oak is some two to three inches long, the plumule comes out from between the stalks of the cotyledons, which elongate and separate to permit its passage, and begins its growth up into air and light; this plumule, too, lives on the stored-up food-stuffs of the cotyledons, the dissolved substances are conveyed into it by the small pipes or vascular bundles arranged for that purpose. As the radicle starts into growth before the plumule, so it keeps ahead of it, being always longer and stouter than the young shoot in air, and beset with side strands or rootlets. At first the young oakling is without leaves, bearing only a few scales; when it is about three inches high, there are two scales close to the top that are a little longer than those that are below, and from between the scales comes the first leaf, a small green leaf of no very decided shape. Then the stem elongates and throws out other leaves that are distinctly oak-leaves in contour. At the end of summer there are five or six leaves, shortly stalked, each between its pair of stipules. A line drawn round this young stem joining the points of leaf insertion, describes a spiral, which circles twice round the stem and arrives at the sixth leaf immediately over the first one.

The root of one of my little oaks was infested with a curious and, I suppose, a fungoid growth. In appearance it was something like the barnacles of the sea, bluntly conical protuberances along the crack-like markings on the stoutest part of the root; filmy slime seemed to come off from the protuberances, and thicken the water. A young oak of the same size that I dug out from its native soil bore the same parasite, but in much less degree. I was much interested, but unable to investigate these further. Perhaps some of your readers may be able to tell us something about this parasite.

As I have already indicated, the observation of the growth of plants from their seeds will be found not only most interesting but, in the case of the larger seeds, such as walnut, oak, beech and others, comparatively easy to manage.

*Ambleside; July*, 1895.

# THE NORTH SEA TRAWL FISHERY.

By John T. Carrington.

SCIENCE and commerce are now so closely allied that it seems in no way out of place for the Marine Biological Association of the United Kingdom to investigate the destruction by trawlers of immature fish. A special number of the journal of the Association was issued at the end of June, which is occupied with "An Examination of the present state of the Grimsby Trawl Fishery with especial reference to the destruction of immature fish; by Ernest W. L. Holt."

It will be remembered by our scientific readers that Mr. Holt was, until recently, connected with the Marine Biological Association as one of its professional naturalists, and has devoted much attention to the North Sea fisheries on its behalf, the Association having had its base for this purpose at Grimsby. In the introduction, Mr. Holt explains that he was appointed by the council of the Marine Biological Association to investigate the causes, from their scientific aspects, of the acknowledged deterioration of the North Sea trawl fishery. During three years, Mr. Holt has laboured to collect whatever information he could obtain on this question. His headquarters were at Grimsby, where the Association, by arrangement with a local society, secured the use of a small laboratory fitted with tanks and other conveniences. The "question" requiring investigation shortly resolved itself into a statement, "that large numbers of immature fish were destroyed by trawling." This especially referred to flat fish, as little round fish are not largely affected by capture in the trawl, readily escaping through the mesh. Mr. Holt early came to the conclusion that the North Sea fisheries are in a diminishing condition.

It is not in accordance with the objects of this magazine to deal with the commercial side of Mr. Holt's report, which, however, contains in addition a good deal of valuable information for ichthyologists. Part ii. of the report is devoted largely to immature fish; that is to say, those which have not reached the age for reproduction. To Dr. Wemyss Fulton belongs the credit of having been the first to endeavour to ascertain the size at which fish of different kinds begin to breed. His investigation appeared in the Eighth Annual Report of the Scotch Fishery Board, being based on material obtained from the East Coast of Scotland. Mr. Holt followed with further results from the records of the Royal Dublin Society's Fishery Survey, in the Scientific Proceedings of that society, Part vii., Vol. 9. These investigations made it evident that even in one sex all fish of the same species did not become mature at exactly the same size. This applies especially with regard to locality. Still it is possible to arrive at a fair average standard in any one locality. The table given by Mr. Holt of sexual maturity in North Sea fish indicates in inches in length: turbot, 18; brill, 15; common sole, 12; plaice, 17; lemon sole, 12; common dab, 7; cod, 25; haddock, 13; whiting, 9 inches.

It will be observed that the standard for North Sea plaice is 17 inches, but Mr. Holt draws attention to a dwarf variety of this fish which appears to have its headquarters in the Baltic. After examining several consignments of these fish from German fish merchants to the Grimsby pontoon, it was found that the largest measured only 13½ inches, which, with some females no longer than 9½ inches, were all full of ripe roe or milt. The plaice of our south-west coast are considerably smaller than the North Sea forms. Their lengths of maturity varying from 11 to 15 inches. As another instance of variation of size of maturity, the common soles of the south-west of England, which are larger than those of the North Sea, mature only at over 13 inches in length.

Many people wanting in knowledge of the life-history of our food fishes are too apt to recommend artificial breeding as a means of replenishment. Mr. Holt devotes considerable attention to this subject. With the exception of skate, herring and cat-fish, all our food fish propagate by means of eggs which float singly on the surface of the water for some considerable period of time, during which the embryo is developing. In most of the more valuable kinds the eggs float until they are hatched, excepting those of turbot, which seem to sink some days before hatching. It will be seen that the difficulties in the way of artificial propagation are almost insuperable. It is necessary to have a continuous change of water in the tanks where the eggs are placed in captivity after being spawned. As they float they naturally drift towards the overflow from the tank, and to have any strainer sufficiently fine to stop these eggs means that the eggs immediately choke the strainer, thus not only preventing the refreshing of the water, but causing injury and disease among the eggs themselves from overcrowding. This, of course, could be overcome by having large spaces of water instead of laboratory tanks, but even then it is not probable that any great percentage would ever reach the size where reproduction commences, if it were considered desirable to keep them so long. The flat fish generally frequent sandy beaches close inshore until they are large enough to migrate to the shallow banks in the main ocean. They have at this period numbers of natural enemies, but few of these are nearly so destructive as the shore-shrimpers with their push-nets. These nets are pushed along the margin at low tide, either by night or by day, as the tide serves. Mr. Holt has examined this source of destruction, and gives the following statistics as a fair example of the catch of one net for a single tide. The value of the shrimps is estimated by the captor at 2s. 6d. "Shrimps, four quarts; soles, four, from $2\frac{3}{4}$ to $3\frac{1}{2}$ inches; turbot, one, $3\frac{1}{8}$ inches; brill, two, from $3\frac{5}{8}$ to $4\frac{3}{4}$ inches; plaice, 896, from $1\frac{1}{2}$ to $4\frac{1}{2}$ inches; plaice, twelve, $4\frac{3}{4}$ to 9 inches; flounders, six, $2\frac{1}{2}$ to $4\frac{7}{8}$ inches; flounders, three, 9 inches; dabs, three, $1\frac{1}{4}$ to $1\frac{3}{4}$ inches; smelts, five, $3\frac{1}{2}$ to $3\frac{7}{8}$ inches; smelts, one, $6\frac{1}{2}$ inches; dragonets, twenty-three, $1\frac{3}{4}$ to $2\frac{3}{4}$ inches; gobies, 261; sticklebacks, twenty-nine; also sand-eels, pipe-fish, etc. It is not suggested that all these fish, which amount to some 1,300 in number, are destroyed at every tide by each man, but there can be little doubt that the majority are more or less injured, if not actually killed. Of course it must not be supposed that gobies, sticklebacks, pipe-fish, or sand-eels have any commercial value, but it should not be forgotten that they constitute a large proportion of the food-supply of more valuable species.

It is very satisfactory to find that the Marine Biological Association is devoting so much attention to what immediately affects the public, through its food-supply. As has been pointed out in a recent number of SCIENCE-GOSSIP, some of our learned societies confine themselves so strictly to science as to be out of touch with public sympathy; but this cannot be said of the work designed by the Council which has control of the Plymouth Biological Station, and its outlying branches.

## INTERNATIONAL METEOROLOGY.

By E. D. ANDERSON and A. E. MANSFORD.

ALTHOUGH issued in 1893, by the American Government, a valuable book has only lately reached this country. It is entitled "A Summary of International Meteorological Observations." Compiled by Major H. H. C. Dunwoody, Signal Service Corps, United States Army. 61 pp., with 61 charts, 24 inches by 19 inches. (Published by the authority of the Secretary of Agriculture, Weather Bureau, Washington, D. C. 1893.)

Few scientific works recently issued are more satisfactory in scope and execution than this fine volume, which we owe to the Weather Bureau of the United States. The charts are perhaps particularly adapted for the use of specialists in meteorology and climatology, but the descriptive letterpress, by which they are prefaced, will do much to render them of general interest. The unusual size of the publication may by some be considered a detriment, but when it is borne in mind that the charts cover the whole known area of the northern hemisphere, and that on them all the chief meteorological stations are depicted by means of small circles, it is evident that anything smaller would have entailed a loss of clearness, and the advantages for purposes of generalisation of seeing the whole region at a glance preclude the idea of their subdivision. Taking these points into consideration, Major Dunwoody and his assistants are certainly to be congratulated on the concise form in which they have presented the result of the labour of eighteen years, the first thirteen of which were devoted to amassing data from nearly 600 stations, which yielded the amazing total of five million daily simultaneous observations. Temperature charts are given, showing the isotherms for every month as well as for the year, the greatest contrast occurring on the January chart, where Barbadoes, Ceylon and parts of West-Central India have a noon mean temperature of 80° F., whilst Verchojansk, in Siberia (67° 34′ N., 153° 31′ E.), has an average of 60° F. below zero. Very low temperatures are marked during January and February on the North American prairies, 40° F. below zero being the normal noon temperature for February for the Great Slave Lake district, but as the Pacific coast is approached, the isotherms take a most pronounced upward trend, so that the sea-coasts of California and British Columbia, even through the winter months, enjoy a temperature of from 40° to 50° F. The highest temperature shown is on the May chart, where, in parts of British India, the mean is above 100° F.

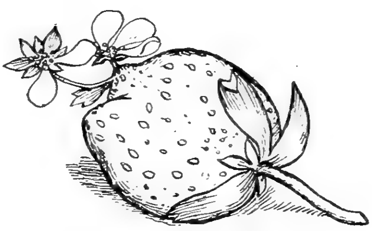
A second complete series of charts illustrates the isobars, and it is noticeable that whereas in the northern hemisphere during summer the areas of highest pressure occur over the ocean and the lowest over the land, during winter the positions are reversed. The lowest mean given is 29·43 at Lahore on the July chart, and the highest 30·67 at Nertchinsk (Asiatic Russia) on the chart for January. The average frequency of storm charts open a wide field for comparison, the St. Lawrence Valley has the doubtful privilege of heading the list with a total of 484 storms in ten years, whilst England in the same period experienced 135, and the western shores of California and Mexico only three. Fog being to the navigator perhaps even a greater danger than storms, the tables giving its average frequency and position are likely to be of special value.

# SOME ABNORMAL PLANTS.

By John T. Carrington.

We have to thank several correspondents for sending abnormal examples of different species of plants. Mr. George C. Griffiths, of 43, Caledonia Place, Clifton, Bristol, forwarded an abnormal inflorescence of cultivated rose, gathered by Mr. William Mullany from his garden at Cotham. The rest of the flowers on the tree from which it was cut were of the usual character. It had the appearance of a somewhat loosely grown red rose, the bud of another flower springing from the centre. This appears to be a case of prolifera-tion somewhat similar to one figured by Dr. Maxwell Masters, F.R.S., in "Vegetable Teratology," the difference being that in his case both portions of the stem showed the inflorescence at the same time. As in that instance, Mr. Griffiths' specimen showed no sign of the immature hip under the lower flower, and the stamens were wanting; the axis was prolonged for the supplementary flower. The lower inflorescence being a case of proliferation.

On July 4th, Mr. George Parish, 124, Kingston Road, Oxford, sent an abnormal strawberry, of which we give an illustration. The fruit was quite normal excepting for a little greenness of colour at the point. As will be seen from the drawing, two little flowers, which are figured natural size, were growing from the apex of the fruit. As Mr. Parish says in his letter, it is not uncommon to see bracts emerging in this manner, but it is unusual to see flowers as fully developed. When the specimen reached us all the petals were still attached, but on arrival at the artist's house some had become lost and have therefore not been drawn. We do not find that Dr. Masters refers to a similar case, though he figures one of median leafy proliferation, representing the thalamus of a strawberry prolonged beyond the fruit into a small leaf-bearing branch. The bunch of leaves in his figure are somewhat larger than the fruit. The difference in appearance between Mr. Parish's specimen and that figured by Dr. Masters, is that where the flowers appear in our figure there is a rather large rosette of small green leaves.



Abnormal Strawberry.

Mr. Charles Bond Smith, of Weston House, Potton, Beds., has sent a monstrous fuchsia flower, the monstrosity consisting of an enlargement of the calyx, growing from one side.

During a ramble in the neighbourhood of Northwood, near Watford, at the end of June, I found a case of cohesion of two branches and their flowers, in a specimen of ox-eye daisy, which is figured on page 151. It will be noticed that two branches have become joined together, and remained united up to the point of flowering. The inflorescence of each is situated at the back of the other. It was necessary in the drawing, to slightly turn the right hand flower forward, to show its position.

Mr. Robt. W. Chidwick, 4, Dagmar Street, Worthing, has sent an abnormal pyrethrum which has grown in his garden upon a plant which has bloomed freely. Upon examination we find that the peduncle is entirely suppressed in three flowers on the stem, probably through exhaustion, otherwise it is normal. There was, therefore, not any sign of stalks to the flowers, which appeared to grow directly out of the stem, in each instance just above the axis of a leaf.

Mr. C. A. Briggs, of Leatherhead, Surrey, has sent a "double raspberry," two fruits being joined together on one stem. The remains of the bracts are visible between the fruits, which have joined at intervals round the edges of two-thirds of the side of each. The effect is to form a flattened obtuse pyramid, the apex being at the attachment with the stalk. The raspberry trees from which it was taken have not previously produced a specimen of this character, but it is doubtless a form which not infrequently occurs.

We have also received reports of twin gooseberries having occurred rather frequently this season. This doubling of some fruit is not, we imagine, of rare occurrence, but is an interesting feature of vegetable teratology. As we went to press, we received from Mr. Henwood Teague, of Penzance, a sunflower, with two flowers on one stem, somewhat like the ox-eye daisy above described.

We desire to take this opportunity of thanking Miss Juliet Hensman for these and other drawings which she has been kind enough to give to the readers of Science-Gossip.

# SCALE INSECTS.

By T. D. A. Cockerell, *Entomologist, New Mexico Agricultural Station.*

THE extensive damage done to cultivated plants by Coccidæ, or scale insects, in various parts of the world is now so well-known, even outside of the professions of horticulture and entomology, which it most intimately concerns, as to show the importance of adding to our knowledge of their distribution. However, notwithstanding the economic importance of the group, it is comparatively little studied, and from many parts of the world no species whatever are known, although they must certainly exist in abundance. For example, we know many more species from the single island of Jamaica, where the present writer collected them, than from the whole continent of Africa. In addition to this, the several faunæ are becoming every day more mixed, to the perplexity of the naturalist and the distress to the horticulturist. Thus I published from Jamaica, in 1892, a presumed new species, found on Capsicum, as *Diaspis lanatus.* It has just transpired that it is not specifically distinct from *Diaspis amygdali*, Tryon, which was described, in 1889, on peach in Australia. Moreover, since that date the same species has been found as a serious peach pest, in the eastern United States of America, and I have seen it from California (on dwarf peach from Japan, in Japanese nursery at San José, coll. Ehrhorn), Japan (coll. Takahashi, com. U.S. Dep. Agric.), and Ceylon (coll. E. E. Green). Thus a seriously injurious species, totally unknown to science until 1889, is now recognised in the Palæarctic, Oriental, Australian, Nearctic and Neotropical regions.

Abnormal Ox-eye Daisy (see p. 150.)

Nothing was known of the Japanese species of Coccidæ until very lately, and even now the published records are extremely few. But the U.S. Department of Agriculture, recognising the danger from unknown Japanese species which might be introduced on fruit trees, has made an effort to obtain some information. Mr. Takahashi was employed to collect in Japan for the Department, and I have been permitted to describe nine new species in the collections he made. Even now, before these descriptions are published, Mr. Ehrhorn sends me one of those described, *Aspidiotus duplex*, as infesting camellias in a Japanese nursery at San Francisco, California.

Last year Dr. Del Guercio described a new species, *Aspidiotus piricola*, from Italy. Mr. Ehrhorn sends me a species of plum from San José, California, which I cannot by any means separate from it. Also, last year, Mr. Newstead described the new *Lecanium perforatum* from the Palm House at Kew, native country unknown. Already I have received it from hothouse palms in Denver, Colorado (Gillette, coll.), and San Francisco, California (Ehrhorn).

The year before last Mr. Maskell described *Dactylopius nipæ*, from Demerara. Last year I received what I am convinced is the same species from a hothouse palm at the Agricultural College, Michigan (coll. G. C. Davis, com. L. O. Howard).

*Lecanium longulum*, a decidedly troublesome species, described, in 1887, by Mr. Douglas, from English hothouses, is now known in the tropics of both hemispheres, and two still unpublished localities are Ceylon (E. E. Green) and a hothouse at Denver, Colorado (on rubber tree, coll. Gillette).

Numerous other cases could easily be given, but the above statements are chosen only out of the unpublished notes which I have accumulated quite recently. They are but a sample of the facts which are continually developing.

Naturalists may be inclined to disregard the records of species on cultivated, and especially hothouse, plants as of no scientific interest. This they must not do, as it is precisely by way of hothouses in temperate climates that tropical species may spread, say from India to the West Indies. Thus it is apparent that we should do all that is possible without delay to ascertain the existing Coccid-faunæ in various localities. It is important both with a view to preventing the further spread of harmful species, and in order to obtain some knowledge of the native countries of the species before they are so thoroughly distributed and mixed up that we lose all trace of the original condition of affairs.

Ordinary collectors of insects have practically ignored Coccidæ, so that we often know not a single Coccid from regions whence butterflies and beetles have been brought in the utmost abundance. Yet no group of insects is easier to collect. All one has to do is to pick or break off a portion of the infested plant (twigs or leaves), and put it into a small card-box, or an envelope, writing on the outside the locality, name of collector, and name of plant, if known. Anyone can do this, it does not need an entomologist.

Searching for Coccidæ, one has no difficulty as a rule in recognising those found. Any scale-like object, any small soft object with cottony or mealy secretion, any cottony or scurfy substance, is likely to represent Coccidæ. Beginners will usually gather also some parasitic fungi, Psyllidæ, etc., taking them for Coccids, until a microscope is used to discern their characters; but collections of Coccidæ are none the worse for thus containing a few other objects. I trust the readers of SCIENCE-GOSSIP in Central Africa and other little-worked stations may send me material for examination.

One has to admit here, that while the collectors might easily be many, the specialists who could at present work out the material collected are lamentably few. Yet there are many signs of an awakening interest, and to my knowledge several able students have joined the ranks of the coccidologists within the last year. Only two days ago I received the first-fruits of the labours of Mr. Karel Sulc, a Bohemian, who has been doing excellent work on the Central European species. Mr. Sasaki, a native of Japan, has lately given us a paper on a new Japanese Coccid, which, we may hope, will be followed by many others showing equal care and ability. In Ceylon, the Coccids of which have been nearly unknown, Mr. E. E. Green has prepared an account, still unpublished, of sixty-nine species, of which forty-two are new. Mr. Green has sent me many of the new species, which are extremely interesting. In the United States, several workers are likely to be heard from shortly. It is often said that the opportunity for making a reputation as a specialist in biological science is becoming more and more limited. In coccidology, however, this is not by any means the case, and the subject offers great opportunities to careful students.

With regard to the material collected, I think it would be very desirable that as much as possible should go not to private individuals, but to public collections. The reasons for this are obvious, especially in respect to new species, the types of which ought in the nature of things to be considered public property. The best public institution for Coccidæ, without doubt, is the U.S. Department of agriculture in conjunction with the U.S. National Museum. The collection of these insects at Washington is no doubt the best public one in existence; and is in charge, in the persons of Messrs. Riley and Howard, of competent Coccidologists, which is not the case in any other museum I know of, except Mr. Newstead's at Chester. For my own part, I have decided to send all my Coccid types to Washington.

The British Museum, which is acknowledged as the greatest central establishment for most groups of animals, has done extremely poorly in Coccidæ. Walker described a few, but his descriptions are practically useless, and his knowledge of the subject may be estimated from the fact that one of his types proved to be not a Coccid but a dried caterpillar. Since Walker's time two of the British Museum entomologists have each described a Coccid, but in neither case does the description even permit one to guess at the proper *genus* of the animal. All this, however, is but an indication that the British Museum entomologists have more than enough to do in other branches, and does not prevent the museum from being a suitable repository for types or other material. It may be said, finally, that no one should be deterred from collecting for fear of not at once finding a specialist who will study the material. It must always be remembered that collected material will keep, whereas, for reasons above given, it is important to do the collecting with the least possible delay.

*New Mexico (U.S.A.) Agricultural Experiment Station.*
*Las Cruces, New Mexico, U.S.A.; July 6th, 1895.*

# FIRST APPEARANCES OF SPRING FLOWERS.

By Edwin E. Turner.

It has been my custom almost ever since first starting the study of flowers to keep a diary of first appearances of the dates of flowering, and the habit has been of considerable benefit in the zest which it has given to observation at all times, whenever or whatever business called me into places where it could be exercised. On looking over these notes it occurred to me that a comparison of the dates of the several years might be of interest to others; I therefore give the comparative dates of first appearances of the flowers of some common Spring plants during the years 1882 to 1894 inclusive. The observations were made in this portion of the County of Essex. In a few paragraphs the yearly dates do not follow. The earliest month, irrespective of year, having the leading position. The first recorded is:

Germander speedwell (*Veronica chamædrys*), which extends over a radius of five months, viz.: From January 9th, 1882, to May 9th, 1891, two entries being in January, one in March, four in April.

Daisy (*Bellis perennis*).—All January, 1892, to March 31st, 1886; two in January, three in February, and two in March.

Cock's-foot grass (*Dactylis glomerata*).—January 9th, 1882, to May 25th, 1888; one in January and eleven in May.

Dog's mercury (*Mercurialis perennis*, male).—January 28th, 1882, to May 22nd, 1883; two in January, four in February, five in March, one in May.

Hazel (*Corylus avellana*, male and female).—January 12th, 1884, to February 12th, 1888; five in January and five in February.

White campion (*Lychnis vespertina*).—January 29th, 1882, to May 25th, 1888; one in January, one in April, and eight in May.

Periwinkle (*Vinca minor*).—January 5th, 1884, to March 27th, 1886; two in January, one in February, one in April, and three in March.

Spurge laurel (*Daphne laureola*).—January 29th, 1882, to March 27th, 1886; one in January, three in February, and five in March.

Stitchwort (*Stellaria media*).—All January, 1882-83, to February 10th, 1894; three in January and four in February.

Buttercup (*Ranunculus bulbosus*).—All January, 1882, to May 8th, 1887; four in January, seven in April, and one in May.

Purple deadnettle (*Lamium purpureum*).—All January, 1882-83, to March 16th, 1890; three in January, four in February, and three in March.

White deadnettle (*Lamium album*).—All January, 1882-83, to March 20th, 1886; three in January and two in March.

Dandelion (*Taraxacum officinale*).—All January, 1882-83, to April 31st, 1887; four in January, one in February, three in March, and two in April.

Groundsel (*Senecio vulgaris*).—All January, 1882-83, to February 6th, 1887; three in January and one in February.

Sweet violet (*Viola adorata*).—All January, 1882, to March 27th, 1891; one in January, one in February, and six in March.

Primrose (*Primula vulgaris*).—All January, 1882-83, to March 31st, 1889; two in January, two in February, and five in March.

Gorse (*Ulex europæus*).—All January, 1882-83, to April 11th, 1886; three in January, one in March, and three in April.

Annual grass (*Poa annua*).—All January, 1882-83; three in January.

Filbert (*Corylus sativa*, male and female).—January 29th, 1892, to February 19th, 1893; one in January and five in February.

Yew (*Taxus baccata*, male).—February 2nd, 1884, to March 31st, 1889; seven in February and four in March.

Figwort (*Scrophularia aquatica*).—February 14th, 1882, to June 24th, 1884; one in February, three in May and four in June.

Shepherd's needle (*Scandix pecten-veneris*).—February 26th, 1882, to May 18th, 1889; one in February, one in March, two in April, and six in May.

Pilewort (*Ranunculus ficaria*),—January 28th, 1883, to March 30th, 1888; one in January, three in February, and seven in March.

Fœtid hellebore (*Helleborus fœtidus*).—Garden. All January, 1883, to April 13th, 1889; two in January, one in February, two in March, and three in April.

Coltsfoot (*Tussilago farfara*).—February 10th, 1894, to March 30th, 1888; three in February and nine in March.

Wood anemone (*Anemone nemorosa*).—March 5th, 1882, to April 23rd, 1892; five in March and four in April.

Black poplar (*Populus nigra*).—March 5th, 1882, to April 12th, 1890; five in March and five in April.

Dog violet (*Viola canina*).—March 8th, 1884, to April 8th, 1887; six in March and four in April.

Whitlow-grass (*Erophila vulgaris*).—March 8th, 1884, to April 23rd, 1892; six in March and four in April.

Ivy-leaved speedwell (*Veronica hederæfolia*).—January 18th, 1884, to April 14th, 1883; one in January, one in February, four in March, and one in April.

Elm (*Ulmus campestris*).—January 18th, 1884, to March 27th, 1886; two in January, four in February, and six in March.

Spotted medick (*Medicago maculata*).—April 8th, 1893, to May 9th, 1885; five in April and five in May.

Greater stitchwort (*Stellaria holostea*).—March 18th, 1882, to April 28th, 1887; three in March and nine in April.

Barren strawberry (*Potentilla fragariastrum*).—March 8th, 1884, to April 3rd, 1886; eight in March and four in April.

Blackthorn (*Prunus spinosa*).—March 10th, 1894, to May 7th, 1888; four in March, six in April, and three in May.

Ground-ivy (*Nepeta glechoma*).—March 8th, 1884, to May 7th, 1888; six in March, five in April, and one in May.

Alder (*Alnus glutinosa*, male and female).—February 10th, 1894, to April 3rd, 1886; five in February, six in March, and one in April.

Marsh marigold (*Caltha palustris*).—March 12th, 1893, to April 13th, 1889; five in March and six in April.

Spring woodrush (*Luzula vernalis*).—March 19th, 1893, to April 30th, 1892; three in March and four in April.

Butter-bur (*Petasites vulgaris*).—March 12th, 1893, to April 3rd, 1885, 1886, 1887; five in March and four in April.

Garlic cress (*Sisymbrium alliaria*).—March 3rd, 1885, to April, 18th, 1891; three in March and eight in April.

Broom (*Cytisus scoparius*).—April 21st, 1894, to May 28th, 1887; three in April and eight in May.

Cuckoo-flower (*Cardamine pratense*).—March 25th, 1893, to May 1st, 1887; three in March, seven in April, and one in May.

Meadow woodrush (*Luzula campestris*).—March 29th, 1890, to April 28th, 1883; one in March and six in April.

Moschatel (*Adoxa moschatellina*).—March 17th, 1894, to May 10th, 1887; four in March, six in April, and three in May.

Maple (*Acer campestre*).—April 7th, 1882, to May 24th, 1890; four in April and five in May.

Ash (*Fraxinus excelsior*).—March 19th, 1893, to May 9th, 1888; two in March, four in April, and three in May.

Cowslip (*Primula veris*).—March 26th, 1894, to April 25th, 1891; two in March and nine in April.

Wood-sorrel (*Oxalis acetosella*).—April 8th, 1882, to April 25th, 1891 and 1893; all in April.

Horsetail (*Equisetum arvense*, female).—April 1st, 1894, to May 1st, 1887; nine in April and one in May.

Water ranunculus (*Ranunculus aquatilis*).—April 2nd, 1884, to May 12th, 1887; eight in April and one in May.

Red campion (*Lychnis diurna*).—January 12th, 1884, to May 12th, 1888; one in January, one in March, five in April, and five in May.

Sycamore (*Acer pseudo-platanus*).—April 8th, 1882, to May 26th, 1883; four in April and seven in May.

Wood-spurge (*Euphorbia amygdaloides*).—April 3rd, 1893, to May 9th, 1891; eight in April and two in May.

Early purple orchis (*Orchis mascula*).—April 3rd, 1893, to May 20th, 1887; six in April and six in May.

Narrow-leaved plantain (*Plantago lanceolata*).—April 9th, 1884, to May 8th, 1886, 1887 and 1893; six in April and six in May.

Vetch (*Vicia sepium*).—April 8th, 1893, to May 11th, 1889; six in April and five in May.

Fox-tail grass (*Alopecurus pratensis*).—March 25th, 1884, to May 9th, 1887; two in March, eight in April, and two in May.

Cuckoo-pint (*Arum maculatum*).—April 18th, 1882, to May 15th, 1891; four in April and four in May.

Slender foxtail-grass (*Alopecurus agrestis*).—April 15th, 1882, to May 25th, 1888; three in April and eight in May.

Oak (*Quercus robur*).—April 18th, 1882, to May 13th, 1889; two in April and six in May.

Hairy bitter-cress (*Cardamine hirsuta*).—February 23rd, 1884, to May 7th, 1888; one in February, three in March, seven in April, and two in May.

Beaked parsley (*Anthriscus sylvestris*).—January 22nd, 1883, to May 7th, 1888; one in January, one in February, three in March, six in April, and two in May.

Bluebell (*Scilla nutans*).—April 5th, 1884-90, to May 7th, 1887-88; nine in April and four in May.

Pansy (*Viola tricolor*).—March 24th, 1884, to May 21st, 1885; two in March, two in April, and three in May.

Celandine (*Chelidonium majus*).—April 21st, 1894, to June 2nd, 1883; two in April, six in May, and one in June.

Avens (*Geum urbanum*).—April 7th, 1884, to June 5th, 1887; two in April, six in May, and two in June.

Sorrel (*Rumex acetosella*).—April 23rd, 1882, to May 26th, 1883; four in April and six in May.

Scorpion-grass (*Myosotis collina*).—March 25th, 1893, to May 18th, 1883; one in March, seven in April, and two in May.

Chickweed (*Cerastium arvense*).—April 5th, 1884, to May 18th, 1883; eight in April and two in May.

Hedge mustard (*Sisymbrium officinale*).—January 12th, 1884, to May 16th, 1885-87; one in January, five in April, and six in May.

Toothwort (*Lathræa squamaria*).—April 3rd, 1893, to April 30th, 1890; seven in April.

Summary.—It will be seen by the above summary that there are some interesting points for notice, a few of which I should like to indicate: *Dactylis glomerata* (Cock's-foot grass) seems to be very regular in appearing, notwithstanding the varied conditions of climate during the extensive period noted, having eleven out of twelve dates in the month of May. The male plants of *Mercurialis perennis* (dog's mercury) in my observation have always been first, but this season the rule was reversed, as the female flowered as early as Christmas last year. *Corylus avellana* and *C. sativa* (the hazels) have only a variation of about a month. *Poa annua* has all its records in the first month of the year, but in this case the record is very meagre. *Tussilago farfara* (coltsfoot), the four following, and numerous others, have a variation of only two months, and seem very constant in all weathers. *Luzula campestris* and *L. vernalis* (wood-rush) seem to agree as to their several dates. *Petasites vulgaris* (butter-bur) bears the same date for three years in succession. *Oxalis acetosella* (wood-sorrel) has all its entries in April, two being on the same day, while *Plantago lanceolata* (narrow-leaved plantain) has the same record in four different years. *Anthriscus sylvestris* (beaked parsley) shows a variation of several months. *Lathræa squamaria* (toothwort) has all seven entries in April; this is a rare plant which I have been led to believe is only to be found in this one place in Essex. The above brief summary may be largely added to, I have no doubt, by thoughtful readers.

*Coggeshall; June, 1895.*

## JUMPING SEEDS OF SOUTH AFRICA.

WE have received the following communication from a correspondent in Cape Colony, accompanied by a specimen of the tree to which he refers:

"Enclosed I send a sample specimen of a wild cypress tree, the peculiarity being that the ovaries on the tree are occupied by the larvæ of some insect. The tree bears a cone, but on account of the larvæ the ovaries are undeveloped, only reaching the size of a turnip-seed. When the larvæ are full grown these immature seeds fall to the ground, and keep up an incessant jumping. They jump about an inch in height, and on the surface of the ground, and move, or I should say hop, great distances. The ground round the tree where this occurs presents a strange sight, these thousands of cases jumping about night and day. On opening one of these cases carefully, the maggot may be seen, and, when viewed under a magnifying glass, resembles the maggot of a common fly. The body contracts and expands, which causes the jumping, but how the insect, shut up in its case, has the power to move the case such a comparatively great distance, and so incessantly, is a marvel. I should like to know whether you have heard of some such cases before. I would have sent some of the larvæ in their cases, but they shrink up and die on confinement. I shall, however, try and get some of the imagoes. "J. H. BELL, A.P.S.

"*Branfort West, South Africa; March 5th, 1895.*"

We have submitted the specimen and letter to Mr. Rowland Trimen, F.L.S., F.E.S., the well-known authority on South African Entomology, who is at present visiting England. The following are his remarks upon Mr. Bell's communication, which Mr. Trimen has been kind enough to send in reply to our enquiry:

"Hyde Park Court, Albert Gate, London, S.W.
"*June 28th*, 1895.

"I received your note of the 18th inst., enclosing one from Mr. J. H. Bell, of Branfort West, Cape Colony, dated March 5th, respecting an insect whose larva sterilizes the ovary of a conifer, and on the fall of the aborted cone, appears to make the latter jump freely about, by the contortions of the larva within it.

"The case is quite new to me, and very different in its details from that of the 'Jumping Eggs' which I recently commented on in a letter to Miss Hopley, which was printed in the 'Entomologist' (vol. xxviii, page 52). In the latter case the larva (the perfect insect of which is not yet known) inhabits a membranous-like cyst or pseudo-cocoon in the leaves and terminal twigs of a species of *Rhus*, and it is only when the cyst (or so-called 'egg') is taken out of the leaf or shoot that any jumping occurs, or can occur.

"Dr. H. Trimen thinks that the 'wild cypress,' concerned in the case mentioned by Mr. Bell, is probably a *Widdringtonia*, or a *Callitris* (?), but the specimen submitted is too imperfect for determination. "R. TRIMEN."

Larvæ causing the cases in which they are enclosed to "jump" have for some time been well known. The "jumping beans," from Central America, are now familiar, not only to entomologists but also to many persons who visit curiosity shops. We recently saw some on view in a shop window in Main Street, Winnipeg, whose owner deemed them a great novelty. The examples quoted by Mr. Rowland Trimen are apparently much larger than those noted by Mr. Bell. They are to be found on Table Mountain, Cape Town, and, to quote Miss Hopley, are "perfectly oval, white, and about the size of a small sugar-plum," which is rather indefinite. Miss Hopley continues "it was the strangest sight to watch these tiny eggs rolling and springing or standing on end. Almost a foot they sometimes jumped, either in height or in distance." Further the lady says: "The shell or case, though only membranous, is hard enough to rattle when confined in some small box. Some of the eggs given to me in Cape Town had been procured the previous day by a young gentleman, who assured me that they kept up such a racket in a match-box in which he had placed them, that they disturbed his rest, and he got up in the night to remove them to a drawer at the furthest end of his room."

Mr. Trimen considers the larvæ contained in the "jumping eggs" to be probably coleopterous, and although he has observed them for some years he has never been able to rear the perfect insects. It is likely that Mr. Bell's jumping seeds may be of coleopterous origin, and we trust he may rear them to a perfect state and let us know the result.

In the following number of the "Entomologist" to that containing Miss Hopley's letter both Mr. G. C. Bignell, of Plymouth, and Dr. Knaggs, of London, draw attention to similar cases natural to England. Dr. Knaggs recorded (Entomologists' Monthly Magazine, vii, p. 282) an account of some hawthorn buds, which fell from a branch of early flowers, that had been brought indoors. These buds "much astonished and amused me by the queer tricks performed" after they fell upon the table. Mr. Bignell's case was of a parasite in a larva of a common moth (*Tæniocampa stabalis*) named by Bridgeman (Transact. Entom. Soc., Lond., July, 1882, p. 151) *Limneria kriechbaumeri*. It is the pupa-case of this insect which jumps, probably before the larva has become transformed to a pupa. This pupa-case could jump as much as two feet. Mr. Bignell's experiments with these cases went to show that they jump "until they suppose they have buried themselves under some fallen leaves or crevice in the ground. When the bounding is obstructed it will commence to roll, and when it can roll no further, or jump, it will cease trying."

The so-called jumping of these seeds is supposed to be produced by the grub within acting after the manner of the cheese-maggots, which, by a flip of the head and tail, spring from one spot to another. How they get a leverage within the seed is a problem unsolved. This interesting subject needs much further investigation.

JOHN T. CARRINGTON.

## NESTING-PLACES OF THE SEDGE-WARBLER.

By H. MEAD-BRIGGS.

FOR some considerable time past it has been my intention to dispute the assertion put forward by many—that the sedge-warbler (*Acrocephalus phragmitis*) does not suspend its nest in the reeds; but unfortunately so many things have otherwise occupied my leisure time I have been reluctantly compelled to abandon the idea up till now. "Unfortunately," I say, in one sense, but perhaps luckily in another, as I have had more time to confirm my own knowledge on the subject, and am thus not hasty to write "without my book," as the saying goes. It has been my habit for several years to hunt a certain marshy locality around Minster, in the Isle of Thanet, Kent, for eggs of the various birds that haunt such places; and amongst those most frequently found are the reed-warbler (*Acrocephalus streperus*), and the sedge-warbler. Now, according to that useful little handbook, "Birds'-nesting and Bird-skinning," by Miller Christy, the sedge-warbler does *not* suspend its nest in the reeds, "as stated by Selby and others," the *not*, for special emphasis, I would have you observe, being in italics. Howard Saunders, in his Manual on British Birds, makes a similar remark. I am sorry to say I must dispute these authors, as both myself and Mr. E. E. Elgar, of Wingham, a companion in very many of my researches, have frequently found the nest *suspended*, showing that our old naturalists, Selby and others, were not so very wrong after all. In June, 1894, my friend and I went over our old hunting-ground and succeeded in finding two more suspended nests, making in all about a dozen that it has been our lot to come across within a space of four years. I should have liked very much to have cut and sent you up a nest to prove that there was no mistaken identity, but the nest contained young birds (at least three young birds and two chipped eggs) which I could not bring myself to destroy even for the sake of proof. In the second case the nest was not within reach, without both trespassing and wading, as it was suspended in the reeds in the middle of a dyke running by the side of the railway, from the bank of which we had received orders to quit, in no very polite language, from a ganger but a few moments previously. Still, from the fence which divided both rail and dyke from the marshes, we could not only see the old bird on the nest, but when she had flown we could also identify the eggs quite distinctly, which we had no hesitation in saying were those of the sedge-warbler, but in order to avoid any doubt on the subject I enclose you an egg similar to those in the two nests.

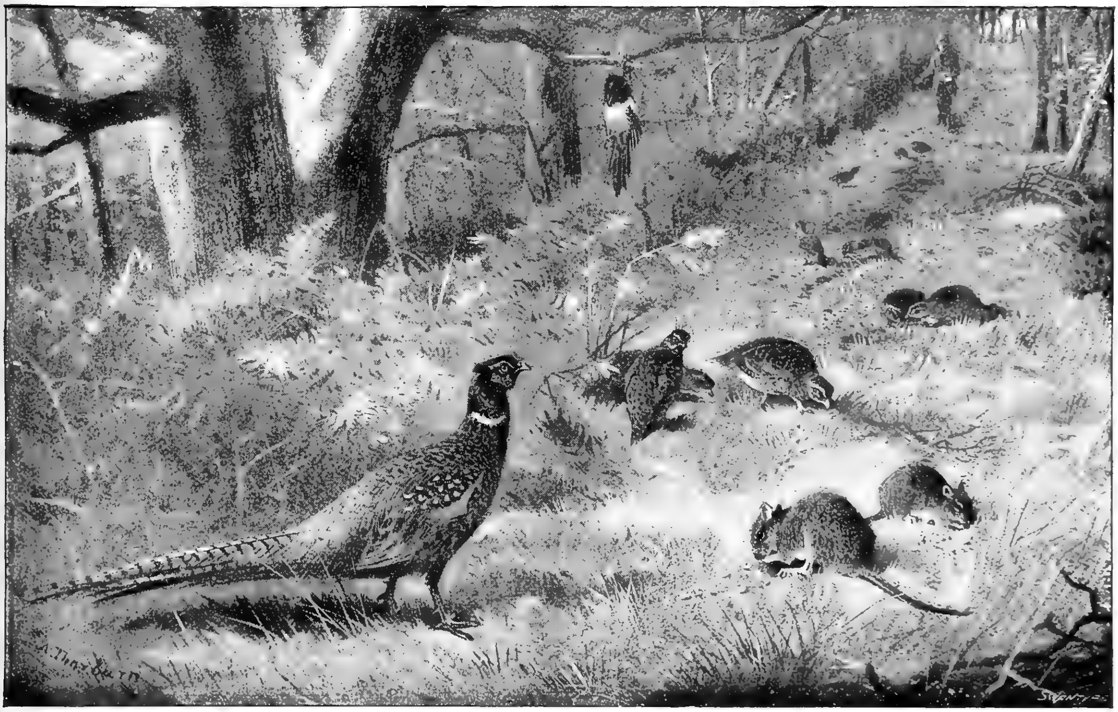
37, *Nunnery Fields, Canterbury.*

[The egg sent for identification is one of the sedge-warbler. Knowing Mr. Briggs' habit of accuracy, we have no doubt of the correctness of his observation.—*Ed. S.-G.*]

# BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*The Pheasant.* Natural History, by the Rev. H. A. MACPHERSON. Shooting, by A. J. STUART-WORTLEY. Cookery, by ALEXANDER INNES SHAND. 273 pp. 8vo. Illustrated with eleven drawings by A. THORBURN, and various diagrams in the text by A. J. STUART-WORTLEY. (London and New York: Longmans, Green and Co., 1895.) Price 5s.



UNINVITED GUESTS.
(From "*The Pheasant.*"—*Fur and Feather Series.*)

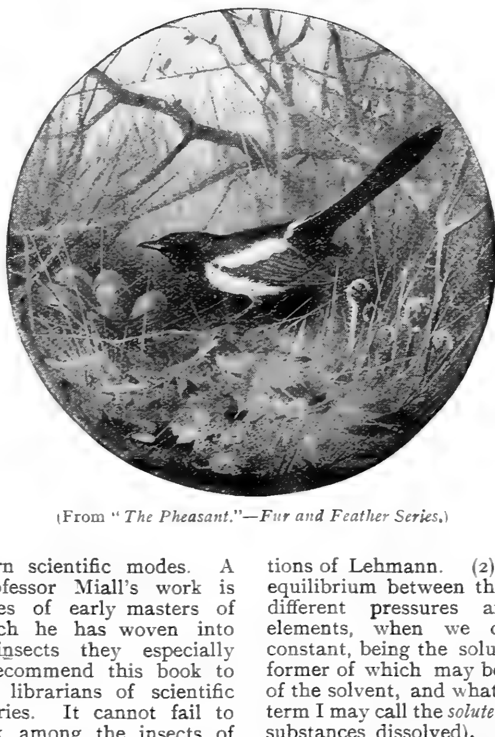
This book is one of Messrs. Longmans' "Fur and Feather Series," which was created to present monographs upon the various English birds and beasts which are generally included under the head of game. Two have already appeared, dealing with "The Partridge" and "The Grouse." It was a happy idea to design this series, for the various chapters appeal to different sections of readers. We have to notice only the natural-history side of the subjects, not that we personally object to either the sporting or the cookery sides, but they will be much better dealt with elsewhere. As hitherto, our section in this series is written by the Rev. H. A. Macpherson, than whom, with regard to the birds at least, no one has a greater claim, in our opinion, for excellence in this kind of work. The preface is written by Mr. Alfred E. T. Watson, the editor, who, by the way, makes the very common error of using the word "variety" for "species." It is surprising how often this interchange occurs, some people evidently considering them synonymous. Mr. Macpherson divides the natural history of the pheasant into five chapters, under the headings of "The Pheasant in History," "The Pheasant in the Woodlands," "Freaks and Oddities," "Old World Fowling" and "Poaching in the Nineteenth Century Style." All these chapters are full of interest, being lightly written to suit both an unscientific and a more learned audience. Mr. Thorburn has been very successful with his pictures, two of which we reproduce by the courtesy of the publishers. Altogether this is an excellent book, which should be, with the others of the series, in every country house.

*The Climates of the Geological Past, and their Relation to the Evolution of the Sun.* By EUG. DUBOIS. 175 pp. crown 8vo. (London: Swan, Sonnenschein and Co., 1895.) Price 3s. 6d.

The name of Mons. Eugene Dubois has recently become familiar to English readers through his supposed discovery of the remains of an animal that was to form a connecting link — the missing link—between man and the anthropoid apes, which he named *Pithecanthropus erectus.* The book before us is a translation by M. Dubois, assisted by Mr. T. Delpart, of a treatise published in 1893 in German, and an enlarged edition of an essay in Dutch, 1891. The work attempts to explain, by changes of solar heat, the great climatic changes of the geological past. The text is in English. There is a large amount of interesting facts for the general reader who is not already acquainted with the geological features of the world outside our own islands. Although the subject, of necessity, is highly speculative, it will be found most fascinating to many, to whom it will come with some sense of novelty.

*The Natural History of Aquatic Insects.* By Professor L. C. MIALL, F.R.S. 395 pp. crown 8vo, with 116 figures by A. R. HAMMOND, F.L.S. (London and New York: Macmillan and Co.) Price 5s.

If we pick out a list of the little-worked orders of animals or plants, we may safely consider we are making a list also of those where there is an absence of trustworthy modern manuals of the subjects. Aquatic entomology, until now, was one of the subjects so neglected, but there will remain no excuse for its absence of study after the issue of Professor Miall's new book. Since the days of Swammerdam, Réaumur, Lyonnet and De Geer—whose works, as pointed out by the author of this manual in his preface, are unjustly neglected now-a-days—we have had very little systematic study of aquatic insects as a group. A few popular and more or less inaccurate compilations by unscientific writers have been all that young naturalists had to depend upon in the English language. Now they have an excellent manual by a trained teacher of high reputation, beautifully illustrated by accurate drawings. The text is well arranged and popularly written, though in the most approved of modern scientific modes. A pleasant feature of Professor Miall's work is the sketches of the lives of early masters of aquatic entomology, which he has woven into his chapters on the insects they especially studied. We strongly recommend this book to our readers and to the librarians of scientific societies or public libraries. It cannot fail to give an impetus to work among the insects of which it treats. We shall consequently expect, in due course, more short notes for our pages about them than we have recently received, for there is still much to learn.



(From "*The Pheasant.*"—*Fur and Feather Series.*)

*A Handbook to the Game-Birds.* By W. R. OGILVIE-GRANT, of the Zoological Department, British Museum. Vol. i., Sand-grouse, Partridges, Pheasants. 320 pp. crown 8vo. Illustrated by 21 coloured plates and other drawings. Allen's Naturalists' Library. (London: W. H. Allen and Co., Limited, 1895.) Price 6s.

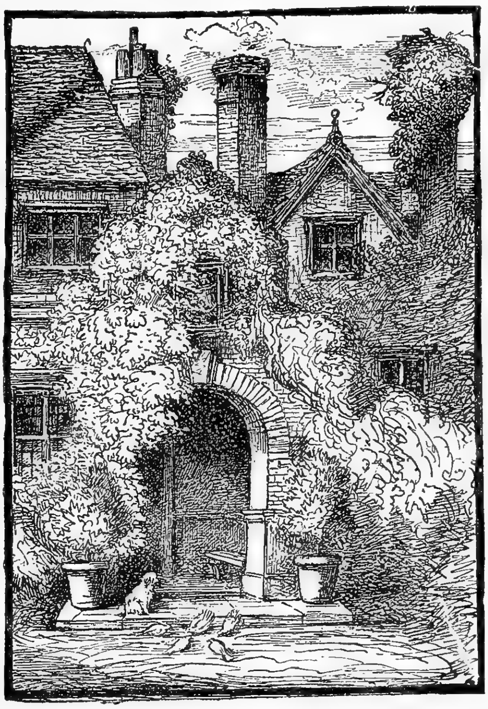
This is one of the best volumes yet issued in the republication of the "Naturalists' Library." The plates are in some instances good and in others fair, but have often more or less of the brand of the lithographic artist, who delight to pile on their colours. This book will appeal to a wider set of readers than those who care only for scientific values. Sportsmen and travellers in Africa and other regions will be pleased to have a trustworthy book on game-birds, for it deals with them as a whole, so far as this volume carries us. The author has a reputation for his knowledge in this branch of ornithology. He gives short but good descriptions of the adult birds, and of the nestlings also, where possible; then follow accounts of the range of the species, habits, nest and eggs.

*An Introduction to Chemical Crystallography.* By ANDREAS FOCK, Ph. D. (Berlin). Translated and Edited by WILLIAM J. POPE, with a preface by N. STORY-MASKELYNE, M.A., F.R.S. 205 pp. crown 8vo. (Oxford: Clarendon Press. London: Henry Frowde, 1895.) Price 5s.

It was in 1888, that Dr. Fock published the work which has now been translated by Mr. Pope. The translator has further brought up to date the many additions to the knowledge of this important branch of crystallography that have been discovered since Dr. Fock brought out his "Einleitung in die Chemische Krystallographie." Prof. Story-Maskelyne's preface is short but important. He points out how singularly readable is Dr. Fock's work, and how this translation brings the book within the reach of University and other students. The book is divided broadly under three headings which we quote from the preface. "(1) Crystal growth, in the discussion of which due importance is given to the extensive and laborious investigations of Lehmann. (2) The laws controlling the equilibrium between the elements of a solution at different pressures and temperatures; these elements, when we consider the pressure as constant, being the solution and crystal-solid, the former of which may be considered as consisting of the solvent, and what for lack of a much-needed term I may call the *solute* (namely—the substance or substances dissolved). (3) Salts containing water of crystallization, double salts and isomorphous substances are treated each in its turn, and the final chapters deal (4) with both physically isometric and isogonous substances and with the crystallographic changes attending the substitution of one radicle or element by another." This is a valuable manual on chemical crystallography, and it will be found that it has rather gained than lost by the translation. Professor Story-Maskelyne remarks that: "A freshness of interest is imparted to each of the larger subjects by a concise but sufficient survey of the historical growth of the ideas involved in them; for frequently whilst tracking the steps by which a scientific idea has become confirmed, we best learn to appreciate the grounds on which contemporary theories rest."

*A Garden of Pleasure.* By E. V. B. 230 pp. 8vo, with illustrations by the author. (London: Elliot Stock, 1895.) Price 5*s.*

The publisher has prettily produced this book for the Hon. Mrs. Eleanor Vere Boyle, the authoress. In these days of "Progress," Trades-unions and over centralization of the rural folk to grimy cities, one feels refreshed by dipping into the sweet simplicity of the country life depicted in these pages. There is no attempt or straining after literary effect, but a healthy story of one glad to live in an old country house surrounded by its beautiful garden. These are the lives which so beautifully illustrate the meaning of the English word "home." The pages are full of country-lore, as will be seen from the following, selected at random. "Either to-day or on May-day, one ought to see the fairies, according to the old Scottish legends! No fairies appeared this time, but I saw a good deal between eight and nine, looking from the broad walk upon our old kitchen garden walls, bright with the eastern sun. How shall the charm of these old brick walls be described? Words could never paint it. In the clear glow of morning light the reds are so delicately pure and warm, and they are mottled with such varied greys and many-tinted yellows. There are stout old buttresses, too, mossed and ferny, and grey with eld. Ancient rugged pear-trees grow up against it, and their outstretched knotted old limbs are set now with knots of flowers, and young, tender leaves, and the half-transparent shadow of every flower and leaf lies still or trembles on the wall. One of these pear-trees, quite worn out and decayed with age, had been cleared away last winter, leaving a broad vacant space, a space that is not bare, but full of interest. Little incidents and details, unobserved before, were plainly seen this morning. There is a curious arrangement of wood bricks built in regular order amongst the others. Worm-eaten and decayed, they have weathered to the same colour as the greyer of the bricks, and are so inconspicuous as to pass, usually, unremarked. These wood bricks must have been devised for the more careful nailing-up of fruit-trees. The fine new garden walls of those days might not be disfigured with nails. Some have fallen out, leaving recesses convenient for wrens' and other nests. Suddenly appeared a curved line of bricks, set end-wise, showing where once had been a low-browed narrow doorway, bricked up long since. There is another as low and narrow, faintly visible further down. Carlyle wrote of the days 'when dresses were smaller and thoughts were larger.' Certainly our modern doorways are mostly wider than those of older date."



(From "*A Garden of Pleasure.*")

*Astronomers and their Observations.* By Lucy Taylor. With Preface by W. Thynne Lynn, B.A., F.R.A.S. 160 pp. crown 8vo, with illustrations. (London: Partridge and Co., 1895.) Price 1s. 6d.

The object of this compilation has been to gather up within a small compass what has been accomplished from the earliest ages by astronomers. The story is pleasantly told, and is more especially suited to young people. The following paragraph is an example of the author's style. Writing of comets she says: "Had they to penetrate air they could not possibly move at such tremendous speed, but, meeting with little or no resistance in their paths, they go tearing round the sun at the rate of two or three hundred miles a second, and then retire to the other extremity of their orbit to progress at about the rate of a London cab."

*Chemists and their Wonders: The Story of the Application of Chemistry to various Arts and Manufactures.* By F. M. Holmes. 160 pp. crown 8vo, with illustrations. (London: Partridge and Co., 1895.) Price 1s. 6d.

This, like "Astronomers and their Observations," is another of "The World's Wonders Series" written for young readers. They make good school prizes or gift-books. This one is in conversational style, which is not altogether an advantage. Chemistry, even as simply told in this book, is rather abstruse to the very young, to whom conversation appeals; while elder young people are apt to look upon it with some contempt. Still this book will have a multitude of readers who will learn much from its pages. The illustrations are generally well selected and some amusing, for instance the reproduced caricature of the use of coal gas in 1807, as viewed by our present knowledge of it as an illuminant. In the conversations the author is "Frank," there is also "Phil" and Phil's sister, who is called "Carrie." The author says: "Carrie is always taking my part. We are to be married soon, and you cannot think how nice it is to have a jolly girl like Phil's sister—and so intelligent too—always taking your part." These young people visit various works, such as some for making gas, matches, aniline dyes, glass, and dynamite. Photography as well as these and other subjects make conversation, which is both amusing and instructive.

*Microbes and Disease Demons: the Truth about the Anti-toxin Treatment of Diphtheria.* By EDWARD BERDOE, L.R.C.P. Ed., M.R.C.S. Eng. 93 pp. 8vo. (London: Swan, Sonnenschein and Co., 1895.) Price 1s.

It was not until we had reached the twenty-sixth page that we found this one of those well-intentioned but weak attempts to put down what is described as vivisection, which in this case is simple inoculation. As is generally the case with books which are written rather from the heart than in a cold critical spirit, there is in this an absence in many places of logical argument. For instance, on page 26 the author says "I am not inclined to take on trust, or on the authority of names, however eminent, the anti-toxin treatment of disease," but the rest of the book is largely occupied by quotations on the authority of persons, not very eminent, by the way, on the opposite side. The author is, we imagine, rather bold when stating that "if diphtheria is brought under proper treatment and surroundings on the first day of the disease, it almost invariably recovers." Some ten or a dozen pages are occupied by news-paragraph accounts of a girl in America, who died after being inoculated with supposed anti-toxin, which was infected by "some powerful poison, by mistake." That seems just about as wide of the question as the case of a person who recently took strychnine in error for phenacitin, through the carelessness of a dispenser. There are, doubtless, sympathetic readers who will enjoy this kind of work, but bacteriology is a subject of such profound importance to mankind that no amount of opposition will stop its investigation as its uses to us become more and more apparent.

*Lessons in Elementary Physics.* By BALFOUR STEWART, M.A., LL.D., F.R.S. New and enlarged edition. 496 pp. small 8vo. Illustrated with 157 figures. (London and New York: Macmillan and Co., 1895.) Price 4s. 6d.

This is the fourth edition and twenty-first issue, including reprints of various previous editions, of Professor Balfour Stewart's standard elementary class-book on Physics. Considerable additions with a number of new examples and figures have been incorporated by the present editor, Mr. W. W. Haldane Gee, B.Sc., thus bringing the volume in accordance with the modern position of Physics. Mr. Haldane Gee, being Chief Lecturer in Physics and Electrical Engineering at the Municipal Technical School of Manchester, has added somewhat to the Electrical Section of the book, and brought the subject well up to date

*The Chess Openings.* By I. GUNSBERG. 101 pp. 8vo. (London and New York: George Bell and Sons, 1895.) Price 1s.

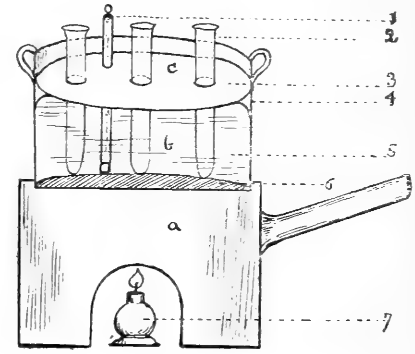
Considering the large number of our readers who are chess players, we include a notice of this very useful book. Mr. Gunsberg's name among "chessmen" is a sufficient guarantee for its accuracy. It is brought well up to date, the latest openings of Steinitz and others being included.

*Hints on Reflecting and Refracting Telescopes, and their Accessories.* By W. Thornthwaite, F.R.A.S. Sixth Edition. 92 pp. 8vo, illustrated. (London: Horne and Thornthwaite, 1895.)

This is a high-class trade catalogue, which contains much general information upon telescopes and other optical instruments. The historical portion will be useful to many persons, especially as this edition contains new chapters on "Transit Instruments" and "Astronomical Photography."

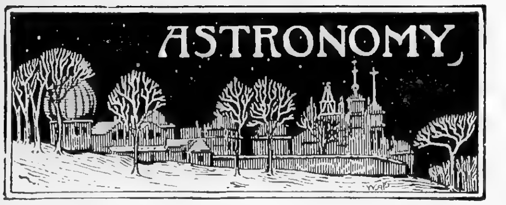
# MICROSCOPY

AN INEXPENSIVE PARAFFIN BATH.—In order that specimens from which sections are to be cut may be infiltrated with paraffin an embedding bath is necessary. This is usually a very costly item, and consequently is not often to be found in the amateur's kit; yet, if it were, it would constantly be of service and enable specimens of soft tissues to be prepared for cutting, so that very perfect sections might be produced. I have therefore thought that particulars of an inexpensive yet thoroughly efficient bath would be of interest to microscopists. The basis of it is a small potato steamer, obtainable at any ironmonger's shop, which should be altered as follows:—The lower portion (*a*), which we will call the heating chamber, must be cut away so as to admit a spirit lamp (7) or small paraffin lamp.



PARAFFIN BATH.

The perforated bottom of the upper vessel which constitutes the bath (*b*) must be covered with a sheet of tin, which must be soldered, to render it water-tight. Near the top of the bath a circular plate of tin (*c*) must be fitted, having holes (3) drilled in it to admit the test tubes (2) and thermometer (1). This plate should be supported by four small pieces of of tin (4), soldered to the inside of the vessel. Having completed these alterations, a layer of cotton wool or a piece of felt (6) should be placed on the bottom of the bath to protect the test tubes from breakage; half fill with water (5), add a cheap chemical thermometer (1), light the lamp, and when the desired temperature is attained (122° Faht.), place some paraffin wax in the test tubes and put them into the bath; when the paraffin has melted, add the specimens. The temperature must be maintained for several hours, so that the paraffin may penetrate to the middle of the tissue. Further treatment would be similar to that for ordinary embedding in paraffin wax. After use, the apparatus should be thoroughly dried so that it may not rust, and if this be attended to, it will last for many years.—*Martin J. Cole, 27, Chancery Lane, W. C.*




| | 1895. | | | Position at Noon. R.A. | Dec. |
|---|---|---|---|---|---|
| | | Rises. h.m. A.M. | Sets. h.m. P.M. | h.m. | |
| Sun ... | Aug. 1 ... | 4.25 ... | 7.47 ... | 8.46 ... | 18° 2′ N. |
| | „ 11 ... | 4.40 ... | 7.30 ... | 9.24 ... | 15° 17′ |
| | „ 21 ... | 4.56 ... | 7.10 ... | 10.1[illegible] ... | 12° 8′ |
| | | Souths. P.M. | Sets. P.M. | | |
| Moon ... | „ 1 ... | 9.9 ... | 12.21 | | |
| | | Rises. P.M. | Souths. A.M. | | |
| | „ 8 ... | 8.35 ... | 2.29 | | |
| | „ 15 ... | 10.53 ... | 8.1 | | |
| | | Souths. P.M. | Sets. P.M. | | |
| | „ 22 ... | 1.48 ... | 7.47 | | |
| | | Rises. A.M. | Souths. A.M. | | |
| Mercury... | „ 9 ... | 3.44 ... | 11.35 ... | 8.42 ... | 19° 38′ N. |
| | 19 ... | 4.57 ... | 12.13 ... | 10.3 ... | 13° 50′ |
| | „ 29 ... | 6.7 ... | 12.43 ... | 11.13 ... | 6° 20′ |
| | | Souths. P.M. | Sets. P.M. | | |
| Venus ... | „ 9 ... | 2.35 ... | 8.30 ... | 11.47 ... | 1° 53′ S. |
| | „ 19 ... | 2.10 ... | 7.46 ... | 12.1 ... | 5° 21′ |
| | „ 29 ... | 1.34 ... | 6.59 ... | 12.4 ... | 7° 42′ |
| Mars ... | „ 9 ... | 1.26 ... | 8.20 ... | 10.37 ... | 9° 50′ N. |
| | „ 19 ... | 1.10 ... | 7.51 ... | 11.1 ... | 7° 23′ |
| | „ 29 ... | 0.54 ... | 7.28 ... | 11.24 ... | 4° 50′ |
| | | Rises. A.M. | Souths. A.M. | | |
| Jupiter ... | „ 9 ... | 2.29 ... | 22.32 ... | 7.46 ... | 21° 26′ N. |
| | „ 29 ... | 13.33 ... | 21.31 ... | 8.4 ... | 20° 40′ |
| | | Souths. P.M. | Sets. P.M. | | |
| Saturn ... | „ 9 ... | 4.49 ... | 10.3 ... | 14.1 ... | 9° 49′ S. |
| | „ 29 ... | 3.36 ... | 8.47 ... | 14.6 ... | 10° 22′ |
| Uranus ... | „ 29 ... | 4.26 ... | 9.2 ... | 14.56 ... | 16° 27′ S. |
| | | Rises. P.M. | Souths. A.M. | | |
| Neptune ... | „ 29 ... | 10.32 ... | 18.35 ... | 5.8 ... | 21° 28′ N. |

### MOON'S PHASES.

| | | | |
|---|---|---|---|
| *Full* ... Aug. 5 ... | 1.51 p.m. | *Last Qr.*... Aug. 13 ... | 5.19 p.m. |
| *New* ... „ 20 ... | 0.56 a.m. | *1st Qr.* ... „ 27 ... | 5.43 a.m. |

THERE will be a very important shower of meteors this month, the Perseids appearing on the 10th. The radiant point is $\alpha$ 45° $\delta$+57°.

THE sun-spot record at Greenwich during 1894, indicates a slight falling off of the mean daily spotted area compared with 1893. In the earlier months of this year there was a further reduction of both area and number of spots.

A PROPOSAL has been made to erect in the park at Greenwich, in connection with the Observatory, a special building to be used for a magnetic observatory, for the determination of the magnetic elements. As this will not be a large undertaking it is nearly certain to be carried out. It will be a work of some importance.

THE progress of the Astrographic Chart at the Royal Observatory, Greenwich, appears from the Report of the Astronomer Royal to be considerable during 1894–95. The number of fields successfully photographed during the year amount to 90 for the chart, and 180 for the catalogue. These bring up the totals since the commencement of the work to 617 for the catalogue and 422 for the chart.


CURIOUS NESTING OF BIRDS.—A new railway is in process of construction through Tuxford, the "overland" or temporary line of rails having been laid for the use of the engines and trucks employed on the work. Beneath one of these rails a pair of wagtails (*Motacilla lugubris*) built their nest, and have reared their brood, in no way disturbed by the numerous trains which daily passed over the line. The birds and their nest were under the protection of the workmen. Another curious instance is that of a blackbird which laid her eggs in a natural cavity between the roots of a larch in Clumber Park, no attempt at nest-making or lining having been made. On June 9th the cavity contained two young birds and two eggs. The bird has frequently been seen by those living near the spot.—*W. A. Gain, Tuxford, Newark; July 8th*, 1895.

NOTE OF FEMALE CUCKOO.—Whilst glancing at the naturalist's column of the *Field*, page 818, on June 9th, 1894, I observed a note by W. H. Tuck, calling attention to the cry of the female cuckoo, it being a sort of bubbling sound, or like a noise of water being poured from a bottle. I have, however, heard just as much cuckooing as "bubbling," and as it is supposed cuckoos do not go in pairs, but singly, I take it that the female bird is also capable of cuckooing, which Mr. Tuck does not think to be the case. Personally, I have always thought the bubbling noise a sort of cackling, as a hen will, after she has laid an egg.—*H. Mead-Briggs*, 37, *Nunnery Fields, Canterbury*.

CUCKOO'S EGGS.—Since I sent my note respecting the cuckoo to SCIENCE-GOSSIP, in June, 1893, I have collected several interesting facts about this bird, who appears to me to select its dupes at random. In 1894, seventeen eggs were found in this village, chiefly in roadside hedges. The nests were of hedge-sparrow (10), robin (1), wagtail (2), yellow-bunting (1), linnet (1), greenfinch (1), shrike (1). The dates were from May 19th to June 27th. This year, at the time I write, fourteen eggs have been found, the first May 9th. The nests were willow-warbler (1), hedge-sparrow (4), sedge-warbler (2), yellow-bunting(3), wagtail (2), spotted fly-catcher(1), greenfinch (1). Several eggs, both seasons, were evidently laid by the same bird. In the case of the fly-catcher, I was watching a nest with four eggs in a fruit-tree on a wall; a boy took the nest out. which I carefully replaced; next morning, the cuckoo had taken out two of the eggs and introduced her own. The case of the greenfinch is still more extraordinary, which is clearly turning the tables and duping the bird. My brother put a deserted greenfinch's nest, with two eggs, in an ivy-wall, where the cuckoo had laid in the wagtail's nest the last two seasons, and, next morning, an egg was found in it. I believe that this circumstance has not before been recorded in Britain, although Herr Baldamus, in his "Naumannia," mentions a similar case.—*W. H. Tuck, Tostock, Bury St. Edmunds; June 22nd*, 1895.

## SCIENCE GOSSIP

PROFESSOR W. RAMSAY contributes to "Nature" of July 4th, particulars of his discovery of both argon and helium in meteoric iron. These elements were obtained by heating the iron *in vacuo*, accompanying them was a comparatively large quantity of hydrogen.

DR. HART MERRIMAN, Chief of the Division of Ornithology in the United States Agricultural Department, has raised his voice against the slaughter of hawks, owls and crows in America. He shows that they there feed largely on mice, grasshoppers, etc.

MR. WALTER P. COHEN read a paper before the Wellington Philosophical Society, New Zealand, on the appearance in some numbers of *Venessa itea* in Wellington, in March, 1894, where this handsome butterfly had not previously been observed. It is a northern New Zealand species.

THE number of "Natural Science" for July is of especial interest, as it is devoted to a *resumé* of the "Challenger Expedition," and contains contributions from some three dozen eminent naturalists. There are also illustrations of the ship and mode of conducting the scientific work on board.

THE excellent Society for the Protection of Birds, which deserves the support of our readers, has issued Nos. 19 and 20 of its publications, the former being a pamphlet on the barn owl by Mr. W. H. Hudson. No. 19 is a leaflet on the use in their millinery, by ladies, of feathers of birds of paradise, which is surely leading to the extinction of these handsome birds.

NATURALISTS studying or collecting eggs or ornithological specimens, are frequently accused of exterminating rare birds. This is quite a mistake, with the exception of a very few rare and local species. A single cold sleet shower passing over a district at the season when young birds are in the nests, will destroy tenfold more than all the naturalists, and, for the matter of that, bird-catchers and schoolboys added, in a whole year.

WE have received Bulletin No. X (May, 1895), of Botany from the Queensland Department of Agriculture at Brisbane. It consists of contributions to the Queensland Flora, and includes two new species of the fungoid genus *Mutinus*, described and figured by the colonial botanist, Mr. F. M. Bailey, F.L.S. They are allied to our *Phalas impudicsus*, one *M. pentagonus* is very beautiful, but like our species, very fœtid.

WE have received from Messrs. Watkins and Doncaster samples of polyporus tablets, which are narrow strips of pith-like material that are coming into general use among leading entomologists for "staging" micro-lepidoptera, micro-hymenoptera and other small insects. It is a great improvement upon pith or cork for this purpose, as it will not injure the finest pins. It is 2s. 6d. per ounce, very light, and quite white in colour.

## SCIENCE ABROAD

THE MONITEUR SCIENTIFIQUE DU DOCTEUR QUESNEVILLE (Paris, July, 1895) contains an article on the chemical constituents of various colouring matters, and the progress made in this branch during the year 1894. The article, which is by Mons. Ed. Ehrmann, is divided into eight chapters, of which only four are given in this number. There is also an article by M. Engelhart on the "Manufacture of Portland Cements by a Dry Process." He does not think the dry process would be suitable in England, as the calcareous materials found here contain so great a proportion of silica that purification is absolutely necessary; but in other countries he maintains the dry process would be much better than the so-called "wet process."

LA NATURE (Paris, July 6th, 1895) has an article on the course of the "Auto-mobile Carriages," illustrated by ten figures, showing the nine principal carriages in the race which took place in France on June 11th last. Dr. E. Trouessart has an article on "The Extinct Gigantic Birds of Southern Patagonia," illustrated by two figures, one of the head and bill of the *Phororhacos longissimus*, and the other an ideal restoration of *Brontornis burmeisteri*, represented as knocking down a Dinosaurien. Remains of these birds are found in eocene deposits. In the same magazine for July 13th, M. E. Hennebert describes the National School of Horticulture at Versailles, which is provided with ample material for laboratory instruction. There is a fine library and beautiful herbariums of native and foreign plants. The article is illustrated with a plan of the buildings and grounds and elevation of the school, which appears to be doing much good work. The number for July 20th contains an illustrated article on "Some Abnormal Trees in France," rather with regard to size than shape. It is also illustrated.

COSMOS (Paris, July, 1895) contains a short illustrated article on the new Meteorological Observatory in St. Helier, Jersey. This observatory is really intended for a meteorological laboratory, as it is proposed, besides the ordinary routine of hourly or three-hourly observations, to carefully watch and note all changes in the atmosphere and general meteorological phenomena. The observatory has been founded by and is under the immediate direction of Mons. Marc Dechevreus, who is already well known as the organiser of the Observatory of Zi-Ka-Wei, in China. The writer of this article says that Mons. Dechevreus might say that the sun never sets upon his possessions, as during the summer solstice the hour of sunrise on one observatory is the hour of sunset on the other. In this number of "Cosmos" there is also an article by Mons. Louis Rabourdin on the proposal recently made by a member of the council to pull down the Observatory of Paris. He sets forth the work done in the past by this observatory as good reason why it should not be destroyed, and urges rather its development.

# IN MEMORIAM

The Right Hon. Thomas Henry Huxley.—Born at Ealing, in 1825, the late Professor Huxley, as he is still best known, died at Eastbourne, on June 29th, 1895, after an illness of upwards of a year's duration. Huxley's name is, and will be in time to come, so well known, not only to the scientific world but to the general public, that it would be a work of supererogation to describe the past work of one so familiar to us. His bold honesty of character and fearless assertion of his opinions have done possibly as much as any other cause to advance natural science to its present strength of position in the public estimation. When he was a youth he and others of his time had to do battle with a many-headed hydra of prejudice, to overcome the sneers and fears of an insufficiently educated public, which insisted on its early teachings being left undisturbed. This is not the place, even if it were proper, for us to enter fully into those prejudices, for we doubt if they have all disappeared, and it is useless to cause pain unnecessarily. The fight so gallantly fought by the little band, which numbered in it Darwin, Tyndall and Huxley, who had to overcome the errors of a century of centuries, can never be understood by many who now accept their teachings as matters of course. The odium they suffered, the contumely they met, and the contempt hurled at them has had no more effect in stopping their teachings than to steady them for a time and prevent their being too lightly accepted. The experiences of these great men, now passed away, shows how certain is the truth to endure, when disinterestedly and honestly told by able masters. A remarkable instance is Huxley of self-education, for although his father was a schoolmaster, he practically directed his own education, slowly but surely absorbing knowledge, rarely forgetting a fact when he had assured himself of its trustworthiness. An independent thinker, Huxley had the fine faculty of applying such knowledge as he attained to its very best use; always comparing, collating and analysing his facts until he had evolved from them a theory which usually stood the test, for him as severe as the assayer's crucible. His system of teaching was marked by simplicity and conciseness. His sureness of his own knowledge gave him a certain strength as a professor which exercised power over his pupils. His clearness of insight ahead of his time was remarkable, and years ago he forecast many events which are now with us. Among Professor Huxley's qualifications and many honours, he was a Privy Councillor, LL.D., Ph.D., D.C.L., M.D., F.R.C.S. Eng., a Past-President of the Royal Society, and member or honorary member of a long list of the leading societies of the world. It would be puerile to deny that as a leader of modern thought in sociology, as well as natural science, Huxley will hold his influence for years to come. His knowledge of biological subjects was closely approached by that of his fellow-creatures, and their present condition of civilization. He had a contempt for all superstition, hypocrisy and conventional service of any kind; he was, in fact, the apostle of realism and common sense. He had but one steadfast object in life—the elucidation of truth and its diffusion as widely as was humanly possible. We even now know some of the results of his life's work and their influence on the intellect of mankind, but how much more will they be felt in another generation or more. J. T. C.

Charles Cardale Babington, M.A., F.R.S., Fellow of St. John's College, Professor of Botany at Cambridge, died at his residence there on July 22nd, 1895, after a protracted illness. He graduated in 1830, was elected to the chair of botany in 1861. He was eighty-six years of age at the time of his death. He was a son of the late Rev. Joseph Babington, and grandson of Mr. Thomas Babington, of Rothley Temple, Leicestershire. Born at Ludlow, he was educated at St. John's College, Cambridge, was appointed Professor of Botany in the University, and elected to a Professorial Fellowship at St. John's College, in October, 1882. He was well known as a naturalist and antiquarian. Among his works were "Flora Bathoniensis," "The Flora of the Channel Islands," a "Manual of British Botany," "Flora of Cambridgeshire," as well as a "History of the Chapel of St. John's College, Cambridge," which he published in 1874.

Ernest Henri Baillon, whose death is announced, committed suicide very sadly by bleeding from the arm. He was one of the most distinguished of French botanists, and perhaps quite the most prolific author of works in that science of the last quarter of a century. He was born at Calais, November 30th, 1827. He prosecuted medical studies at Paris. In 1855 he received the double degree of doctor of medicine and of the natural sciences. In 1864 he was appointed Professor of Medical Natural History to the Faculty of Paris, and soon afterwards Professor of Hygiene to the Central School of Arts and Manufactures. He was decorated with the Légion d'Honneur on August 17th, 1867, and promoted to Officer, July 13th, 1888. His chief publication was "Histoire des Plantes," which has been partly translated into English, a vast undertaking in twelve fully-illustrated volumes, the publication of which commenced in 1866, and concluded only three years ago. His next great work was a "Dictionnaire de Botanique," which he began in 1876; the first volume appeared in 1878, and the fourth in 1885. These are works of great value and research. He published a number of monographs and studies on various natural orders and groups of plants, particularly on the orders Aurantiaceæ, Euphorbiaceæ, and Caprifoliaceæ. Most of these appeared at first in his journal "Adansonia," which appeared periodically for many years.

Among other deaths during the past month are to be numbered those of Professor Daniel C. Eaton, another well-known botanist and authority upon ferns, who died at New Haven, in the United States; Professor Tietjen, of the Berlin Observatory, who was for some time editor of the "Berlin Astronomical Annals"; Professor G. F. W. Spörer, of the Potsdam Observatory, and the well-known Monsieur J. Deby, an authority on the diatomaceæ, whose magnificent collection of those beautiful objects was some little time since purchased for the Natural History Museum at South Kensington. M. Deby was a well-known Belgian naturalist, who was born at the royal suburb of Lacken, near Brussels, in 1826.

# BOTANY

THE FLORA OF NEWFOUNDLAND.—Last July and August, Messrs. Robinson and Schrenk, of Harvard University, made a botanical visit through the Exploits Valley and some other stations in Newfoundland. They collected over 7,000 specimens of flowering plants and vascular cryptogams. The Exploits Valley, though 200 miles further north than St. John's, has a richer and more advanced flora.

FLOWERING OF EVENING PRIMROSE.—On July 6th, about 7.30 p.m., I was looking at some very fine specimens of evening primrose, in a garden opposite the infant school at Coldharbour. The evening was decidedly cool, after a very hot afternoon, and most of the flowers were fully expanded; but I observed in one flower that was still closed a peculiar rotatory movement, as if some one held it by the flower-stalk and swung the flower round; or, as if a large humble-bee were describing circles inside it. In fact, every moment I expected to see such a bee issue from it; but, instead of this, the sepals of the calyx all at once flew back with a spring and the petals began to gradually separate from one another. I do not pretend to explain the phenomenon, but I fancy it may be due to a fall of temperature, producing contraction of elastic fibres in the flower-stalk, because the flowers will open in the day-light when the sky is overcast and the temperature falls. At any rate, the phenomenon is most interesting to the student of biology, showing, as it does, the intimate connection of physical and mechanical laws with vital functions.—*D. Hooper, B.A. and M.B. (Lond.), Kitland's Farm, Coldharbour, Surrey; July 7th*, 1895.

HARMONIOUS COLOURING OF WILD FLOWERS.—Everyone who possesses a mixed border in his garden must have experienced the difficulty of effecting harmony in the colour of the flowers composing it. Here, we may be shocked by the sight of a red tiger-lily side by side with a rose-coloured foxglove; there, the bright blue cornflower flaunts itself in too close proximity to a clump of lavender-blue campanula. Now it has often struck me as remarkable, that flowers of our fields and woods exhibit no such discords of colour in their juxtaposition, but on the contrary are ever charming us with their apparently fortuitous harmonies. The instance of the purple heath and yellow gorse is a familiar one. On Mickleham Downs at the present moment may be seen sheets of pale yellow *Sedum acre* interspersed with the pale blue of some forget-me-not (*Myosotis arvensis*), and when the *Sedum* goes off, its place in the harmony will be filled up by the rock rose (*Helianthium vulgare*), which grows here almost as abundantly as the *Sedum*. In a wood near Dorking one early summer, I remember another harmony of darker blues and yellows made up of spikes of ground-ivy and "weasel snout," in a dainty bed of melic and other grasses, and the same colours are contrasted, to the increased setting off of each flower. Now we know that the colour of flowers has been developed through natural selection as an attraction to the insects that fertilize them, that flowers to attract bees tend to become blue. But is there not some good reason for the harmonious juxtaposition of the wayside flowers? May not, for instance, the contrasts of colour, so gratifying to our artistic sense, serve the purpose of attracting insects by making each colour more conspicuous, or in other words, may not each flower best flourish and abound on the community of interest and natural selection principle, side by side by that other whose colour best serves to display its charms?—*M. J. Teesdale, St. Margaret's, Dulwich; July 13th*, 1895.

GROWTH OF REED-MACE.—While out for a ramble with my friend, Mr. Broadbent, a few weeks ago, we came across a pond wherein the common bulrush (*Typha latifolia*) grew very plentifully, and among the rest we noticed one, the leaves of which had penetrated a piece of the dried stem of a last year's plant, which it had lifted out of the water for a distance of twelve or fourteen inches as represented in the accompanying drawing. Similar occurrences may be noticed in woods in early summer, when the leaves of the bluebell will be found to have bored through and lifted up the dried leaves which fell from the trees in the previous autumn.—*Charles Mosley, Woodside Road, Huddersfield; June*, 1895.

FORCED GERMINATION OF SEEDS.—In answer to Mr. Geo. Nowers' query in SCIENCE-GOSSIP of July, it is well known that by the application of chlorate of potass, oxalic acid and chlorine, the germination of seeds that have been kept for some time has been brought about, when probably they would not have germinated under ordinary conditions. Humboldt stated that the seeds of the common cress (*Lepidium sativum*) in a solution of chlorine, germinated in six or seven hours, whereas in water, germination did not take place for thirty-six or thirty-eight hours. I am not aware of any other experiments on the forcing power of acids, but I would refer Mr. Nowers to an article on "Electricity in Horticulture," published in SCIENCE-GOSSIP (Vol. I., New Series, 1894-5, page 124), in which it is shown that, according to the experiments of certain observers, electricity can hasten the germination of seeds when currents are passed through the soil. It is well known that the prime factors in the germination of seeds are heat and moisture in due proportions, and that after the initial stages, and with the unfolding of the first leaves, light in proportion must be afforded or no real growth or formation of material by the action of chlorophyll can be obtained. Some botanists have striven to show that artificial light can hasten the germination of seed, but it is probable that rays of light have but little or no influence on the actual germination of seeds. The probable explanation is that the artificial light promotes greater heat than when plants were grown under ordinary conditions. The question, "Which does exercise the most beneficial influence on seed germination, light or heat?" could easily be answered, and it is to be hoped that someone will soon throw a little light on this important subject. There seems to be no doubt that when the green leaves first put in an appearance above ground much may be done by the rays of the arc-lamp to hasten maturity, and it may be suggested that some of our county councils take up this subject, for anything that will enable the English market gardener to compete with foreign produce is of great importance. Some day forcing by electric light may be universally employed.—*Herbert C. Fyfe, Kensington.*

# PHOTOGRAPHY

FORAMINIFERÆ IN MOUNTAIN LIMESTONE.—Not the least evidence of progress which science has made during the present century is the way in which geological knowledge has advanced. How different is our information as to the past history of the earth and of its inhabitants and the conditions under which the sedimentary rocks were deposited, compared with that of the close of the last century. The mountain limestone may be taken as an example. By the intelligent and persistent accumulation of observed facts connected with its organic contents we know that it is built up of the calcareous remains of marine animals, such as shells of molluscs, echinoderms, corals, etc. Even the fine compact parts, if prepared in thin slides and examined with the microscope, reveal tests of organic life still retaining the shape in which the tiny inhabitants lived in that remote period. These, the Foraminiferæ, belong to the lowest division of animals, the Protozoa, and, small as they are, have played and are still playing an important part, as rock builders, in the earth's history. The white chalk rocks are almost entirely composed of their remains; and the tertiary or numulitic limestone of Southern Europe and Asia Minor is also the product chiefly of the same class of animals. The photomicrograph fig. 1 is a section of mountain limestone from near Skipton, in Yorkshire (× thirty diameters), while (fig. 2) is a section cut from an erratic boulder found in the River Wyre, Lancashire (also × thirty diameters).

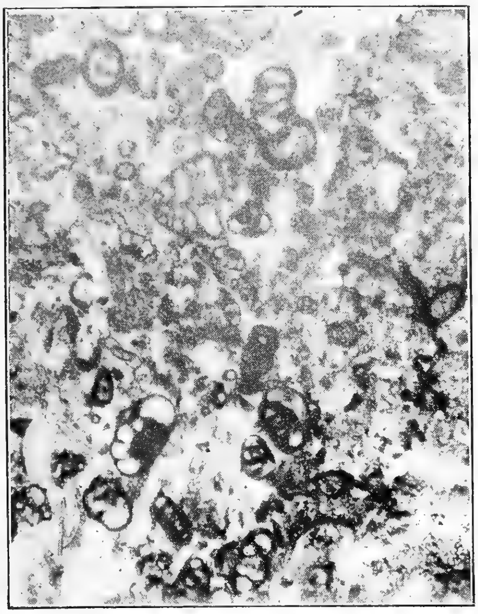


FIG. 1.—× 30 *diam.*
MOUNTAIN LIMESTONE CONTAINING FORAMINIFERÆ

Both show an abundance of the chambered shells cut in sections. We have many examples from the mountain and tertiary limestones. The abundance of such forms of life tells us that the rocks in which they are found are of marine origin, and that at the time of its accumulation the area in which they occur must have been submerged and formed in deep sea. If we examine a little of the ooze from the bottom of the sea we find it almost entirely composed of the descendants of these little creatures, who can claim an ancestry reaching back to the earliest geological records. Well might the Rev. H. N. Hutchinson in his "Autobiography of the Earth," say: "Poor, frail, invisible little foraminifer, is it given to you and your countless progeny, so long unknown, uncared for, to build up, on your abysmal graveyard, the rocks on which in future ages men shall found their cities, in which shall dwell the kingdoms and democracies of future ages? Is it for you, when we are turned to useless dust, thus to serve mankind? Oh, mighty privilege! Oh, great destiny! And yet ours may be, and we believe will be, greater still—to lay as firmly and as truly those invisible foundations on which alone communities may rest securely, of righteousness, judgment, peace!"—*W. W. Midgley, F.R.Met.Soc., Museum, Bolton; July*, 1895.

AMATEUR PHOTOGRAPHERS.—The Editor of "The Photogram," draws attention to the decline of interest in societies of amateur photographers. This applies equally to both sides of the Atlantic Ocean. There seems to be little doubt that this falling off in interest is real, though it does not indicate an actual reduction among the workers at photography on either continent. The manufacturers of cameras and photographers' material were never more busy than this season, and are generally far behind with orders, although working overtime. The fact is, we imagine the fault lies with some of the members themselves. We refer especially to the class among photographers and naturalists who attend meetings solely for the purpose of criticising, and seldom help to find part of the evening's entertainment.

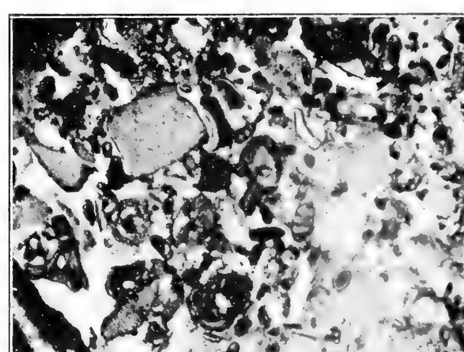


FIG. 2.—LIMESTONE BOULDER, × 30 *diam.*

## GEOLOGY

IGUANODON AT KENSINGTON.—The Geological Magazine for July, contains an illustrated article by Dr. H. Woodward, F.R.S., President of the Geological Society, upon the reconstruction of *Iguanodon* in the British Museum, Kensington, which is indebted to the assistance of Mons. E. Dupont, the Director of the Royal Museum in Brussels, for obtaining a coloured reproduction of the entire skeleton of *I. bernissartensis*. This is now on view in the reptile gallery of the geological department. The article is of value to students of geology on account of Dr. Woodward's description of the find, in 1878, of no fewer than twenty-three of these skeletons in Wealden strata, near the village of Bernissart, between Mons and Tournay, on the French frontier of Belgium. A trial gallery made in order to discover the continuation of a missing seam of coal, led to discovering an ancient river-gorge, excavated by a stream in the Jurassic period, through several hundreds of feet of coal-measures, but long since filled up and lost. This river-gorge is very rich in fossils, and well stocked with fishes, reptiles, tree-ferns and semi-tropical animals and plants.

ATURIA ZICZAC IN SUFFOLK.—I beg to send you a sketch and also a photograph of a magnificent specimen of an extinct species of the Pearly Nautilus which I recently found in the London clay cliffs at Walton-on-the-Naze. The fossil weighs nine and a half pounds, its lateral measurement, eight inches, length on the dorsal curvature, nineteen and a half inches, whilst the periphery or head aperture measures five and a half inches in diameter. The outer shell, although decalcified, shows distinctly all the successive growths of the laminæ, and where the shell has been worn away, the nacre or inner pearly coating is brought in view, retaining in parts almost its original colour. In places where the fossil has been denuded of both shell and nacre, the septa or casts of the nautiloid chambers are beautifully marked, and still coloured as vividly as in life, although an abyss in time has elapsed since the creature ceased to exist. Dr. J. E. Taylor has declared this fossil to be a perfect specimen of the elegantly proportioned Nautilus, *Aturia ziczac*, a cephalopod characteristic of the eocene formation, a stratum immediately succeeding the chalk, and at an epoch when the climate of this country was tropical. Another interesting specimen of the London clay had interstratified, to all appearance, two well-defined miniature coal seams. These, however, upon examination, proved to be highly carbonized vegetation. The clay in that neighbourhood is intermixed with crystals of selenite or sulphate of lime, ranging from microscopic size to seven inches in length, these latter may be split into very thin plates and used in various polarising appliances. So geologically rich are the cliffs at Walton, that on the same visit, I made quite a collection of crag shells, including the reversed whelk, the whole being now on view at Wolsey House, Ipswich.—*A. Martinelli, 77, Hervey Street, Ipswich; June,* 1895.

## NOTES & QUERIES

FUNGOID POTATO DISEASE.—Several potato plants in my garden and in those of my neighbours have this hot season suffered from a disease that does not appear to be noted in any of the books to which I have access. A few dark-brown irregular spots appeared on the leaves about the end of May or beginning of June. The leaves gradually turned brown and very dry; dark shiny spots appeared on these dry leaves, something like those of *Rhytisma acerinum*, but smaller. The infection spreads down the stem gradually, and the whole of the stem becomes dry and withered as if shrivelled by frost. It is noticeable that separate leaflets may be infected for a long time before the others. The old tuber appears to be filled with a tangled mass of septate mycelium, and I have found what appear to be zoospores—small oval bodies in movement—and talentospores—two or three thick-walled cells coloured a dirty green. Later on, perhaps in consequence of the drought, the dark patches did not appear. The infection appears to travel down the intercellular spaces, but in some cases cells seem to be filled with very small black spores. Can any of your readers tell me what fungus this is?—*J. Leuton Brain, Swanton Morley, E. Dereham; July,* 1895.

CHALK ROCK IN HERTS.—In a well recently dug at St. George's School, Harpenden, Herts, this bed was pierced at a depth of about 110 feet below the surface, the height of which above sea-level is 410 feet. It had a thickness of three feet, and was of a very tough consistency, markedly different from the soft beds of upper chalk hitherto excavated. It seemed to consist at this spot, to a very large extent, of the remains of echinoidea. Owing to the hardness of the stone these were generally broken across, showing a chalky interior surrounded by a thin calcite shell with gleaming cleavage surfaces. There were also present irregular shaped nodules of a hard cream-coloured rock with a dull green powdery exterior. Some microscopic sections which I prepared showed the substance of the rock almost entirely composed of organic remains—foraminifera, sponge spicules, spines and plates of echinoidea—with very little amorphous mud. Among the larger fossils were terebratulæ and rhynchonellæ, beautifully preserved, small ventriculites and casts of *Pleurotomaria* and other gasteropods, with a few fish-teeth. Accessory minerals were glauconite (very abundant—some grains very large), flakes of mica, and many rounded nodules of decomposed iron pyrites, enclosed always in an ochreous covering. It is interesting to note the position of the bed here, compared with the long exposure in the cutting on the Midland Railway south of Luton, four miles to the north, at an altitude of 420 feet, and with that at the summit of Kensworth Downs, above Dunstable, nine miles away to the north-west at 800 feet. I have never seen any description of the bed in the records of the well-sections below London.—*N. E. McIntire, St. George's School, Harpenden; May 20th,* 1895.

Marine Aquarium.—I am anxious to start a small aquarium. I should be much obliged if one of the many readers of Science-Gossip would tell me the name of any naturalist on the Coast who would forward seaweeds, etc., at small cost.—*Joseph Blundell*, 39, *Westmoreland Road, Bayswater, W.*

Rapid Growth of Spruce Fir.—Some months ago, I was taking a few pieces of the spruce fir *Picea excelsa* for microscopic work, when I noticed that the growth made in 1894 appeared to be greatly in excess of that made in 1893. After the great gale on March 24th last, I examined several of the terminal shoots of fallen trees and found some twenty inches in length compared with ten inches made in 1893. The leaves, also, were as long again as those of the previous year, and much thicker. In some cases the larch and Austrian pine appeared to have grown abnormally fast in 1894, but the difference was not so marked. I should be glad to know whether any of your readers have observed the same fact.—*J. Lewton Brain, Swanton Morley, E. Dereham.*

Animal Intelligence.—An interesting instance of animal intelligence recently came to my notice. A ferret, *Putorius furo*, belonging to Mr. Jenner, of Colickmoor Farm, had the unusually large litter of eleven young ones, and evidently finding difficulty in feeding so large a family the mother made a second nest into which she removed three of the young ones. By this means she was enabled to give the proper attention that her offspring demanded. A somewhat similar case was that of a great titmouse, *Parus major*, which built a nest at the bottom of a large flowerpot used for forcing rhubarb. The nest was made of moss, worsted, and the various other things that this bird seems to especially delight in using, and fitted the pot, forming a kind of mat. A cup-shaped indentation was made and two eggs were laid. Then came a wet day, and the bird, finding no doubt that the rain had caused that portion of its nest to become uncomfortable, moved to a more sheltered part of the pot, and some six inches away shaped another hole and there in the dry laid another ten eggs.—*David J. Rice, Squire's Farm, Westcott, Surrey; July 10th*, 1895.

Luminosity in Animals.—Having for some years watched with great interest the luminous bodies taken from the sea, such as *Noctiluca*, and noticing the effect of sunlight upon these soft-bodied swimming creatures, I have come to the conclusion, after comparing the two lights, that that produced by sulphide of calcium, which is the basis of luminous paint, is identical with the *Noctiluca* light. Those who have worked with the microscope in studying living objects must have observed the great power which light has in attracting the swimming *Rotifers* and *Infusoria*. The same observation applies to the effect of the electric light in dredging and tow-netting on a dark night. This well-known attraction of light will, I think, account for the luminosity of some inhabitants of the sea being more vivid after a bright sunny day than after cloud and rain. It will also be found by observation that these soft-bodied living objects have the power of absorbing light during the day and emitting it at night. This power again has led me to the conclusion that sulphide of calcium, formed by the decomposing matter in the sea combining with the lime in the water, is the product which produces luminosity in some animals as well as in luminous paint. It is generally known that luminous paint must be exposed to daylight before the light is reproduced in the dark, and I have found that glow-worms and *Noctiluca* kept shut up entirely from daylight emit little or no light at night. I advance this theory to induce others abler than myself to put it to the test, and also to correct a generally believed idea that phosphorus causes this luminosity.—*Thomas Shepheard, Kingsley, Bournemouth.*

Winter Exhibitions.—Secretaries of natural history societies will soon be making arrangements for their winter programmes. In the hope of suggesting an idea that may be useful to them I send some details of a scheme that is now being carried out by the curator of the Tunbridge Wells Natural History Society. His object is to obtain a good series of slides for a lantern evening next winter, and by means of co-operation with neighbouring societies to obtain the maximum of result with the minimum of trouble. He has chosen geology for this series, but the plan would apply just as well to microscopical, botanical and other lantern slides. Early in the winter a letter was sent to the secretaries of the ten nearest natural history societies asking the assistance of their committees in carrying out the following proposals;—(1) That each natural history society in Kent, Sussex, and Surrey should prepare some geological lantern slides, (five or more), of the most interesting parts of their own district, with written description. (2) That before next winter arrangements be made to show the whole collection before each society. (3) That the slides be made in duplicate, so that if broken they can be replaced at a small charge. They all consented, and in May a few more detailed rules were sent round. Each society contributes one shilling towards the cost of a travelling-box to contain the slides. All slides are to be clearly marked with the name of contributing society, and numbered to correspond with description. They are to be sent in before August 1st to our curator, with an intimation from each society as to when the whole set will be required for exhibition. He will then arrange the rota, and each society will receive them in turn and keep them about a week, paying the carriage forwards to the next society on the list. Each society will receive their own contribution back at the end of the winter session, 1895-6. The slides are already coming in, and promise to provide material for a most interesting evening.—*G. Abbott*, 57, *Ye Pantiles, Tunbridge Wells; June 25th*, 1895.

Coloured Plates.—Some of my friends have noticed my objection to coloured plates for illustrating natural history books. It is not to coloured plates as a whole, but to the highly decorative specimens. That clever artist, Mr. P. J. Smit, has protested against my remarks on his plate of hoopoes, when noticing the "Royal Natural History" (*ante* page 102). He says in his letter "I may say that my figure of the hoopoe was carefully painted from life. There was a good specimen of the bird living in the Zoological Gardens, and there can be no doubt that the bird seen in a bright light is very striking in colour. To say that my drawing is more brilliant than accurate is quite a mistake. Dr. Sharp thought my figure a good one. Possibly the reviewer doesn't know the bird alive, and is only familiar with skins or stuffed specimens." I have frequently seen the bird alive in Southern Spain and North Africa, but still think the plate too bright. What is the opinion of others familiar with these birds? J. T. C.


City of London Entomological and Natural History Society.—At the meeting of May 21st, 1895, the exhibits were: Mr. Clarke, three specimens of *Amphidasys strataria* from Epping Forest, bred by Mr. Lane; one of them was of a very pale ochreous-grey colour, with the usual markings mapped out in a slightly darker shade. Mr. Gates, a series of *Lithocolletis lantanella*, bred from leaf rubbish collected from the ground. Mr. Bate, young larvæ of *Spilosoma mendica*, which had passed the winter as ova. Mr. Prout, a variety of *Tæniocampa munda*, much resembling some of the dark mottled forms of *T. incerta*, from Broxbourne, and an asymmetrical *T. populati*, from Epping Forest. The latter had the orbicular stigma on left forewing much enlarged and of a very irregular shape. Mr. Bacot, a series of *Cidaria suffumata*, bred from Aberdeen ova; they were all of the ordinary form although said to be the produce of a female of the var. *piceata*. Rev. C. R. N. Burrows, a case of *Epichnopteryx reticella*, which represented a whole day's work on the sea-wall at Benfleet. Mr. May stated that a male *Spilosoma lubricipeda* had paired with two females, and both had laid fertile ova. Mr. Bartley recorded the capture of a specimen of *Tæniocampa opima* at light, at Clapton, near London, about May 10th. Mr. Bate read a paper on "*Amphidasys betularia.*"—Tuesday, June 4th, 1895. The exhibits were: Mr. Bate, a specimen of *Rumia luteolata*, from Brixton, which had brownish, longitudinal streaks between the wing-rays on the right fore-wing. Dr. Sequeira, a short series of *Plusia orichalcea*, bred from Ely larvæ. Mr. Hamling, a series of *Boarmia roboraria*, taken on tree-trunks and at sugar in the New Forest last year. He remarked that out of thirty-seven specimens so taken only one was a female. Mr. Fuller, four *Chœrocampa porcellus* taken the previous night at Hayes, Kent, flying round the flowers of rhododendrons. Mr. Cox recorded the capture by himself of two specimens of *Pachetra leucophaea* and a series of *Scoria dealbata* on the hills near Canterbury. Mr. Riches, remarking on the great abundance of larvæ at Epping Forest, said he had obtained a dozen *Trichiura crataegi.*—Tuesday, June 18th, 1895. Exhibits were: Captain Thompson, specimens of *Amphidasys betularia*, var. *doubledayaria*, bred from Halifax ova, all of which produced the black form. Mr. Richardson, *Scoria lineata (dealbata)*, males of *Agrotis cinerea*, and some fine examples of *Pachetra leucophaea*, all from Wye, Kent. Mr. Prout said he had bred a specimen of *Noctua ditrapezium* from a larva taken at Hampstead in the spring. Mr. Oldham and the Rev. C. R. N. Burrows recorded the capture of *Agrotis suffusa* and *A. puta* quite recently, and the latter gentleman observed that the case of *Epichnopteryx reticella*, lately exhibited by him, had produced a male specimen.

The South London Entomological and Natural History Society.—June 13th, T. W. Hall, Esq., F.E.S., president, in the chair. Mr. Frohawk exhibited a dark leaden blue variety of *Lycæna bellargus*, taken at Weymouth in 1892. Mr. Perks, a Julus, taken among bananas in Covent Garden. Remarks were made by several members on the season, and a few records were made of the appearance of *Colias edusa*.—June 27th, the president in the chair. Mr. Jäger, a bred series of *Arctia lubricepeda*, from *radiata* parents. Among them were both var. *radiata* and var. *fasciata*, as well as some almost normal types. Mr. Turner, eggs of a lace-wing fly. Mr. Dennis, a larva of *Catocala nupta*, a pupa of *Lycæna argiolus*, and a pale specimen of *Argynnis selene*. Mr. West (Greenwich), specimens of *Cryptocephalus nitidulus*, *C. coryli*, *C. aureolus*, and *Elater elongatulus*, all taken in Headley Lane on June 3rd.—*Hy. J. Turner (Hon. Rep. Sec.)*.

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s*. 6*d*. for twelve months (including postage), are now due.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Varieties of Helix hortensis and H. nemoralis, H. arbustorum, H. lapicida and others. Wanted, varieties and others not in collection.—W. Domaille, 37, Argyle Road, St. Paul's, Bristol.

Wanted, microscopic slides in variety, foreign shells, stamps, for British marine shells and unmounted objects. 60 Science-Gossips, 1888-1892; offers.—A. Sclater, Northumberland Place, Teignmouth.

Fox Moth larvæ, vapourer moths and others in exchange for larvæ or pupæ of equal value, or butterfly-net and store boxes.—W. A. Nicholson, 39, Tower Street, Portobello, Scotland.

Wanted, Sowerby's "English Botany," 3rd edition.—G. Freeman, 79, Copleston Road, Denmark Park, London, S.E.

Back parts of Science-Gossip and "Midland Naturalist" in exchange for back parts of archæological publications, etc.—T. Sladen, 17, Cank Street, Leicester.

Offered, North American Unios and other shells. Wanted, Geomalacus and Testacella, living or in fluid, Otina, Vertigo moulinsiana, and other British as well as foreign species.—W. A. Gain, Tuxford, Newark.

I am desirous of exchanging foreign Helices and obtaining foreign correspondents on the subject.—(Rev.) J. W. Horsley, St. Peter's Rectory, Walworth, London.

Offered, herbarium of British plants, more than 1,400 species and varieties, many rare. What offers in foreign Helices or cash?—A. E. Stevens, 1, Doynton Street, Highgate, N.

Wanted, eggs of cuckoo with those of foster parents; good exchange in other eggs.—W. Wells Bladen, Stone, Staffordshire.

# PRESERVATION OF OUR FAUNA AND FLORA.

By John T. Carrington.

It is useless to disguise the fact that, however slowly, many of our native animals and plants are gradually but surely doomed to extinction in these isles. It is therefore due to posterity on our part to do all we can to preserve such species for their pleasure and instruction. If we go carefully through the list of plants and animals which have become actually or comparatively extinct with us in moderately recent times, many will be surprised to find its length. The causes of such extinction are varied as they are numerous, some doubtless being climatic changes which are beyond the control of man. Agriculture and drainage works are further sources of extermination; the individual naturalist being as little able to cope with them, as with natural forces. Fortunately for the biological student and the collector, the condition of agriculture in this country has not latterly been such as to cause much recent reclamation, but it is possible that some reorganization of the industry may create a new demand for land, when many of our best collecting grounds will disappear. We have much to be thankful for to the great landowners who preserve game; otherwise the names of some more species of our native wild creatures would long since have gone from the British lists. Game preserving means the retaining, in a more or less wild condition, of large tracts of woodland and heather which would be cut down or turned into barren sheep pastures. We need only look at some of the Departments of France, where the little cultivators have turned the whole face of the country into nothing less than a series of well-kept gardens. The same tendency is indicated for Britain, the populace already hungrily calling for the land. The first step has come in the extension of the allotment-garden system, which must in course of time extend to the three acres, served by light railways by the sides of country roads, as in Belgium. The outlook, therefore, is in the direction of extinction of all native animals and plants which cannot adapt themselves to their new surroundings.

What is to be done to protect them? The futile cry of certain people, that it is the birds'-nesting boy or the rapacious collector that extinguishes our fauna is absurd as it is weak. What is wanted is not so much the attempt to protect living things in face of changes of the country going on through agriculture, drainage, manufactories, or otherwise, but the establishment in as many counties as possible of reservations, avowedly for the preservation of both plants and animals already occurring there. This is not by any means so large a task as may at first appear. We will take an example which might become typical. Few more suitable places of its own character could be found than Wicken Fen, in Cambridgeshire. It is true it has been a good deal drained, but many things of interest still remain. There is no knowing what may become of this primeval bit of fenland in a few years time. An association of those interested in biology should be formed to get control of Wicken Fen for its conservation. The rentals for reed cutting or other sources of revenue must be comparatively small. Most of these might continue and practically cover the annual outlay which the society would have to pay. If properly managed and shown to be feasible, in course of time the county councils might take over the management and responsibility of these reservations. Naturalists could have collecting tickets issued, which would be far more satisfactory than the pending annoyance of being turned off by some churlish gamekeeper or farmer. Already county councils are beginning to show inclination to do work of this kind in the preservation of wild birds and their eggs. It will be only necessary for private enterprise among local or general naturalists to show the way to these reservations, and the county councils will take up the subject with very little pressure. Few counties are there without some special locality such as we have referred to, either in marsh, woodland, or moorland. We have already a few such reservations in the New Forest, Epping Forest, and elsewhere. A list of public properties of this kind would be useful, and we should be glad of information about them and their regulations. Cannot powerful bodies like some of the county natural history societies lead the way? Land is cheap enough to rent now-a-days, probably at its very lowest, and long leases of many suitable places could be readily obtained by responsible bodies. These tenancies need not be of great extent, but should be as natural as possible and typical of the surrounding country. The golf players are far more enterprising than the naturalists, and are fast getting control of localities which would be equally useful to the students and collectors. Unfortunately, golf and natural history cannot run side by side on the reservations, for the animals and plants which are not scared away by the continual presence of players are soon trampled under foot by the golfers. We feel sure this subject is one well worth consideration during the coming winter at the meetings of natural history and other scientific societies, which might eventually form themselves into unions for the purpose of supporting a trial of one or more reservations thus indicated.

# THE LABOUR OF LOBWORMS.

By Charles Davison, M.A., F.G.S.

FEW, if any, of Mr. Darwin's books have appealed more strongly to the popular taste than the last of all, the well-known work on "The Formation of Vegetable Mould, through the action of Worms, with Observations on their Habits." Interesting as the whole volume is, one of the most remarkable facts established by Mr. Darwin is the great quantity of earth brought up by worms to the surface. Squares, generally of a yard each side, were carefully measured off, and the castings formed on them were removed, dried and weighed. At the end of a year the total amount of earth thus collected was found to be equivalent to a weight of from seven and a half tons to eighteen tons per acre. If it had been spread out over the surface, without any loss from wind-drifting or otherwise, it would have formed a layer from one-tenth to about one-sixth of an inch in thickness.

All who are accustomed to walking along a sandy beach are familiar with the appearance it presents when the tide goes down. The whole surface in places is then thickly dotted over with the castings of the lobworm or lugworm, *Arenicola piscatorum*, so called from its frequent use as bait. So closely are the castings sometimes collected, that from a distance the sand looks as if covered with a rash. When we reflect on the enormous numbers of castings thus thrown up, and then remember that as the tide advances they are all obliterated, only to be renewed as the water again retires, the vastness of the work accomplished by the lobworm will be easily apparent. A few years ago I endeavoured to estimate roughly the number of castings thrown up in a given area, and also the weight of sand contained in them (Geological Magazine, vol. viii., 1891, p. 489). My observations were made chiefly on the broad stretch of sand, three miles wide, which at low tide separates Holy Island from the opposite coast of Northumberland. They were, however, confined to a short visit of only a week in August, 1891, and as it seems possible that both the number and weight of castings may vary much at different times of the year, I propose to describe here the method adopted and some of the results arrived at, in the hope that others who live near the sea may be induced to carry on similar observations at regular intervals throughout the year.

The implements required are few and of the simplest description—a measuring tape (one that will not stretch is essential); a small shovel with a sharp edge and flat bottom, which can be easily made to order; one or more wide-mouthed jars or bottles (say two- or three-pound marmalade jars), and some pieces of oiled silk to cover them; the whole costing about a shilling. Being provided with these, we proceed to work. We select a stretch of sand where castings are clustered with a fair approach to uniformity, and seem to be neither more nor less abundant than in surrounding parts. If the spot can be identified so as to be used on subsequent occasions, so much the better. With a stick we mark out a triangular area, making the sides as straight as possible, and each about four or five yards long. The reason for choosing a triangular area is that we have only three sides to measure, and one area to calculate. If a four-sided area were employed, we should have to measure five lengths (the four sides and a diagonal), and to calculate two areas, as we cannot be certain that the sides are all at right-angles to one another. We then count the number of castings within our selected spot, marking off small spaces in regular order round the sides, so as to count more easily and accurately; and lastly, we measure the lengths of the three sides. These data are sufficient to determine the average number of castings thrown up over any required area, say one acre. If we wish to ascertain also the weight of sand contained in them, we gather as many castings with the shovel as the jar will hold, taking care to select those which seem to be of the average size, for it will be found that their dimensions vary even within a very small area.

The following data should be entered in a note-book as soon as they are known: The position of the selected area, the lengths of its three sides, the number of castings contained within it, the number collected for weighing, and any other remarks as to size, uniformity of distribution, and others which may appear desirable. If possible, several observations of this kind should be made after the same tide, and on the same or a neighbouring stretch of sand. The greater the number of observations, the more likely are we to eliminate errors due to our selection of areas and castings, and the more accurate, of course, will be the results obtained. As the number of jars we can carry is limited, we cannot expect to collect castings from more than three or four areas on any one day, but there is no limit, except the time at our disposal, to the observations on the number of castings.

As to the time when the measurements should be made, I do not think much care is required, though it might be desirable to inquire into this point. I was unable to make very careful observations myself, but I am under the impression that few, if any, castings are ejected *on the surface* after the water has retired. If we wait for a quarter or half an hour after this time, we shall, I think, be well on the safe side, though perhaps a watch ought to be kept during this time to see that no castings are obliterated by waves. For the same reason we should avoid a day when the sea is rough, for even if the castings are not entirely washed away they may be much reduced in size if surrounded again by water.

To show how the measurements should be reduced, I will take one of those I made at Holy Island. The following are the notes: "August 18th, 1891, Holy Island sands, about one hundred yards west of the old lime-kilns. Sides of triangle, 115, 119⅓ and 129⅔ inches. Number of castings, 53. Number collected, 6. Castings all large, and of nearly uniform size."

We have first to find the area of the triangle. This is done as follows: Add the three lengths together and divide the sum by 2, giving 182. Subtract the length of each side in turn from 182; the remainders are 67, 62⅔ and 52⅓. Multiply 182, 67, 62⅔ and 52⅓ together; the product is approximately 39,986,687. Find the square root of this number, namely, 6,324. This gives the area of the triangle in square inches. The rest of the calculation is simple rule-of-three. If there are 53 castings in an area of 6,324 square inches, we easily find the equivalent number to be 52,568 per acre.

The six castings collected were taken home, dried in an oven, and were found then to weigh 7,986 grains. By rule-of-three again, we find the weight of 52,568 castings to be 419,808,048 grains, or about 9,995 pounds. Since there are 705 high tides in a year, it follows that, if the same amount were thrown up at every tide, the lobworms eject annually on the surface as much as 3,146 tons of sand per acre. In this particular case the castings, though much larger than usual, were not nearly so numerous as in other parts. Taking all my observations on the Holy Island sands, the average number of castings is 82,423 per acre, or more than fifty million per square mile; and the average weight of sand brought up annually to the surface is 1,911 tons per acre. Whether the number and weight of castings thrown up may be regarded as uniform throughout the year, I am unable to say. I have never been in Holy Island during the winter months. At the beginning of this year, however, on the sands a mile or two north of Sunderland, I counted 153 small castings in a triangular area of 10,944 square inches, equal to 87,509 per acre. The previous night had been intensely cold, and the sea-water left higher up on the beach was a sheet of ice. The activity of lobworms in winter is therefore evident; but it appears to me very desirable that further observations should be made, not only at different parts of the coast, but, in one place at least, at regular intervals throughout the year.

The labour involved in such operations is small in comparison with the interest of the results. I would suggest that measurements should be made once a month, on about the same day of the month, and that on each occasion castings should be collected from three or four neighbouring areas, the same spots if possible, being selected every time.

373, *Gillott Road, Birmingham; August 5th*, 1895.

## IRREGULARITY OF SOME COTYLEDONS.

By H. B. Guppy, M.B.

A NOTE on tricotyledonous ivy seedlings in Science-Gossip for last May (*ante* p. 80), has tempted me to send the following communication on the subject. Whilst observing the germination of a large number of British plants during the last four years, my attention has been frequently drawn to this matter; and most of the results obtained are given in the appended table and are illustrated in the accompanying figures.

These abnormalities constituted, as a rule, a proportion of from two to six per cent. of the seedlings examined; and, since it was to the twelve plants below named that my inquiries in this direction were mostly confined, such abnormalities are doubtless just as frequent in the case of many other plants. Sometimes the proportion may be much greater, as in the instance of *Myriophyllum spicatum*, where about one-sixth, or seventeen per cent., of the seedlings were thus characterised. As shown in the table, the most frequent type of abnormality was that of seedlings with three cotyledons. Occasionally, as with *Caltha palustris* and *Lysimachia vulgaris*, one of the blades of a dicotyledonous seedling was cleft. Very rarely, four cotyledons were to be observed; this was remarked in a solitary instance where a seedling of *Caltha palustris* exhibited two pairs of cotyledons, each pair arising from a common pedicle. The character of the venation sometimes threw light upon the nature of these abnormalities; and it could be thus seen that the supernumerary cotyledons resembled the others, and that the cleft blade of a dicotyledonous seedling possessed the veins of two ordinary cotyledons joined in their lower halves.

Perhaps, the most curious irregularity was to be found in the monocotyledonous forms of the seedlings of *Myriophyllum spicatum*, *Samolus valerandi*, and *Limnanthemum nymphæoides*. With *M. spicatum* the cotyledons in these cases were more or less completely joined into one, forming a tube open at the side, the plumule lying in the hollow. From such seedlings healthy typical plants were grown. The tubular form is probably due to the linear shape of the normal cotyledons. With *Limnanthemum* and *Samolus* the normal cotyledons are broader, a difference that goes to explain the contrast in their monocotyledonous seedlings with regard to those of *Myriophyllum*.

I followed the history of the plant in the case of tricotyledonous seedlings of *Scrophularia aquatica* and *Galium palustre*. In the instance of *S. aquatica*, the first leaves were as a rule a whorl of three and not a pair as in the typical plant. Then appeared usually another whorl of three, and after this pairs were regularly produced. In the case of *G. palustre*, it was not until after the sixth whorl that the plant permanently assumed the usual type of four leaves in a whorl. The first six whorls were thus composed: five, six, four, five, five, four.

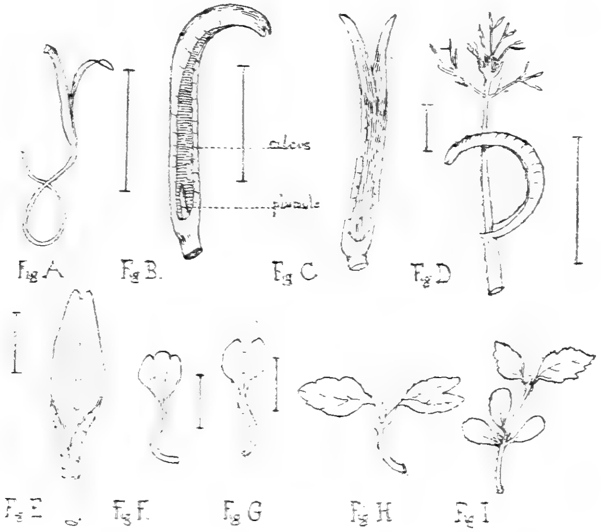



Fig. A. *Myriophyllum spicatum* (normal dicotyl.).
.. B. ,, ,, (monocotyl.).
,, C. ,, ,, (monocotyl.).
.. D. ,, ,, (B in a more advanced stage).
.. E. *Limnanthemum nymphæoides* (monocotyl.).
.. F. *Samolus valerandi* (monocotyl.).
.. G. ,, ,, (monocotyl.).
.. H. *Lysimachia vulgaris* (dicotyl., with one cotyl. cleft).
.. I. *Alnus glutinosa* (tricotyl., with first pair of leaves).

| Plant. | Nature of Abnormality. | Per Cent. |
|---|---|---|
| *Ranunculus repens* | Tricotyl. | 2 |
| *Caltha palustris* | Tricotyl., 6 p. c.; dicotyl., with 1 cotyl. cleft, 2 p. c.; two pairs of cotyls., 1 p. c. | 9 |
| *Lythrum salicaria* | Tricotyl. | 2 |
| *Myriophyllum spicatum* | Monocotyl. | 17 |
| *Hydrocotyle vulgaris* | Tricotyl. | Not noted |
| *Galium palustre* | Tricotyl. | 1 |
| *Lysimachia vulgaris* | Tricotyl.; and dicotyl., with 1 cotyl. cleft | Not noted |
| *Samolus valerandi* | Tricotyl., 2 p. c.; monocotyl., 4 p. c. | 6 |
| *Limnanthemum nymphæoides* | Monocotyl., 1·5 p. c.; tricotyl., 0·5 p. c. | 2 |
| *Scrophularia aquatica* | Tricotyl. | 6 |
| *Salicornia herbacea* | Tricotyl. | 4 |
| *Alnus glutinosa* | Tricotyl. | 2 |

*6, Fairfield West, Kingston-on-Thames; July, 1895.*

# LEPIDOPTERA IN EPPING FOREST.

By W. Mansbridge.

I DID not begin out-door work this season until the end of March, when a visit to the forest produced a nice series of *Tortricoides hycmana*, by beating the thorn bushes; among them I found a pretty clear grey form. The day was very dull and cloudy, so when disturbed, the moths after a short flight dropped into the grass and simulated death. Such as I had taken in previous years, flying in the sunshine, were much worn. I did not work the sallows bloom at Loughton this year, but I have heard that on favourable evenings the usual Tæniocampidæ were abundant.

April 20th was a warm bright day, and I went out with the hope that I should find the holly-blue butterfly, *Lycæna argiolus*, but was disappointed, though I met with it sparingly a fortnight later. On this occasion I searched the tree-boles for *Diurnea fagella*, to see if, after an absence of four years from the London district, the percentage of black forms had increased. After taking a long series I could not see any difference in this direction, which somewhat surprised me, as in the north, even away from the smoky areas, I have noted a distinct increase in the proportion of the melanic variety in each season I worked there. At dusk I captured several specimens of *Selenia bilunaria* and *Anticlea badiata*.

Early in May, besides the "holly-blues," *Fidonia atomaria* was captured at Loughton, and *Tephrosia biundularia* was met with sparingly on the oaks in Hawk Wood. Although one does not get many insects the first week or two in May, the beauty of the forest fully compensates for the lack of sport. The beeches are brilliant in the first burst of tender green; hornbeams not quite so forward; oaks just beginning to burst off the brown bud-scales; while the wild cherry and crab trees which occur here and there in the forest are in full leaf and blossom. At Loughton one can see the trees to advantage as they rise above on the slopes, and from Monk Wood there are some charming views right across the forest. Already the advance-guard of the coming millions of spring larvæ, *Cheimatobia brumata*, *C. boreata*, *Hybernia defoliaria*, *H. aurantiaria*, and other less numerous species, are making their presence apparent by perforations, minute as yet, in the young foliage, while at night the assiduous collector will find the larvæ of many of the June noctuæ feeding on low plants and shrubs. By the middle of the month the pretty little skipper butterfly, *Syricthus malvæ*, was well out and in splendid condition, and the ubiquitous *Cœnonympha pamphilus* enlivened the open spaces and rides with its restless motions. *Fidonia atomaria* was abundant, but careful searching failed to detect any distinct variation. *Euclidia mi* and *Phytometra viridaria* (=*ænea*) were kicked out, as also *Panagra petraria* and *Melanippe sociata*, while the interesting little *Epichnopteryx pulla* was obtained in some numbers by sweeping. *Corycia temerata* and *Orgyia pudibunda* were also taken. A pretty sight was the needle-whin (*Genista anglica*) which is so abundant in the forest, and then in flower, especially interesting to entomologists as being the pabulum of *Pseudoterpna cytisaria*. The dwarf sallow we found attractive to day-flying insects, but it is about over when the early butterflies appear.

All through May the evenings were cold and often very misty in the forest, so that it was very little use working the rides at dusk. Towards the end of the month beating in the daytime was fairly productive, the usual common species being taken. In Hawk Wood, *Corycia temerata* was more common; *Ephyra trilinearia* could be beaten from the beeches; *Coremia ferrugata*, *C. unidentaria*, and *C. designata* (=*propugnata*) were taken sparingly, and the hook-tips, *Drepana lacertinaria* and *D. falcataria*, were occasionally knocked out of bushes in the neighbourhood of birch. I did not get *D. hamula* this year. The forest presented a striking contrast to the earlier part of the month; the armies of caterpillars had devastated the trees, many, especially the hornbeams, being completely stripped of foliage. Perhaps we do not altogether regret this from our own point of view, for later the trees will burst out again as if a second spring had come, and then—remember the chance of varieties of *Hybernia defoliaria* in the autumn.

I commenced sugaring the first week in June at Chingford, and found the usual common species very abundant. *Noctua festiva* was in swarms at every tree, as also was *Agrotis exclamationis*, of which I secured some very nice forms. *Grammesia trigrammica* appeared to be less numerous than in some years, the var. *bilinea* not being once seen. *Miana fasciuneula* was scarce, but its near relative, *M. strigilis*, came up later in large numbers, and lasted well into August. Less frequent visitors to the sugar were *Thyatira batis*, *Aplecta nebulosa*, *Noctua triangulum*, *N. augur*, *Rusina tenebrosa*, and *Caradrina morpheus*. *Xylophasia rurea* was very rare this season, only one specimen being taken; but *X. hepatica* fully made up for the scarcity of its congener, both in variety and numbers. Towards the end of the month *Noctua brunnea* succeeded *N. festiva* in even greater numbers.

*9, The Green, Stratford, E.; July, 1895.*

# PLANTS IN THE SIERRA NEVADA.

By William Edward Nicholson.

THE great interest that I recently found in an excursion in the Sierra Nevada, and the fact that the region is but little visited by the British botanist, has induced me to record a few botanical notes made while visiting this mountain range, though from the short time at my disposal, and the fact that my energies were partially devoted to entomology, they are not so complete as I could have wished.

One difficulty for a naturalist in this part of Spain is the absence of any accommodation, that may be depended upon, at any high elevation. It was, therefore, after some hesitation, and relying on the vague information that there was a house in connection with some mining operations in the mountains, about eight hours walk from Granada, where accommodation might sometimes be had, that I started with a friend, early in the morning of June 6th last, from the Alhambra Hill, above Granada. The road to the mountains lies past the cemetery, as far as which there is a road, when a path should be taken to the left, which leads over dry reddish hillsides, deeply furrowed by the autumnal torrents, and past fields of corn on the lower slopes bordered with agaves and opuntias, to the village of Senes.

Among the more interesting plants noticed on these dry hillsides were the silvery bushes of *Retama sphærocarpa*, Bss., so terribly mutilated by the ravages of a beetle (*Gonioctena variabilis*) that it was difficult to find a bush in flower; *Armeria allioides*, Bss., with its white, almost globular, flower-heads, *Phlomis lychnitis*, L., and *P. purpurea*, L., two very conspicuous labiates with an almost shrubby stem, which disputed some of the driest ground with *Marrubium hispanicum*, L., and two handsome yellow composites, *Asteriscus spinosus*, Godr., and *Buphthalmum salicifolium*, L. On the lower ground was a formidable array of thistle-like plants, and amongst them a variegated sow-thistle, *Scolymus hispanicus*, L. Here also the pale lemon-coloured flowers of *Andryala integrifolia*, L., were very conspicuous, and *Scabiosa stellata*, L., with its curious spreading involucels also occurred.

From the village of Senes there is a rough carriage road bordered in places with *Elæagnus augustifolius*, L., from which a pleasant scent is wafted. This road, on reaching the village of Penillos, about three-quarters of an hour distant, degenerates into a mule track, whick keeps along the flank of the hills on the right bank of the River Xenil, until the small town of Huejar is reached. The vegetation as far as Huejar, and for some way beyond, does not vary very much, but on the hillsides just before reaching the town, *Digitalis obscura*, L., is rather abundant. It is not until about an hour's walk beyond Huejar that you begin to ascend the mountains in earnest; when, after crossing the Xenil to the left bank, where two valleys meet, the valley which opens to the right is pursued by a winding path to La Estrella Mine. In the lower part of this valley *Gymnogramma leptophylla*, Desv., is fairly common in damp places, especially where there is a slight accumulation of humus under the rocks. It was in great perfection at the time of our visit and covered with ripe sori. The mountain sides were now much greener than they were below, and small rivulets stole down from time to time, which nourished a luxuriant vegetation of *Mentha*, *Heracleum* and *Myrrhis odorata*, Scop. It was in this district that we came upon a beautiful little fumitory, *Sarcocapnos enneaphylla*, Dc., which grew in the fissures of a vertical or almost overhanging rock. Further up, at an elevation of about 4,000 feet, the most conspicuous plant was *Adenocarpus decorticans*, Bss., a leguminiferous shrub or small tree with pale-coloured bark peeling off in strips, showy terminal racemes of golden-yellow flowers and a curious pod covered with purple villæ, and which was growing with our common hawthorn of the *oxyacanthoides* form. Slightly higher still, *Smyrnium perfoliatum*, L., conspicuous from its yellowish upper leaves, grew among the grass, and the swampy ground, which now became more frequent, was filled with mosses, among which *Bartramia calcarea*, B. and S., and *Hypnum crista-castrensis*, L., predominated, and appeared to quite replace the species of *Sphagnum* which one would expect to meet with in similar situations in England. No trace of any species of *Sphagnum* was, however, noticed in the Sierra Nevada. All the mosses, that I have at present identified, are British species, in great contrast to the higher plants. The commonest species on the rocks were *Hedwigia ciliata*, Dicks., and *Leucodon sciuroides*, L., the latter fruiting very freely.

At the house itself a Belgian gentleman, M. Louis de Pelsmaeker, the lessee of the mine, had, most fortunately for us, arrived that very day, and at some inconvenience to himself, as the greater part of the house had been destroyed by storms during the winter, he entertained us hospitably for the next three days. The day after our arrival we made an early start, with a miner off duty as a guide, and, following the path leading to the upper mines, we soon passed the last straggler of the scattered evergreen oaks, which are the only trees to be found in the higher regions (over 6,000 feet) in this part of the Sierra Nevada. The scarcity of trees on the lower slopes and the complete absence of larches or pines on the higher parts, coupled with their general barrenness, due in great measure to the scarcity of rain in the summer months, give to the Sierra Nevada a very desolate appearance as compared with the Alps or the Pyrenees. In the last cultivated fields—if the mere scratching of the surface of the soil and the scattering of a handful or two of rye can be called such—at an elevation of about 7,000 feet, several plants of *Gagea arvensis*, R. Sch , were still in flower, growing with *Muscari racemosum*, Dc. Near these fields a quantity of *Primula elatior*, Jacq., was growing by the side of a rivulet, but none of the smaller species of primula, so conspicuous in the Alps, were noticed in the higher regions.

It was not until we reached an elevation of about 7,500 feet that we came upon the strictly Alpine flora of the range. Among the first plants noticed at this elevation was *Fritillaria messanensis*, Raf., a species with glaucous leaves, and two dull purplish flowers very slightly chequered. Its leaves were often much infested by a species of *Puccinia*. Near the *Fritillaria* was a crocus, probably *C. nudiflorus*, Sm., the leaves of which were only then visible. Soon after these plants began to appear we crossed one of the lower cols and entered the Corral de Veleta, a kind of cirque composed of the principal peaks of the range, Alcazabar, Mulhahacen and Veleta, which now burst magnificently into view. Large patches of still unmelted snow covered a considerable area of the Corral, and the best Alpine plants were generally to be found in their vicinity, as owing to the scarcity of rain the vegetation is, to a great extent, dependent upon it. Prominent among these plants was *Ranunculus acetosellæfolius*, Bss., allied to *R. glacialis* of the Alps, but readily distinguished by its long pointed leaves, wider and fringed at the base, somewhat like those of *Rumex acetosella*, L.; growing with it, but very much rarer, was *Ranunculus demissus*, Dc., a yellow species with single-flowered peduncules springing from a rosette of spreading root leaves. Other good plants noticed were *Viola nevadensis*, Bss., a species with small spathulate leaves growing in dense spreading tufts, *Draba hispanica*, Bss., similar to our *Draba aizoides*, L., but with a hirsute peduncule, and *Plantago nivalis*, Bss., a small species with a thick root stock and spreading silvery leaves, which generally grew very close to the melting snow.

The most familiar plant growing in this elevated region was *Montia fontana*, L., which was very abundant in the tiny rivulets which trickled down the mountain side, and close to which *Gentiana verna*, L., appeared from time to time. Last year's dead flower stalks of a species of *Eryngium* (probably *E. glaciale*, Bss.) were noticed, but no living specimens, and a number of other plants still presented a dry and withered appearance, not having yet started into growth for the year, so doubtless the region would yield a larger supply of botanical treasures during July.

On the top of the Culeta de Vacares, about 9,000 feet, the highest point to which we could induce our guide to take us, *Artemisia granatensis*, Bss., was not uncommon on the bare stony ground between the patches of snow. It was not yet in flower, but though small and obscure it attracted the attention of our guide, who had remained quite impassive before the handsomer plants below, as he hailed it with delight and constantly directed my attention to it. It is known by the natives under the name of Manzanilla, and is much used in the preparation of simples and for flavouring the sherry that goes by that name. As a strong wind was blowing at the top of the Culeta, from whence we looked down upon the still frozen Laguna de Vacares, we rapidly descended, soon leaving the snow behind, much to the relief of the guide, whose flimsy aspargates, or shoes with canvas tops and soles of matted hemp, formed a very insufficient protection against it. Our hospitable quarters were reached about 6 p.m., and a most enjoyable botanical excursion was brought to a close.

*Lewes; August 2nd, 1895.*

## BIOLOGICAL DISTRIBUTION.

IT must have frequently occurred to many thinking people that the usual theory of climatic influence can insufficiently account for the geographical distribution of animals and plants on large continents. Dr. C. Hart Merriam has been conducting systematic research into the subject in North America. He deals with the three main zones of life found there. These are the tropical, the austral and the boreal. Dr. Hart Merriam treats only with the vegetation of these regions, and the reason for the characteristic species of each remaining therein, without extending over the adjoining regions. His theories are that the northward distribution is determined by the total quantity of heat, or the sum of effective temperatures. The Transisian zone between the boreal and austral regions is determined by the mean temperature of the hottest part of the year. The sum of the effective heat is the constant, obtained by adding together the excess of the daily temperature above 43° Fahr., which is the minimum at which active plant life begins. The effective temperature begins in spring, when the daily mean rises above 43° and continues to accumulate until the autumn daily temperature becomes lower than 43°. Humidity proves to be of secondary importance in defining the regions of plants, and probably of animals also.

## MINERALOGY.

By John T. Carrington.

We often wonder why so comparatively few persons in this country take up the study of Mineralogy. As a study, or even as a hobby for collectors, it is deeply interesting. The specimens are often things of great beauty, and a knowledge of the different kinds cannot fail to be of value to those who have opportunities of visiting little known lands.

These thoughts were vividly impressed upon us during a recent visit to the collection of Mr. Thos. D. Russell, of 78, Newgate Street, London. We remembered how many persons there are who would be better for taking up some hobby, numbers of these people are young, and could not have a recreation which will prove more valuable in after life.

Among Mr. Russell's specimens we were shown an exceptionally brilliant and showy series of Calcites from Cumberland; especially some transparent twin crystals. These are called "butterflies" by the miners, from the nearly symmetrical appearance of the cleavage planes within the mass, which looks as though silvery butterflies had been caught and entrapped within the crystal, like the flies seen in amber. Other Calcites were tinted reddish-brown by hematite; the specimens being taken from iron-mines in Cumberland. From the same district were some lovely pieces of specular iron, with quartz crystals; one especially handsome one having a flat basis of specular hematite, with a large quartz crystal resting upon it, in fine contrast, which was found with the others in the Cleator Moor Ironworks. With these were some richly-coloured examples of Pearl-spar or Dolomites; some being "golden," and others with tints running through brown into pale lemon yellows. Zinc blends were also associated with quartz and pearlspar in other specimens. Also from Cumberland were some remarkably beautiful specimens of Calcite, sprinkled with a delicate incrustation of coloured iron pyrites. The iridescence from the faces of these minute pyrites is very brilliant, showing hues of golden green, blue and bronze-red. Near these are found tabular crystal masses of Byerite, in white, blue and brownish-yellow.

From Herkimer, County New York, in the State of New York, was a fine series of doubly-terminated diamond-like crystals of quartz, most brilliant in appearance. By them were a number of Utah Topaz crystals in the matrix; these occurred both transparent and vinous-coloured. From Mexico were a number of examples of the transparent colourless variety Hyalite of Opal, which has the appearance of groups of small drops of oily water piled up one on the other. Other American minerals included masses of Iron pyrites in cubical crystals associated with Magnetite, Calcite and Byssolite, an unusual combination from Pennsylvania. The uncommon mineral, Rhodochrosite, associated with Copper pyrites, was from Colorado. Rutile paramorph, after Brookite, was from Arkansas, perfect specimens of these dark geniculated crystals forming a kind of rosette. There were also specimens of the iron-black octohedrons of Martite, from Utah, with lovely pieces of Chalcotrichite or velvet copper.

Among the more peculiar minerals are the Chalcidonic geods, containing fluid with which the pieces are only partially filled, so that it may be seen through the semi-transparent mass. It is a most interesting form of silica in small sponge-like masses from Uruguay. Another and very different variety of silica is the "liver opal," or Menilite, so called from the locality, Menil Montant, near Paris, where it is found. Specimens are like compressed flints covered with a smooth incrustation of calcareous marl. From France, also, Mr. Russell has received some fine "cross-stones," or Staurolite, which occurs in Brittany. Norway contributes some polished specimens and cleavages of Thulite, a pink and white variety of Zoisite. This mineral, when polished, makes handsome ornaments; for instance, a casket of Thulite was included in the wedding presents of the Princess of Wales.

An imposing group among the novelties of this collection was of "peacock" coal, which is highly iridescent; it came from Barnsley, in Yorkshire.

The last new mineral is named Lorandite. It is sulpharsenide of Thallium associated with Realgar, and found in Macedonia. The only other known Thallium ore is named after its discoverer, Crooksite, Professor Crooks, F.R.S., being the first to identify this mineral. Mr. Henson, of Regent Street, has some fine specimens of this rare and beautiful mineral. He has also now on view some half-inch crystals in the matrix of the very scarce mineral Whewellite, transparent oxalate of lime. It is a closely allied mineral to Thierschite, if not actually identical, which occurs as an incrustation. Such large crystals of Whewellite do not seem to have been previously observed, as hitherto they have only been found of almost microscopic size. These fine examples are from Saxony.

Mr. James R. Gregory, the well-known mineralogist, has migrated with his business to the neighbourhood of the Kensington Museums and Science Schools. His firm's address is now 1, Kelso Place, Stanford Road, Kensington, W., which is within easy reach of High Street, Kensington, and Gloucester Road Stations.

# HABITS OF THE NIGHTJAR.

By David J. Rice.

THAT the nightjar (*Caprimulgus europæus*) should be deemed an uncanny bird is not to be wondered at. Its nocturnal habits and its two peculiarly distinctive notes—the one a prolonged and monotonous rattle, the other a sharp eirie cry difficult to describe, but having somewhat the sound of Wi-*ep*—alone places it in an especial position; whilst its noiseless flight and curious habit of perching lengthwise along a branch adds still further interest to the curious creature. Then again, unlike most other birds, the nightjar makes no pretence at a nest, but simply chooses a bare piece of ground, sometimes taking advantage of a slight natural depression, and there, surrounded by heather and quite open to the elements, lays its eggs. They are always two in number, oval in shape, with very beautiful markings. The ground colour of the egg is of a whitish character, and is splashed irregularly with blotches varying from a faint purple-grey, which appears to assimilate somewhat with the ground colour, to burnt umber, the last colour being most pronounced and apparently deposited very shortly before the egg is laid. The whole effect recalls a piece of marble of a certain kind, and has a highly polished surface. There are often pieces of weathered stone lying about near the eggs, and unless one is quite familiar with them they might be easily passed unnoticed. The eggs are quite distinct and cannot be confused with those of any other British bird.

A short time since I had an opportunity of observing the bird with its young. Walking across a heather-clad common, something suddenly flapped up before me evidently in the last stage of decrepitude. My brother, who was with me, tried to capture the creature by falling on it, but it managed to flutter just beyond his reach with apparent effort. After pursuing the chase for some distance, the nightjar (for such it was) rose suddenly, and, flying off rapidly, disappeared among some Scotch firs near by. I had remained watching the pursuit, and after the bird had gone I looked around and saw almost at my feet a young nightjar sitting motionless on the ground, among some pieces of egg-shell and a few whitish stones. I picked it up, but it did not exhibit any sign of life, although I turned it about in my hand, and had I not felt the warmth of its body I should have been tempted to believe it dead. I restored it to its original position, and left it. The next day I revisited the place, and, by creeping cautiously, obtained an excellent view of the mother bird, whose plumage formed a perfect harmony with its surroundings, and was only betrayed by the brightness of its rich brown eyes. On my attempting a nearer approach the bird again fluttered off as before described, but this time I kept a sharp eye on the place from which it started. The young bird was still there, and I also became aware of another one about eighteen inches away, some low branches of a small fir dividing the two, whilst there was a distinct run on the ground between them, evidently planned by the parent bird to lessen the danger of discovery, the two being parted immediately a cause rendered it necessary. I was greatly interested, as on the former occasion I had only seen the one young bird.

The following day I again visited the spot, and this time the birds were nowhere to be seen. I searched carefully, and discovered the two young ones together some four yards away from the place where they were hatched. On taking one up the mother bird came flying round, and endeavoured to draw me on by its former tactics of feigning helplessness. I put the birds down again, when the parent bird flew immediately above me, uttering a sound very like the "cluck, cluck, cluck," that the domestic fowl uses when calling her chicks together. The young birds, on hearing it, squatted closely, and became quite rigid. I retired a little distance to await events, but finding the mother bird did not return, I went to take a final view of the young ones, but they had disappeared completely. I looked around in vain, and at last decided on making a more careful scrutiny. I went down on my hands and knees, and searched every inch of the ground. After about twenty minutes I came upon one of the birds squatting against a piece of heather, and a better case of protective coloration it would be impossible to imagine. The plumage of the bird harmonised so perfectly with its surroundings of lichens and heather that hardly anything short of actual handling would have enabled it to have been discovered. I continued my search for the other for fully an hour; but although I knew exactly what I was looking for, I failed to find it, and finally left, wondering only that the nightjar, with its marvellous perfection of safe-guards, should be as comparatively scarce a bird as it is.

This season seems to have been a particularly good one for the nightjar, it having been fairly plentiful in this district which is very suitable to its habits. It was in finest condition towards the end of June, but from that time it has gradually decreased in numbers. It appears to me that the males are the first to leave. Can any of the readers of Science-Gossip confirm this opinion?

*Squire's Farm, Westcott, Surrey; Aug., 1895.*

# SOME ABNORMAL PLANTS.

By John T. Carrington.

ONE of the most remarkable of many abnormal plants received during the past month is the case of proliferation in the flower spikes of broad-leafed plantain, which we have illustrated on this page. It was found by Mr. M. P. Richardson, of Accrington, and forwarded to us by our correspondent, Mr. Isaac Stephenson, of that town. It will be observed that the ordinary spikes have become bunched in the manner represented.

Mr. Robt. W. Chidwick, of 4, Dagmar Street, Worthing, writes as follows:

"I am sending you another monstrous growth, this time a cultivated *Scabious*. You will find enclosed four heads in different stages of development. In the one marked No. 1, you will observe that the growing point has extended right through the capitulum forming first a whorl of leaves, then an extention of peduncle, then another whorl of leaves, and lastly, at its summit, two or three incomplete flowers. The plant from which the enclosed were cut produced about thirty heads of flowers all more or less malformed after the manner of No. 1. Is this a case, think you, of reversion? At some time in the early history of *Scabious*, was it not possible that the inflorescence assumed a different form to that of its present? I think it probable, and the present specimen seems to add weight to the surmise, that the early ancestors of the family formed their leaves in whorls at the nodes of the stem, producing their flowers in axillary clusters, after the manner of the genus *Lamium* of the present time. If so, this is a very interesting case to the student of development. Mr. Grant Allen says, in his interesting 'Story of the Plants,' that small flowers co-operate and form a head in order to attract insects, and thus insure more perfect fertilization. This case in point seems to add weight to the theory, as the co-operating flowers form a most beautiful and attractive head in *Scabious*, and an object by which insects are sure to be attracted. On the other hand, the solitary flower in the axil of the leaves forming the whorl is so insignificant as to be easily passed by. Then to render fertilization still more sure, the aggregation of flowers are further enhanced, by adding to their beauty of form, a delicious scent, which is so enticing to many insects."

Abnormal Plantain, *Plantago major*.

Mr. G. B. Nielson, Bank of Scotland House, Glasgow, says: "A few days ago I discovered, near Arbroath, an abnormal flower of *Lychnis vespertina* (the evening campion). The specimen comprised two flowers in one, having the stamens in two complete sets of ten each, while the calyx was only eight-cleft, and the petals numbering nine, one of which was inserted between the two sets of stamens. There were of course no pistils. The other flowers on the same plant were quite normal."

Mr. John Brown, of 7, North End, Wisbech, says: "Having been much interested in the examples of sports and the abnormal growth of plants figured in your journal, I now send you two heads of the yellow loosestrife (*Lysimachia vulgaris*), as further examples. The loosestrife has been in my garden now for thirty years. I brought it originally from Wicken Fen. I daresay many of your readers know the locality, and have enjoyed collecting either insects or plants in that unique hunting-ground. I also send a plume of a common reed (*Phragmites communis*), which I gathered yesterday. In this case the plume is only about half the usual length, consequently the spikelets are much crowded together, giving quite a different character to the plume. All the heads, twelve in number, were like the one sent. Therefore one would be inclined to think it is a seedling sport, from the ordinary plants, which were growing all around in abundance."

The loosestrife plants are cases of cohesion of two stems, plainly showing the branching of each stem. They divide close to the top into two flat heads closely attached, in shape much like the familiar "cocks-comb" plant.

Mr. Henwood Teague, of Penzance, forwards a "treble-headed" sunflower on one stalk, but it is really only two flowers on one stem, one being broadly elongated and pinched in at the centre.

Mrs. Dora Twopenny, of Woodstock, Sittingbourne, sends an interesting case of fasciation of two stems of a plant of hawkweed, each side throwing off branches and having two larger flowers at the top.

# NOTES OF A HOME NATURALIST.

By Emily J. Climenson.

THE home naturalist has betaken herself the last two months to "fresh woods and pastures new," spending the time at South Brent, in South Devon. The first six weeks fine weather prevailed, but lately it has been an almost continual downpour. There is no doubt this is a rainy place as a rule, probably from the proximity of Dartmoor—Ugborough Beacon, one of the finest of the southern tors, being close by. The River Avon runs through our grounds here. The rapidity with which this river rises and falls in a few hours, according to weather, is remarkable. A small stream, not above two yards wide, also rushes through the grounds with the rapidity of a mill-chase. When I first came here, in the drought, the miller who turns his mill lower down, had the stream dammed, in order to clean out the channel, and it was reduced literally dry, with the exception of small puddles. In these I saw some boys searching, and found they were catching small trout and eels, though the depth, when full, is not more than a foot. I bought the largest confectioner's glass I could in the village, and placed a few trout and two small eels in it. The trout, to my grief, soon died, but the eels survived; but on my visiting the glass the next morning I found both of them gone. I searched the floor, and at last found one under a sofa, and the other coiled like a veritable snake under a table! I replaced them in the jar, but they soon died. Now what there is to note in this is that the glass, the only substitute I could obtain for an aquarium, was twelve inches high, six inches in diameter at top, the top rather incurving. I had not filled it more than seven inches with water, thus leaving five inches to the top empty, and yet the eels escaped. As the glass was incurved, they must have literally sprung out, no climbing was possible. The same little stream, when refilled, I fished with a pond net, but have only obtained some curious caddises of a different sort than I ever took before, their cases resembled Tunbridge ware boxes, inlaid with small pieces of wood, straw, etc., but quite smooth. There were also sand caddises, their whole case composed of same material. On the Avon I have taken several curious insects that run on the top of the water. Three of these lived on the top of the water in a wine-cooler for six weeks or more. They are the size of a large flea, though one was bigger than the other, a black shining oval body, with four legs, and two antennæ. What they fed on must have been invisible to the naked eye. I had nothing in the glass but a piece of brown river-moss unknown before to me, and three diminutive snails, *Succinea putris*. I am well accustomed to water-spiders and their provisioning, but these creatures remained on the water surface, never descending, though if soused with water they instantly ascended to the surface.

The first few weeks here I took many butterflies and some moths. Amongst the latter is a transparent yellow moth with red spots, unknown before to me. The continuous rain latterly has spoilt entomological pursuits, and caterpillars seem very rare, probably from wet weather. The only things the rain has suited are mushrooms, perfect eruptions of them in the fields a week or so ago, but just now none, probably from the ground being thoroughly chilled and no hot sunshine to evolve growth. Early in July I was at Totnes, and witnessed a most curious sight. At a sharp curve of the River Dart is a very steep rounded weir; up this the salmon-trout were wriggling by hundreds. With a desperate leap from the pool below they commenced their upward journey, but such was the steepness of the weir that unless they kept their noses quite straight in the wriggling process, the pouring stream sent them back, and their shimmering bodies flashed downwards again into the pool below, to wait and rest till another desperate effort could be made to ascend to the higher waters. They were as if demented to get upward, taking no heed of the alluring flies of three fishermen all angling in the pool; against the actual legs of one, several fish I saw, in falling back, struck, as he stood below the weir, on the stones, a sore temptation to pick them up. They were making their way to the upper stream in order to spawn. How they avoided being killed by their efforts was remarkable, especially when one reflects that a sharp tap on the nose with a small stick instantly kills them, as I witnessed afterwards, when the seine net was drawn one hundred yards lower than the weir, full of fine salmon and salmon-trout, and the fishermen dispatched the fish in this manner. I bought one of the smallest caught, which weighed three pounds and a half.

This place is a paradise for ferns, out of every crevice in the rocks and walls peep *Asplenium tricomanes*, *A. adiantum-nigrum*, and the hart's-tongue, lady-fern, marsh-fern, mountain- and male-shield-ferns vie with each other to adorn the lanes. Under a mountain rill of water I found growing, the other day, mingled with moss, *Hymenophyllum wilsoni*, one of the filmy ferns.

*August*, 1895.

# A NOBLE SANCTUARY.

By C. H. Watson.

IN a recent issue of Science-Gossip a short paragraph appeared on the subject of a national park, or reservation, in the Province of Ontario, and the writer of the following article, who was settled in the district for some time, feels assured that fuller information thereon cannot fail to be interesting to all lovers of nature. For years past it had been abundantly clear that unless effective measures were adopted for the protection of the game and fur-bearing animals of that part of Canada, a comparatively short time would witness the extinction of many valuable and interesting species. It was therefore, in the year 1892, decided by the Provincial Government to appoint a Commission "to enquire into and report respecting the setting apart of certain territory situated in the district of Nipissing for the purpose of a Forest Reservation and National Park." The report was duly made, and being promptly acted upon, the scheme is now, happily, an accomplished fact. A copy of this report, issued by order of the Legislative Assembly, has, in consequence of the above-mentioned paragraph in Science-Gossip, been forwarded from Canada, and furnishes much information of a highly instructive and interesting character.

The tract of land constituting what is now the Algonquin National Park is typical of the vast district lying between the Ottawa River and Georgian Bay, and is situated some thirty miles south-east of Lake Nipissing. "The north-east angle of the Reservation approaches to within about twelve miles of the Ottawa River; but as the course of the river is south-easterly, while the boundary of the park runs almost due north and south, the distance from the confines of the park rapidly increases as the southern limit of the latter is reached. The town of Deux Rivières on the Ottawa, some twelve miles from its northern limit, is the nearest settlement of any importance, the population in the townships lying between the eastern boundary and the Ottawa, through which the Canadian Pacific Railway passes, being very sparse. Otherwise, for considerable distances on all sides of the park there is scarcely any settlement at all. The reservation comprises eighteen townships, and forms a compact block with an average length from north to south of forty miles, and breadth from east to west of thirty-six miles, the whole area containing 1,300 square miles of land and 166 square miles of water." The significance of these figures will be more readily grasped if it be borne in mind that this extent of country is about fifteen times as large as the Isle of Wight, or the New Forest in Hampshire.

It will thus be seen that ample space is provided for the protection and natural increase of the wild animals and birds of the forest. It is also satisfactory to learn that the action of the Government is approved by the hunters and trappers, who, for many years past, have gained their livelihood in the woods now included within the reservation. These men acknowledge that the fur-bearing animals were becoming scarcer every year, and frankly admit that their preservation and increase will eventually be to the advantage of men of their calling, when following their occupation outside the limits of the park.

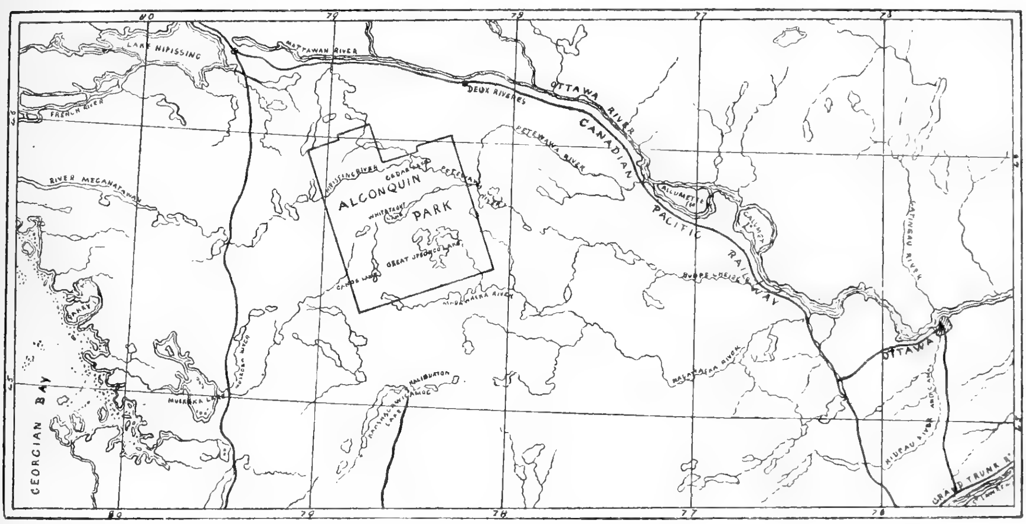
To quote the report already referred to: "Here, not many years ago, the moose, monarch of Canadian woods, roamed and browsed in large numbers, the leaves and tender branches of the young trees supplying him with his favourite diet; here herds of red deer grazed in the open beaver meadows, or quenched their thirst at the rippling brooks or crystal lakes; here the industrious beaver—that greatest natural conservator of water—felled his trees and built his dams on every stream; here the wolf's detested howl startled the timid deer, and the bear pushed his black bulk through the dense undergrowth in search of ripe nuts and berries. Here, in fact, may be said to have been the centre from which the moose, red deer, and other animals spread out to all sections of the Province south of the Mattawa river and Lake Nipissing."

The wanton destruction to which the large game have been subjected for the past few years is almost incredible. As an illustration of this ferocious folly it may be stated that in the Spring of 1887, the carcases of not less than sixty moose were found in the district now constituting the reservation, the animals having been killed for their skins alone. Even were there no other reasons, such reckless slaughter of valuable animals would furnish ample justification for the action taken by the Provincial Government in establishing this noble sanctuary for helpless persecuted creatures. Despite all this persecution, however, at the present time large game are fairly plentiful, especially in the northern and western townships; there are also many wolves and bears, whilst mink, otter, fisher, martin and musk-rat abound. Beavers are few and scattered, but, being a prolific animal, will, under more favourable conditions, in a very few years become plentiful as of old.

The birds include wild duck, grouse, heron, partridge and pigeon, and amongst song birds, the whip-poor-will and chicadee are not uncommon. There are several species of hawks and woodpeckers, and many other interesting birds. The numerous creeks and lakes are teeming with fish, and include white-fish, chub, pike, cat-fish and eels, the white-fish being very plentiful in Great Opeongo, Cedar and several other lakes, and it is proposed to introduce other species which are known to be suitable for these waters.

The park forms part of the great forest which formerly covered the whole of Ontario, and which even now extends over many thousands of square miles. It contains a great variety of trees, including, amongst the hardwood species, beech, birch, maple, ironwood and ash, all of which are found in groves or intermingled with pine. It is the home of the black birch, which grows to magnificent proportions. In the neighbouring district, I have frequently met with perfectly sound trees of enormous size and have measured specimens from fifteen feet to eighteen feet in circumference. Hemlock is common, also balsam-fir, cedar and basswood, and the white and red pine although much diminished in quantity by the operations of the lumbermen are yet well represented. Spruce and tamarack in the swamps abound, and there is a dense undergrowth of balsam, cherry, hazel and ground hemlock, the last-named furnishing splendid bedding for the camp of the solitary hunter. Alders are found along the creek-beds everywhere and in the marshes. It is worthy of remark that after a fire the ground is rapidly covered with a second growth of poplar, white birch, cherry, maple and pine. Vast quantities of raspberries spring up, and these, with the bilberries and other wild fruits, constitute a very welcome addition to the simple fare of the hardy trapper or isolated settler. The flora generally is rich in species and characteristic of this great virgin forest. Many species of wild flowers and shrubs possessing medicinal and other virtues are very plentiful, not the least important being that popular herb, the sarsaparilla, but near the older settlements the majority of these plants are almost forgotten where once they were the common objects of the forest glades. In the new park many species will be saved from extinction, and others adapted to the locality will be introduced.

As regards the land itself, it may be stated briefly that "owing to its situation on a watershed it possesses little agricultural value, being rough, broken and stoney. There are few high hills, the surface being mainly composed of rocky ridges alternating with valleys, swamps and marshes. Rocks of the Laurentian formation everywhere protrude above the soil, and granite, or gneiss, dip at various angles towards the south-east, the 'grain' of the strata being north-east and south-west. No limestone, so far as is known, occurs, and indications of minerals hitherto met with are few, comprising chiefly iron ore." Many rivers have their rise within the reservation, the more important being the Muskoka, Petewawa and Madawaska, the elevation of their sources averaging about 1,400 feet above the sea level. The lakes vary in size, from the Great Opeongo, which extends over many square miles, to tiny ponds of a few acres. In their rapid course the rivers frequently widen into picturesque lakes, and are fed by innumerable streams. Viewed generally, the aspect of the park presents many interesting features. The whole district is covered with a complicated network of streams and lakes, stretches of dry forest and




MAP OF ALGONQUIN NATIONAL PARK.

tangled swamps, and affords an infinite variety of charming and romantic scenes. Nothing is calculated to make a more solemn and indelible impression on the mind, than to rest at the close of day on the shores of one of the many beautiful lakes lying concealed in this great silent forest. The sun is majestically sinking to rest amidst the grandeur of a brilliant and cloudless sky, its expiring beams gilding the summits of the lofty pines which clothe the distant hills; and as we watch the deepening shadows creeping upward from the calm unruffled bosom of the lake, a melancholy sigh tells of the passing zephyr breathing gently over the mighty green woodland surrounding us. The cry of the owl, the monotonous song of the frogs issuing from the neighbouring swamps, the hoarse croaking of the bull-frog as he rears his head from the waters at our feet, the occasional rustle of the undergrowth as some wild animal rouses from its slumbers and goes forth in search of its evening meal; all these but deepen the feeling of perfect peace and emphasise the solemn silence—the holy calm pervading the vast primeval forest.

The name given to the reservation is intended to perpetuate the memory of one of the greatest Indian nations that inhabited the North American continent. At the time of the discovery of America the Algonquin Indians were lords of the greater part of what was formerly known as Canada, and principally inhabited the great basins of the St. Lawrence and Ottawa Rivers. After their defeat, in the St. Lawrence Valley, by the Iroquois, they abandoned that district and joined their kindred north and west. History finds them early in the sixteenth century scattered about the shores of Lakes Huron, Michigan and Superior. They were divided into numerous bands bearing generally some local name, but differing very slightly in language, features, manners or customs. They numbered about forty different tribes, and included the Nipissings, Ottawas, Delawares, Wyandots, etc. The Nipissings, who are deemed the true Algonquins by archæologists, lived by Lake Nipissing. There are still the remains of an old burial ground on the lonely shores of the Great Opeongo Lake, and as this locality abounded in game, it was doubtless a favourite hunting-ground of the roving tribes. Perhaps, also, it was the scene of many a sanguinary conflict between bands of contending warriors, ascending the Petewawa and Madawaska on the east, and the Muskoka and Maganetawan on the west. It is fitting, therefore, that the name of a once great and powerful people, who in their savage manner held sway over this territory centuries ago, should bequeath their name to a part of it which will now be maintained, as nearly as possible, in the condition in which it was when they fished in its waters and hunted and fought in its forests.

Every precaution has been taken by the Provincial Government of Ontario, for the conservation of this national reserve. Rangers' accommodation has been provided for at intervals of a few miles throughout the district, with the object of preventing poaching or other abuse of the public property. It is intended to provide accommodation for visitors. Botanists and naturalists generally, will thus have splendid opportunities for studying, under as nearly as possible natural conditions, the objects in which they are interested.

Much might be said of the new reservation as a health resort, and as a great educational medium, but it will suffice to remark that its value in these directions can scarcely be over estimated. It will ever be regarded as one of Canada's most valuable possessions and be treasured by future generations as a splendid inheritance, a lasting and glorious monument to the wisdom and forethought of the men of our time.

53, *Glen Eldon Road, Streatham, S.W.; August*, 1895.

## THE GEOGRAPHICAL CONGRESS.

THE International Geographical Congress held its sixth session in London, from July 26th to the 3rd of August. As a whole the meeting may be set down as a success, though there was not the full attendance of British geographers which had been expected. The two foremost subjects of the day in exploration, of course occupied the chief attention of the Congress, perhaps next to garden parties and other social fêtes. These were polar expeditions and Central Africa. Admiral Markham, General Greely, Professor Neumayer, Mons. E. Payart and Herr S. A. Andrée read papers on the prospects or improbabilities in results from expeditions to the ice caps of the earth, whether in ships or by balloons. One interesting paper on an Antarctic voyage commanded much attention, especially as it made frequent reference to the comparatively abundant life of varied character met with during the expedition.

Much picturesqueness was added to the African section by the presence of Slatin Pasha, who still wore the deep bronze of his long captivity among the Soudanese Arabs. Mr. H. M. Stanley, M.P., spoke with emphasis on some points, especially in defence of his friends, the Central African natives, and the climate. He and Slatin Pasha had on their side at least the authority of residence among these people, and Mr. Stanley by no means missed its value in his trenchant remarks. One paper was as much geological as geographical, being on the French glaciers, by Prince Rowland Buonaparte. Considering the easy access of the Dauphiné region of France, it is surprising to find how little the public know about its glaciers and mountains.

# THE SELBORNE SOCIETY FIELD CLUB.

THE district around Pinner affords many opportunities for an interesting field-club ramble, such as is now the delight of the numerous rambling clubs which have, within recent years, started into existence. In connection with the Selborne Society a ramble had been arranged for June 29th, which was to lead a party of wanderers from Pinner (Metropolitan Station) by way of Ruislip to Northwood. There was enough work to last for a three hours' tramp.

After passing away on the right from the main road, which runs under the railway at Pinner Station, rural life at once became apparent. To the ordinary town-liver, few things appeal with such force to his sense of the beautiful as a hedge thickly covered by the sweet perfumed dog-rose. The hedges at the sides of the road were covered with the blossoms of the roses, some only just bursting their buds, these the safer ones to take away to our homes if we wish to revive their beauty.

There are some sharp turns in the road, and at each of these turnings there is usually a piece of ground left to grow just as nature wills it. The road skirts closely the opposite hedge, and here nature grows apace, free from interference; and here the sorrel, the red campion, and the herb-robert hold sway. It was noteworthy that throughout the whole journey not a single white campion was found. Ragged robin (*Lychnis flos-cuculi*) soon fell to the lot of a member of the party, whilst the woodbine (*Lonicera periclymenum*), which crowned the tops of most of the hedges, was the prize of everybody. There is a good deal of stagnant water in this district, and this, of course, gives an undoubted character to the flora. We soon met on our right a large green scum-covered expanse of water, in which we saw a quantity of the large bur-reed (*Sparganium ramosum*) in blossom, and from which, at some risk, we obtained this, with its coarse-looking yellow blossoms, as well as the great water-plantain, with its small three pink-petalled flowers, and its broad, handsome leaves. The three-cornered stems of the sedges were here very noticeable, whilst clusters of wick-making rush (*Juncus effusus*) made an interesting show. Reed-mace, or bulrushes (*Typha latifolia*) were not sufficiently forward to warrant a seizure. A half-hidden brook, or, perhaps, only a ditch, meandered at the side of the road hence to Eastcott, and in this the glaucus speedwell (*Veronica beccabunga*), raised its little blue blossoms on a succulent stem, enshrouded in a mass of thick juicy-looking leaves, whilst trailing away from the older portions of its stem were the long racemes, bearing the rapidly-ripening seeds. In the drier parts, hedge woundwort (*Stachys sylvatica*) was wonderfully plentiful.

As the party passed through Eastcott, one lovely wild garden was just seen above the tops of a protecting hedge. A giant umbellifer, such as one might stand under in a shower of rain, made a handsome if not a pretty show. In the pathway leading to the rural homestead was a row of monster mulleins (*Verbascum thapsus*), which were evidently flourishing here. This species we were unable, however, to find wild. A little distance in the garden we could descry the comfreys (*Symphytum officinale*) hanging their graceful heads on plants not less than five feet high.

A white dead-nettle (*Lamium album*) was culled, which, although undoubtedly of this species, had its lip-like blossoms tinted with the red of its sister-species, perhaps an instance of cross-fertilization between the two. I always have a liking for the white nettle. The blossoms are so regular and well-formed, and the whorl of ten is, as a rule, so perfect as almost to insist on admiration. There is, too, the relief of being enabled to handle the nettle-like leaves without being reminded of their stinging properties. Over and over again we have all been warned by our well-meaning friends not to touch it because of its stinging hairs, no distinction being made in the popular mind between *Lamium album* and *Urtica dioica*.

Nipple-wort (*Lipsana communis*) was making a show. We saw a bank from which came a reminder of the rapid course of summer, in the shape of the lovely wild spiræa, or meadow-sweet (*Spiræa ulmaria*), A number of blossoms were noticed from time to time. A few were picked, but most were left to sweeten their native air, and to ensure a continuance of the species on the same spot. Red campion (*Lychnis diurna*) had in many parts already run to seed. It is a good plan to remove the ripe seed from specimens which are plucked, and scatter it by the wayside.

The first object of the members of the Selborne Society is the preservation of our native plants and animals. Though the distribution of the seeds of such a common plant as the red campion is in itself a small thing, if the practice were generally followed by ramblers with regard to other plants, the results would in very few years begin to show themselves, in the increased number of our wayside flowers.

After leaving Eastcott, our road swerved round to the left. One of the fields presented a perfect picture of monster ox-eye daises (*Chrysanthemum leucanthemum*) and crimson hard-heads (*Centaurea nigra*). Near a pond at the bend in our road we noticed the upright pipe-like stems of the great spearwort (*Ranunculus lingua*), with their elongated seed-receptacles, together with the ivy-leaved lettuce (*Lactuca muralis*) and creeping-jenny (*Lysimachia nummularia*), whilst straight ahead were tall hedges on each side of the road, bright with the clusters of dogwood blossom (*Cornus sanguinea*), with a foreground of tall white bedstraw. Here and there the white bryony was climbing over the hedge. Beneath all, like a brigade of skeletons of bye-gone days, were the upright stems and turned-down leaves, stricken red by a midsummer sun, of the white hedge-garlic (*Alliaria officinalis*). The willow-herb (*Epilobium montanum*) was occasionally met. Many of the small pale-crimson blossoms had dropped, but the long thin seed-pods were still complete, not at present showing the rows of seeds, covered with curls of cotton, which will be seen when ripe. The hairy willow-herb (*Epilobium hirsutum*) had almost grown to its full height, but was not in blossom.

Just opposite the village church at Ruislip we saw a cluster of one of the calamints in the hedge, and the refreshing odour of the sweet-briar attracted our notice as we passed out of the village There is a pretty homestead a little way out of Ruislip, where we knew we could obtain refreshment. An hour was spent over tea, and the mutual examination and comparison of our specimens.

Perhaps the pleasantest part of an afternoon ramble is that which takes place in the cool of the evening, when all nature seems so restful, when the birds are calling to their mates, and the may-flies are dancing in the slanting rays of the sun. We had ample time to wander around the reservoir before making our way to Northwood Railway Station. This reservoir has nothing artificial about it. It seems to lie in a perfectly natural hollow. All around it are the usual associations of pond life. As we look across the water, a thick wood appears to bound it on the one hand. From near the reed-beds a peewit arose, disturbed by the unwonted company. As it screamed and was faintly answered afar off, a young member of our party mimicked its call. Whirling round and round over our heads, it endeavoured to ascertain whence the call came.

Little frogs, with very broad and high shoulders, covering a surface not more than half an inch square, their missing links not long lost, were skurrying into the ditches. The grass seems full of them. A solitary specimen of lesser red-rattle was plucked, whilst on each little mound was a handful of wild thyme, and around many plants of the delicate needle-whin. We crossed a stile and were among the hedge-rows again. There is a solitary specimen of yarrow (*Achillæa millefolia*) well out in blossom, and two or three of ragwort (*Senecio jacobæa*), solemn warnings that Autumn will soon be upon us.

On a bank we saw the gaunt stems of the cuckoo-pint (*Arum maculatum*); the beautiful spathe has gone; all that remains is the lengthened rod, bearing at its end a cluster of green-pea-like seeds, which will soon change to a beautiful red as they ripen. We skirted a ditch by the side of the path into which a sparrow-hawk had fallen, a prey to the ignorance of the possessor of the gun which laid it low. Away in the fields we heard the harsh grating of the corncrake.

Night had set in rapidly. Nimbus had gained possession of the sky, and as Northwood was reached the rain, which had commenced to threaten as the sun set, shed its welcome fragrance on the thirsty earth. EDWARD A. MARTIN.

*62, Bensham Manor Road, Thornton Heath; July, 1895.*

On July 13th, the Field Club of the Selborne Society met at Merstham, in Surrey, for a ramble to Coulsdon, under the guidance of Professor Boulger. The number of botanical specimens collected this time was not so large as in a corresponding ramble last year. The most interesting specimens were as follows: *Listera ovata, Epipactis latifolia* (var. *media*), *Campanula rotundifolia* and *C. trachelium, Lactuca muralis, Tanacetum vulgare, Silene cucubalus, Lathyrus sylvestris, Asperula odorata* and *A. cynanchica, Carduus acaulis, Centaurea scabiosa, Circæa lutetiana, Orobus tuberosus, Crepis virens, Galium verum* and *G. mollugo, Calamintha clinopodium, Origanum vulgare, Epilobium montanum, Bartsia odontites*, and *Sonchus arvensis*. Herb Paris was searched for in a wooded valley in the beginning of the ramble, but could not be found. Tea was provided at Smitham's Bottom. After the meal Professor Boulger gave an interesting account of the herb Paris. This is a plant not easily forgotten if once seen and studied. Its most striking feature is the four foliage leaves in a whorl; hence its scientific trivial name of *quadrifolia*. It is truly European, being found over nearly the whole of Europe, Iceland and Siberia. Curiously enough it is not found in the North of Scotland, nor in America; some specimens have been found at the foot of the Himalayas. There is only one species in Europe. The English name for herb Paris is herb true-love, from the fanciful resemblance of the four-whorled leaves to a true lover's knot. Professor Boulger had seen some particularly fine specimens in the Oakley Woods, near the Cotswold Hills. Here, under the beeches, the herb Paris was so abundant that it was nearly ousting the dog's mercury. It is a noticeable fact that the number of parts in the flower was more varied there than elsewhere. E. J. TEMPLE.

*Hon. Sec. Field Club, Selborne Society,*
*50, Clovelly Mansions, W.C.*

# BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Country Pastimes for Boys.* By P. ANDERSON GRAHAM. 464 pp. 8vo, illustrated by 248 plates and figures. (London and New York: Longmans, Green and Co., 1895.) Price 6s.

It is quite a pleasure to wander through the pages of this book, with boyhood memories refreshed, until we wish we had to live it all over again. It is even a greater satisfaction to find the good manly tone which pervades the letterpress, such a contrast to the masses of inaccurate rubbish which many caterers of boys' books unfortunately provide. How boys mentally and morally survive such stuff is often a marvel to us. Unfortunately some do not, becoming social failures, largely in consequence of their early reading. Here, however, is a good book well worth its price, profusely illustrated with pictures on every other page or more. We reproduce three of them as examples. Natural history occupies many pages, birds and bird-nesting no less than 100, besides others on "Bird Pets" and "Familiar Birds for Talking." Fish and some animals are also treated, as are poisonous plants, berries and fungi. Considering the space at his disposal, Mr. Graham has done well to avoid long articles of the organized games of cricket, football, or tennis, and to devote himself to what may be seen in country rambles. Still there is much beyond natural history which will gladden the heart of a manly boy in the chapters on "Skating," "Tobogganing," "Swimming," and many open-air games. In his treatment of the natural history section, the author fully recognizes the necessity of allowing boys to catch and handle such wild animals as they can. As he says, the hunting instinct is one of the strongest possessed by boys, and to crush it out of existence is impossible. We might add neither is it desirable, for the more we civilize the more effeteness do we introduce into human character, which soon develops faddiness. Far preferable in boyhood is the noble young savage who delights in honourable manliness, even if his nails are in perpetual mourning, to the namby-pamby youth devoid of all originality. Cruelty must ever be discouraged, but priggishness should be equally stamped out in guiding youthful habits of thought. In the chapter on "Fishing without Tackle" is an account of catching fresh-water mussels which is ingenious, but we imagine hardly such good fun as tickling trout. That, however, is perhaps one of the things boys should not know, as it savours of the tricks of the poacher, though it is not omitted from this book and will be found under "Gumping" and "Tickling." This account opens with the very sound advice that all good sportsmen ought to know how a wild creature behaves in ease and security before attempting to catch it. As a gift-book for boys we can hardly imagine a better, either for amusement, "wrinkles," or trustworthiness.

CATCHING MUSSELS.
From "*Country Pastimes for Boys.*"

*Notable Answers to One Thousand Questions.* 463 pp. 8vo. (London: George Newnes, Limited, 1895.) Price 2s. 6d.

This is a reprint of the sixth thousand questions in the enquiry columns of "Tit-Bits," with replies. There will be found among the questions a considerable sprinkling on scientific subjects, and from them we may gain some instruction and also amusement. For instance, under the question "What is the smallest known insect?" We are referred to the number of *microbes* found in forty-five days' old Gruyère cheese. We were under the impression that microbes were considered to be more probably of vegetable origin than insects.

*Missouri Botanical Garden.* Sixth Annual Report, 1895. Edited by WILLIAM TRELEASE. 134 pp. royal 8vo, with 62 full-page plates. (St. Louis, Mo., and London: W. Wesley and Son.)

This year's report of the Missouri Botanical Garden at St. Louis is a handsome volume, which is improved by the omission of the annual flower sermon and reports of the two banquets. The scientific papers include a revision of the North American species of *Saggitaria* and *Lophotocarpus*, by Jared G. Smith. It is illustrated by twenty-nine plates of species, varieties being added. The letterpress of this useful monograph extends to thirty-eight pages, treating over forty species and many varieties. Among the plates are half a dozen views from the gardens, the frontispiece "Among the Willows" being especially successful. The scientific papers are also published separately.

*Nature versus Natural Selection: An Essay on Organic Evolution.* By CHARLES CLEMENT COE. 220 pp. royal 8vo. (London: Swan Sonnenschein and Co., 1895.) Price 10s. 6d.

This book has been evidently a great undertaking on the part of Mr. Coe. We will, however, quote the author's own words as to the intentions of the work, and leave to our readers the task of forming their own opinions upon his arguments. In his preface he says: "The author believes that the process of organic evolution has taken place, but he does not believe that natural selection has been the means by which that result has been brought about. . . . The object of this work is to show that natural selection has no place in the world of nature." The book is well worth reading, even if we do not agree with all the author's arguments. There is, however, a considerable amount of special pleading in its pages. There is every evidence of much research, and a wide range of books that have been annotated with the object in view.

*Tit-Bits Guide to London.* 140 pp. 8vo, with illustrations. (London: George Newnes, Limited, 1895.) Price 6d.

This is a handy little Guide for strangers visiting the metropolis. It is arranged in daily excursions from each of the great railway stations. There is a list of the museums, and regulations for admission, from which we regret to see one of the handsomest and most central omitted, namely, the Geological Museum, in Jermyn Street.

YOUNG COOTS.
From "*Country Pastimes for Boys.*"

*A Handbook of the British Macro-Lepidoptera.* By BERTRAM GEO. RYE, F.E.S., with hand-coloured illustrations by MAUD HORMAN-FISHER. Vol. i. part 3; 8 pp. large 8vo, with two coloured plates. (London: Ward and Foxlow.) Price 2s. 6d.

We are pleased to find that the parts of this work are to be more frequently issued, and it will appear at intervals of two months. The species dealt with are *Euchloë cardamines*, *Leucophasia sinapis*, *Colias hyale* and *C. edusa*.

*British Birds.* By W. H. Hudson, C.M.Z.S., with a chapter on Structure and Classification, by Frank E. Beddard, F.R.S. 363 pp. large 8vo, with 8 coloured plates from original drawings by A. Thorburn, and 8 plates and 100 figures in black and white, from original drawings by G. E. Lodge, and 3 illustrations from photographs from nature, by R. B. Lodge. (London and New York: Longmans, Green and Co., 1895.) Price 12s. 6d.

This is another of Messrs. Longmans' "Outdoor World Library," and reflects the highest credit on the publishers for a piece of book-production. The coloured plates are above the average, and the pictures from photographs are nicely composed. Most of the birds illustrated by Mr. Lodge are recognizable, but many are too loosely drawn, giving the appearance, in some cases, of sickly specimens. This applies to fig. 18, song thrush; fig. 26, nightingale; fig. 37, pied wagtail; fig. 57, a raven; and fig. 117, little grebe. Professor Beddard's chapter is good, but perhaps a little too condensed in places.

Eli Collins, Truffle Hunter. From "*Country Pastimes for Boys.*"

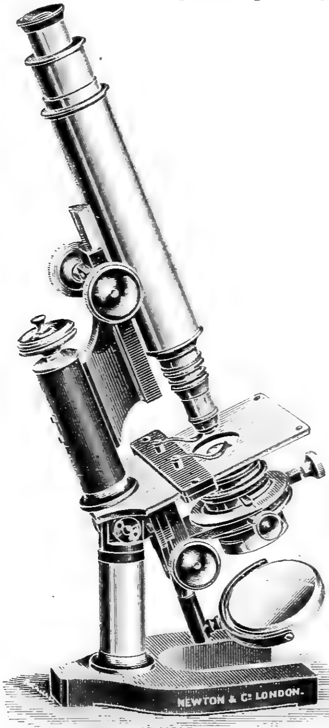
When such a book as this appears, it is customary for some people to exclaim, "What need for it? There are already too many of such works." With this we do not agree, for we believe every work of a special nature induces some people to take an interest in the objects on which it treats. This will doubtless be the case with this newest book on British birds. Although the author is known to be interested in our insular ornithology, specialists will consider his work largely a compilation, with little that is new in its pages. Still, the work will be of much use to those who had not studied our birds before meeting with it; for it summarises much of what is stated elsewhere at greater length, and the information is fairly up to our latest knowledge. This, as stated by Mr. Hudson in his introduction, has been his object, rather than giving elaborate histories of each kind of bird. His remarks on observing birds in a state of nature are good, when he writes, "Let us imagine the case of a youth or boy who has read and re-read half-a-dozen long histories of some one species, and, primed with all this knowledge, who finally goes out to observe it for himself. It will astonish him to find how much he has not been told. . . . The reflection will follow that there must be a limit to all things that can be recorded, . . . and in the end he will be more than content that it should be so." The casual species of bird visitors to these islands are no more than referred to by the author, who confines himself to those kinds which may be always found at one or other season of the year.

*The Royal Natural History.* Edited by Richard Lydekker, B.A., F.R.S. Illustrated with 72 coloured plates and 1,600 engravings. (London and New York: Frederick Warne and Co.) Published in 1s. parts.

We have received part 22, vol. iv., of this fine work, which continues the birds, dealing especially with the herons, storks, and ibises, on through the flamingoes, ducks, to the pigeons and sand-grouse.

# MICROSCOPY

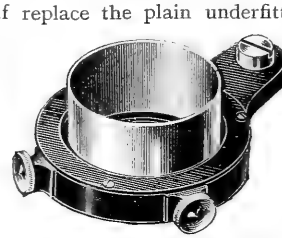
Micro-Photography.—We have had submitted for examination by Messrs. Newton and Co., of Fleet Street, London, a combination of their students' microscope and photo-micrographic apparatus, which we figure separately and in




Newton and Co.'s New Pattern Student's Microscope.

association, for the use of our readers. The new pattern students' microscope was specially designed to include the most modern improvements and still be both portable and inexpensive, the price being £5 15s. 6d. This instrument is especially suitable for photography, as it bends steadily into a horizontal position, and may be then moved on an axis right round a circle on the foot. We have seldom seen a more firmly made instrument at the price. There is a good fine adjustment as well as the ordinary rackwork movement. Messrs. Newton's photographic apparatus figured below is very simple, and can be used in connection with any microscope. The leather collapsing arrangement gives a range of extension for focussing the plate, and there is a fine movement as well as the ordinary extension screw. Its price is four guineas. With this instrument any naturalist should be able to prepare beautiful negatives, that would produce useful lantern slides; these are the coming features of scientific meetings.

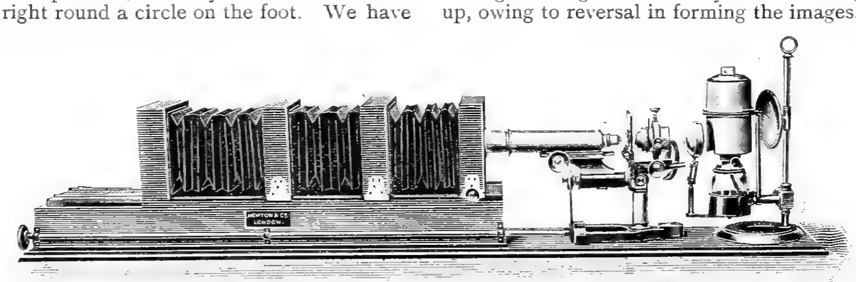
A new Centring Underfitting.—Possessors of students' microscopes whose work has, with increasing knowledge, called for additional facilities for accurate manipulation, have frequently wished that some means of centring the substage condenser could be adapted to their instrument. It is true that one or two opticians now manufacture many parts of their microscopes to gauged sizes, enabling a worker, should he desire to do so subsequently, to himself replace the plain underfitting with a



Centring Underfitting.

substage, but it has been felt that something less costly than this might be advantageously introduced. Our attention has been called to a new centring underfitting, which has been recently designed by Messrs. W. Watson and Sons, of 313, High Holborn. It enables a condenser to be exactly centred, in the same manner as with a substage, and it is shown in the accompanying figure. It was designed primarily for that firm's Edinburgh Students' Microscopes, but we understand that it can be readily adapted to almost any form of students' microscope.

Eye of Beetle for Multiple Image.—"The Microscope," for July, 1895, says: "Have a diffuse side-light; use plane mirror and small aperture of diaphragm. Focus on the piece of cornea; then with one hand, held about three feet from the mirror toward the light, with fingers spread and in motion, and with the other hand on the fine adjustment, slowly draw the objective back from the slide, watching the facets of the cornea until hundreds of tiny hands are seen. After you have learned how to do it, anything may be substituted for the hand. A profile-face against the sky, a house in bright sunlight, etc. They will not be right side up, owing to reversal in forming the images."



Newton and Co.'s Photo-Micrographic Apparatus.


| | 1895. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| | | A.M. | P.M. | | |
| Sun | Sept. 1 | 5.14 | 6.46 | 10.42 | 8° 17′ N. |
| | „ 11 | 5.30 | 6.24 | 11.18 | 4° 34′ |
| | „ 21 | 5.46 | 6.1 | 11.54 | 0° 42′ |
| | | Souths. P.M. | Sets. A.M. | | |
| Moon | „ 1 | 10.26 | 2.54 | | |
| | | Rises. P.M. | Souths. A.M. | | |
| | „ 8 | 7.27 | 3 13 | | |
| | | A.M. | A.M. | | |
| | „ 11 | 1.48 | 9.46 | | |
| | | Souths. P.M. | Sets. P.M. | | |
| | „ 22 | 3.3 | 6.58 | | |
| Mercury | „ 8 | 1.3 | 7.1 | 12.12 | 1° 16′ S. |
| | 18 | 1.16 | 6.38 | 13.4 | 8° 13′ |
| | „ 28 | 1.22 | 6.13 | 13.50 | 13° 59′ |
| | | Rises. A.M. | Souths. P.M. | | |
| Venus | „ 8 | 7.22 | 0.44 | 11.54 | 8° 15′ S. |
| | | A.M. | A.M. | | |
| | „ 18 | 6.9 | 11.39 | 11.33 | 6° 34′ |
| | „ 28 | 4.55 | 10.41 | 11.14 | 3° 25′ |
| | | Souths. P.M. | Sets. P.M. | | |
| Mars | „ 8 | 0.38 | 6.53 | 11.48 | 2° 14′ N. |
| | „ 18 | 0.23 | 6.25 | 12.11 | 0° 24′ S. |
| | „ 28 | 0.7 | 5.56 | 12.35 | 3° 3′ |
| | | Rises. A.M. | Souths. A.M. | | |
| Jupiter | „ 18 | 0.36 | 8.26 | 8.19 | 19° 54′ N. |
| | | Souths. P.M. | Sets. P.M. | | |
| Saturn | „ 18 | 2.24 | 7.31 | 14.13 | 11° 3′ S. |
| Uranus | „ 28 | 2.33 | 7.8 | 15.1 | 16° 48′ S. |
| | | Rises. P.M. | Souths. A.M. | | |
| Neptune | „ 28 | 8.34 | 4.38 | 5.9 | 21° 28′ N. |

### Moon's Phases.

| | | | | | |
|---|---|---|---|---|---|
| *Full* ... | Sept. 4 | 3.55 a.m. | *Last Qr.*... | Sept. 12 | 4.51 a.m. |
| *New* ... | „ 18 | 8.55 p.m. | *1st Qr.* ... | „ 25 | 6.23 p.m. |

Mercury is an evening star, and Neptune is visible in the evening, but none of the other planets are very well placed for observation.

Considerable progress has been made with the new twenty-six-inch photographic telescope, presented to the National Observatory, at Greenwich, by Sir Henry Thompson. Sir Howard Grubb is occupied upon both the glass discs, while Mr. Simms is producing a new spectroscope for photographing spectra.

The Yerkes Observatory.—Mr. E. E. Barnard, of the Lick Observatory, has resigned, to accept a position in connection with the Yerkes Observatory, on Lake Geneva, Wisconsin. There appears to have been some friction among the staff of the Lick Observatory, which may have caused Mr. Barnard to arrange for this exchange of appointment.

Mr. Percival Lowell contributes to "Nature" a carefully prepared paper on the "Evidence of a Twilight Arc upon the Planet Mars." It is based upon what he terms a "by-product," found during a reduction of 341 micrometric measures of the diameters of Mars taken last year by Mr. Douglass, the well-known astronomer. This investigation, in Mr. Lowell's opinion, indicates unmistakably that twilight not only exists on the planet but is visible from the earth, having been unconsciously measured by Mr. Douglass. That Mars possesses an atmosphere few astronomers had any doubt, but if any seriously exists the discovery of twilight on the planet must set such doubts at rest.

Popular Astronomy.—The last number of the American Journal, "Popular Astronomy," is well up to the excellence that has characterised this magazine, which has now reached its twenty-first number and third volume. The leading article is an illustrated translation, by T. J. J. See, of the eulogy of Laplace, by Baron Fourier, which was delivered on June 15th, 1829, at the Royal Academy of Sciences of France. A useful article, entitled "Observations for Beginners," is by Mr. W. W. Payne. In it he says, whether a person has only a field-glass, an opera-glass, or a desire to see with the unaided eye, the questions arise what to observe and how to observe. It is important to know what to observe, that time may be wisely used, and equally important for obtaining the best results that we should know how to observe. Experience and aptitude alone points out what one may observe to be useful. Work too difficult should not be undertaken at first. For illustration, at first it is enough to study the names and places in the sky, of the first and second magnitude stars. It is said that even this is neglected, for not one in twenty average astronomers of the present time could name all these stars at sight in his own latitude. Thus the beginner may soon place himself even, or superior in this special knowledge, with the professional astronomers. To begin this work of instruction, the learner should have a planisphere which contains the names and places of these stars, with directions for finding them. First make a table of the first magnitude stars, with columns for the Arabic names, and for those indicated by the Greek letters, and the constellations in which they occur, reserving space for a third column, to be used later for the observation of colour, and a fourth for general remarks. In a similar manner make another table for the second magnitude stars, and in this way begin work in earnest, having before the mind at first only the names and places of these stars. Be sure the Arabic names are pronounced as correctly as possible, and for this consult the best dictionary within reach. Make a record of every observation in a note-book, on the method of observing by Miss Mary E. Byrd, viz.: (1) Begin each night's record on a separate page. (2) Date each page of observations. (3) Record each night the place of observing, and the time of beginning and ending. (4) Enter the record in connection with the observation. (5) Keep all records of observations in pencil. (6) Make all corrections of the original record, and enter copied observations in ink. The success of the work will depend on the patience and perseverance of the person undertaking it. At first it will go slowly, very slowly, and the beginner will lose patience because able to do so little, and what he does seems to amount to so little. This is the common experience of all. Soon that impression will wear away and facility in doing will come, and interest and knowledge will improve. Messrs. W. Wesley and Son, London, are the European agents for "Popular Astronomy," the subscription being 12s. 6d. per annum.

## SCIENCE GOSSIP

Professor N. Zograf has communicated to the Société d'acclimatation of Paris, an interesting paper on "Pisciculture in Russia."

We hear with pleasure that a Civil List Pension of £200 per annum has been granted to Mrs. Huxley, widow of the Rt. Hon. T. H. Huxley, F.R.S.

A useful article upon "The Orchids of County Dublin," by Mr. Nathaniel Colgan, M.R.I.A., is in the "Irish Naturalist" for August. It appears that sixteen of the twenty-three species occurring in Ireland have been found in Dublin County.

The Secretary of the Royal Botanical Society draws attention to a passage in Herodotus, proving that double roses were artificially cultivated 400 or 500 years B.C. Reference is made to their having as many as sixty petals apiece, and to their fragrance.

The use of compressed oxygen in ballooning has been successfully tried by Dr. Berson, of Stassfurt, who, by breathing it after reaching an altitude of 22,000 feet, was able to rise to 31,300 feet, without discomfort; and he believes higher regions may be explored with its aid.

Norway has lost one of her leading marine zoologists in Professor Svenon Louis Lovën, of the Stockholm University, who died in his eighty-sixth year. He has been a teacher of biology since the year 1830, and was curator of the Royal Museum of Natural History.

Messrs. Chapman and Hall, have been constituted sole agents in this country, the Continent, and the Colonies, for the sale of the scientific and technological publications of Messrs. Wiley and Sons, of New York. Messrs. Wiley stand among the leading publishers of works on science in the world.

In Indian Museum Notes, Vol. iii, No. 5, Mr. E. C. Cotes reviews the work done in ten years preceding 1894, by the Entomological Section of the Indian Museum, during which he was connected with it. Much valuable information and material of an economic character was accumulated and published.

The Biological Laboratory at Cold Spring Harbour, Long Island, New York, is described at some length in the "Scientific American," of August 17th last. The laboratory is in a pretty building seventy-two feet long, by thirty-six feet wide; with abundant light and air. It is under the direction of Dr. Conn and a board of managers.

The Smithsonian Institution of the United States of America has, on the advice of the Committee appointed for their consideration, awarded the Hodgkin's Fund prizes. The first prize of $10,000 has been given to Lord Rayleigh and Professor William Ramsey for the discovery of argon. A second prize of equal amount is not awarded, but the third prize of $1,000 goes to Dr. Henry de Varigny, of Paris, for an essay entitled "L'Air et la Vie."

Fellows of the Geological Society will miss the genial help rendered on their visits to Burlington House, by the late Francis E. Brown. He died with sad suddenness on August 2nd last.

In Mr. Colgan's article on Dublin orchids, in August "Irish Naturalist," the word "calcicole" is introduced. He describes *Orchis pyramidalis* as a calcicole plant, of course this refers to its association with lime or chalk. He borrows the word from the French of M. Coutejean, in "Geographie Botanique," Paris, 1881.

To the "Quarterly Journal of Microscopical Science," for August, Mr. Henry Bury, M.A., F.L.S., contributes an important illustrated article on the various early stages of sea-urchins, starfish and sea-cucumbers. His investigations into the subject extended over larval forms from each of the five classes of Echinoderms.

Among the present exceptionally numerous vacancies in museum management, we note the position of Keeper of Zoology in the British Museum, South Kensington, through the resignation of Dr. Albert Gunther, F.R.S., which post he has admirably occupied for many years. The salary is £750 per annum.

We observe that Mr. Rowland Trimen, F.R.S., has resigned the directorship of the South African Museum at Capetown. The trustees are prepared to appoint another in his stead, the appointment being worth about £700 per annum. The applications are to be made to the Agent General for South Africa, before September 15th, at Victoria Street, London.

The Piscatorial Society of London has been discussing whether the angler's fish are, or are not, learning to refuse the tempting baits used by anglers to allure them. If not, it certainly cannot be because they have not been systematically shown the evils of taking the bait. Complaint is made that both fluviatile and marine fish are more dainty and less prone to temptation than of old.

The Yorkshire Naturalists' Union will hold the annual meeting for 1895 at York, on October 30th. An exhibition of work and photographs done during the year, will be held at the same time. The 120th ordinary meeting will take place on Saturday, September 21st, at Filey. The marine zoology committee of the Union will take advantage of the equinoctial low tides, to investigate the rock pools on Filey Brig.

We learn from the "Victorian Naturalist," of the death of the indefatigable botanist, D. Sullivan, F.L.S., who contributed largely to a knowledge of the Victorian flora. An orchid of the genus *Caleya* bears his name. It is stated that worry, in consequence of compulsory retirement by the Educational Department, in which he served for nearly thirty years as a headmaster, so affected his spirits and health, that his life was possibly shortened.

In the quarterly journal of the Geological Society, appears an illustrated paper by Mr. E. T. Newton, F.R.S., upon a human skull and other bones found by Mr. Robert Elliott, of Camberwell, in the palæolithic terrace-gravel at Galley Hill, near Northfleet, Kent. The important characters of this skull are its lengh and narrowness, parallel-sided and depressed shape. Attention is drawn to the similarity between this skull and those of the extant Eskimos, whom Professor Boyd Dawkins considers to be descended from palæolithic ancestors.

# SCIENCE ABROAD

L'Aerophile (Paris, July, 1895) contains a portrait of Herr Andrée and a short account of the life of this illustrious aeronaut. The preparations which are being made at Stockholm for his attempt to discover the North Pole by a balloon voyage next year are fully described.

Cosmos (Paris, August 24th, 1895). Mons. Acloque commences a series of articles upon the Homological Organization of Insects. There is also an article by M. Maurice Farman on "The Causes and Consequences of the Rain of July and August." He considers it is due to the influence of an exceptional cyclone.

Bulletin de la Société Industrielle de Mulhouse (Mulhouse, June, 1895) has a long report of meteorological observations for the year 1894, giving several tables of temperature taken at the meteorological station at Mulhouse, also two diagrams showing the temperature and barometer pressure for the several months of the year 1894.

L'Eclairage Electrique (Paris, August 3rd, 1895) announces the publication of a new electrical journal to be called "l'Electrochimie," edited by M. Adolphe Minet. There is also an account of an accident which occurred to a workman employed by an electrical company at Rochester, U.S.A., He received a charge of between 2,000 and 3,000 volts, which is three times greater than that given to criminals condemned to death by electricity. The workman showed every sign of death, but by the indefatigable exertions of his comrades to restore respiration, after three quarters of an hour he began to show signs of life and was finally recovered.

La Nature (Paris, August 24th, 1895) contains an illustrated article by M. Planchon, giving an account of the various methods which have been used in China for measuring time. In the reign of the Emperor Yao, in the year 2337 B.C., the Chinese astronomers divided the year into four seasons, and fixed the duration of the year at 365 days, 6 hours. They divided their day into 12 parts, more or less equal, which corresponded to two of our hours. The hours were divided into 100 parts, called "kés." Each "ké" had 100 minutes, and each minute 100 seconds. The Chinese employ 12 characters which are the signs of the Zodiac for the months of the year. This division of time was imported to Japan from China. In the seventeenth century, however, the Jesuit missionaries persuaded the Chinese to adopt the European division of the day. Mons. G. Mingaud has an article on "Prehistoric Remains," giving an account and an illustration of the reconstruction of a prehistoric dwelling, which was done by M. Clement, and is to be seen at the Hotel de Nimes. There is also an article by M. E. Hospitalier on "The Electrical Engines used on the Baltimore and Ohio railroad." It is illustrated by four figures and some diagrams.

Journal of the New York Microscopical Society (New York; July, 1895) has an account of "Some Interesting Features of well-known Plants of New York Harbour," by Carlton E. Curtis, Ph.D. He observes that a common member of the summer flora of the harbour is found on the larger algæ, or in patches on the rock. It is *Calothrix*, and is easily to be recognised, as it belongs to one of the simplest groups of plants. In morphological characters and life processes it often closely resembles the bacteria. Multiplication of species is only accomplished by the escape of a few cells of the filaments, which grow into new plants. There are no sexual processes.

Trinidad Field-Naturalists' Club Journal (Trinidad, B.W.I., June, 1895).—Mr. R. Mole has an article "On the Formation and Disintegration of Segments of Caudal Appendage in *Crotalus horridus*," a rattlesnake. He refers to a paper in the same journal for February, 1894, by himself and Mr. Urich, giving their observations on a South American rattlesnake. They have kept this snake in captivity and under observation from before that date to February 15th, 1895. Mr. Mole says that as the period of sloughing the skin draws near, the new segment, which is of a bluish-black colour, can be seen growing out from underneath the scales, and pushing the last-formed rattle out. As the time approaches, when the snake becomes temporarily blind, the new rattle is pushed right out, the scales covering it presenting a withered yellow-whitish colour, their free points being slightly raised. These disappear, and after the skin is cast the new segment becomes a pale yellow, subsequently changing into the usual colour. Mr. Mole considers the material of the rattle to be thin horn, something like one's finger-nails. In a further article, entitled "The Dimensions of Animals," Mr. Mole points out how very untrustworthy are many of the statements made about the sizes of animals, with which people are not familiar, or have only seen when dead. He says that, as a rule, no attempt is made to measure an animal until it is skinned, and then it is the skin, not the animal, which is measured. Mr. Mole refers to the offer made by Jamrach, of London, in the *Field* newspaper some months ago, to pay anyone who will bring him a snake thirty feet long, £1,000, and for one forty feet, £10,000, as being a very safe one, although snakes of over thirty feet in length have been reported by travellers. There are two articles by Professor T. D. A. Cockerell, Entomologist of the New Mexico (U.S.A.) Agricultural Experiment Station, one on "A New Scale Insect from Grenada, giving an account of some coccidæ, collected by Mr. W. E. Broadway, on *Citrus medica*, var. *acida*, in the Botanic Gardens at Grenada, one of the species being an interesting new *Lecanium*. The other article is on "A New Mealy-Bug on Sugar-Cane." It is named *Dactylopius sacchari*, Ckl. Mr. C. A. Barber gives an account of "The effects produced by Ticks upon their Hosts," showing that in Texas at least one species out of the five known is a very active agent in dissemination of the dreaded Texan cattle fever. The first part of an article by Mr. E. D. Ewen, entitled "Notes on the Economic Uses of the Compositæ," commences in this number. It is a statement of the uses of the various plants belonging to this order, the manner in which their properties can best be extracted, the form in which they should be used, and the disorders for which they may be beneficial.

# BOTANY

British Mosses.—Part 16 of Mr. Braithwait's "British Moss-Flora," which finishes vol. ii, was published a short time ago and completes the acrocarpous mosses.

Mimulus Lutens, Linn.—On July 30th, I found growing in a ditch near Weybridge, in Surrey, several robust specimens of *Mimulus lutens*, which, though not a native, is naturalised in some parts of England. *Impatiens fulva*, Nutt, was growing in large quantities on the banks of the Wey, close by.—*W. J. Lucas, Knight's Park, Kingston-on-Thames*; *August 3rd* 1895.

Second Flowering of Sallow and Elder.—Whilst hunting last week for the larvæ of *Smerinthus ocelatus* on Wimbledon Common, near here, I observed that three bushes of the common sallow (*Salix capræa*) were coming into bloom for the second time this season, one branch having five or six good catkins. All the bushes were male plants. Later in the day an elder-tree was seen blossoming for a second time this summer. The elder-tree in question standing close to Wimbledon Green.—*Bertram G. Rye*, 281, *Fulham Road, London, S.E.*; *August 15th*, 1895.

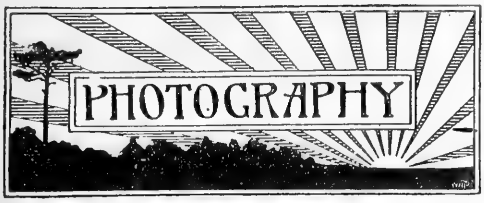
An Oak Seedling.—I was much interested in reading the article in Science-Gossip on "An Oak Seedling" (*ante* page 145). I have now growing in water, in a small bottle, an oak seedling from an acorn of 1893. It germinated in the following Spring, and grew a stem four inches high, putting out five leaves. This Spring (1895), it grew another two inches, putting out five more leaves. The curious part is, that the first five leaves of 1894 are quite green and show no signs of withering. The two withered cotyledons are still adhering to the base of the stem. The acorn was from the moss-cupped oak.—*Athelstan Corbet, Adderley Rectory, Market Drayton*; *August*, 1895.

Harmonious Colouring of Wild Flowers.—Referring to my note in your August number (*ante* page 164) under the above heading, there may be observed, here in West Sussex, further instances of nature's floral harmonies. The banks of the river are fringed with masses of tansy (*Tanacetum vulgare*) and purple loosestrife (*Lythrum salicaria*). These make a gorgeous contrast. On the golf links at Littlehampton, as I suppose on most of our sandy sea-coast commons, flourish and abound, in close juxtaposition, the thrift (*Armeria maritima*) and the viper's bugloss (*Echium vulgare*), the pale pink of the one flower according admirably with the bright blue of the other, and both set off by a sprinkling of the yellow mouse-ear (*Hieracium pilosella*). No artist could have composed a more tasteful and effective harmony than that produced by the intermingling of these three flowers. Will you, or one of your readers, say if there is any scientific reason, such as that suggested in my former note, to account for this rule of colour-harmony in the growth of the wild flowers?—*M. J. Teasdale, Fittleworth, Sussex*.

Cuscuta Europœa in Sussex.—I have found this plant growing on nettle and hop behind the old water-mill here. Also a variety (query var. *cambrica*) with divided segments, of *Polypodium vulgare*.—*M. J. Teasdale, Fittleworth, Sussex*; *August*, 1895.

Ampelopsis Fruiting.—I have a flourishing Virginia creeper on the house-front, facing south-west. Often in previous years it has produced many flowers and even small fruits, but this season great numbers of the berries have ripened, which has never been the case before. The fruits are like small dark grapes, about a quarter of an inch in diameter, and covered with a similar bloom but without the juicy flesh. I do not know another instance of this plant ripening its fruit in England, and should be glad to hear if it is at all common. Its near relationship to the grape-vine is very clearly shown in both flowers and fruit, which are interesting in several respects from a botanical point of view.—*J. Burton*, 9, *Agamemnon Road, West Hampstead*.

Stomata and Sunlight.—The references (*ante* page 136) with respect to variability in the size and number of the leaf stomata are so far correct and valuable. According to M. Dufour "in sunlight the stomata are more numerous, especially on the upper surface of the leaf, the different elements of the epidermis are more developed, the cells are higher, their lateral and outer walls are thicker and much less sinuous, the cuticle in particular, than in the shade." The leaves of *Circæa luteteana* have been especially investigated in this connection and it has been found that in the young leaf while in the shade most of the stomata show only a single rounded cell very different from the adjacent ones, in the sun most of them are already divided and many present a stomata opening. The formation of the stomata is due in most cases to a local multiplication of the epidermal cells, followed by an arrest of development, and this process goes on up to an advanced period in the life of the leaf. It is hard to see, however, where the element of protection from the increased heat of the sun in exposed situations comes in. In point of fact, leaves comport themselves almost as opaque screens, the thicker they are the more heat they absorb, while the thinner ones transmit more and absorb less. The only sort of protection that is required in the case is that against a too active transpiration, and this may be effected by a thick, cuticle, closured stomata, a covering of hairs on the under surface, etc., all of which are naturally produced under the influence of strong direct sunlight, which at the same time induces a more active and abundant transpiration. Moreover, according to Lesage, the palisade tissue of the leaf appears to function as a means of protection from excessive transpiration. Now, as is well known, in sunlight this tissue presents a greater development—it cells are more elongated, or the layers of its cells are doubled, as in privet, and they are richer in chlorophyll—than in the shade. Hence we see that an open exposure to strong direct sunlight cuts, as it were, both ways. At the same time while transpiration is rendered more vigorous, the means whereby its excess may be checked are amply provided by the vital energy of the leaf itself. The plant, therefore, in reality struggles to adapt itself to the environment, and not to select this or that variation as a means of protection, etc.—*Dr. P. Q. Keegan, Patterdale, nr. Penrith*; *August*, 1895.

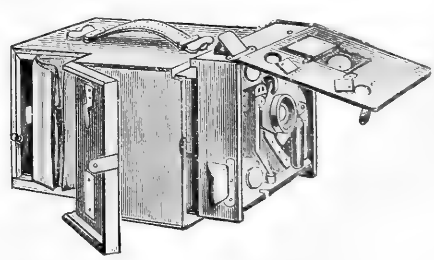



PHOTOGRAPHY FOR NATURALISTS. — Hand cameras have hitherto hardly been taken seriously into consideration for effecting scientific work. Still their portability and convenience for travel

PORTRAIT OF A PARROT, *by T. Peacock.*

has caused the science student to look longingly in their direction. To meet the difficulty, Messrs. Newman and Guardia, of 92, Shaftesbury Avenue, London, W., have perfected a hand camera which will be of great value to naturalists. As an instance of the work to be obtained from it, we figure a beautiful piece of portraiture from life, taken by an amateur, Mr. T. Peacock, of London, being of a parrot which was allowed free flight in a garden. It was taken during an instant of momentary rest on a branch, the time allowed for approaching, focussing, and obtaining the plate, being only a few seconds. It will be observed that the object is in perfect focus, every feather being seen in detail. One important feature of these cameras is the fact that a new focussing screen has been adapted, which enables the photographer to get three distinct views, as if taken at different distances. This is very important to a naturalist or geologist, who, as a rule, cannot get close to his object. He can also see which focus will best suit his picture, and so select its size without moving from his position of observation. For photographing still subjects this camera is equal to and better than many tripod cameras. The motion of the shutter is perfect for steadiness, there being no "kicking" with its consequent blurring of the picture. This movement has been most successfully treated, consequently the pictures are good. The Newman and Guardia latest "B" pattern is for quarter-plate or 5 × 4. It can be fitted with the Zeiss Jena lens and iris reduction movement, so that three different sizes as above explained can be obtained. This instrument is necessarily expensive on account of the cost of the lens, the quarter-plate size being £22 10s. while the half-plate size camera is £26 15s. Much less costly cameras are made by this firm with equal care, being fitted with either Swift or Wray lenses for quarter-plate, which do most excellent work. These may be had from twelve guineas upwards. The cameras shown to us are so perfect that nothing remains for the amateur photographer but to take his pictures, which can hardly fail to be successes, if only ordinary care be taken in studying the composition of the pictures. Each camera contains frames for twelve plates. There is further a double camera made by the same firm, by which the operator can see the proper moment for taking views of small moving objects, such as moths, flies, fighting spiders and others. We hope to be able in early numbers to illustrate some of these wonderful pictures.

STENOPAIC PHOTOGRAPHY.—We have received a little book, by Frederick W. Mills, F.R.M.S., and Archibald C. Ponton (London: Dawbarn and Ward, Limited, price 1s.) upon stenopaic or pin-hole photography, which, as many of our readers know, is the taking of photographs without the aid of a lens. There is a fine piece of this kind of work, illustrating the process, in a frontispiece to the book. The progenitor of the pin-hole camera was Giovanni Baptista Porta, a physician of Padua, about A.D. 1500. The word "stenopaic" is from the Greek *stenos*, narrow or confined, in reference to the aperture of the camera admitting the image. This is done by employing a thin sheet of metal or other substance perforated with a small hole and fixed in the position usually occupied by the lens of a camera. Messrs. Mills and Ponton's book very simply instructs the amateur how to proceed with this system; a camera having a rising front and a swing back being best suited for stenopaic work. One method of preparing the aperture is to take a sheet of thin brass and drive through it a sewing needle by a series of gentle taps, the burr being removed with a very fine file; the needle is again passed through the hole and the brass sheet is finally blackened. The best plates to use for this kind of photography are rapid plates, which must be thickly coated by emulsion, and to prevent halation they should be backed by a piece of black carbon transfer-paper, such as is used in autotype printing. The Manual before us will be found of great use to some of our readers who have not yet studied stenopaic photography.



NEWMAN AND GUARDIA'S CAMERA.
Open, to Show Fittings.

# NOTES & QUERIES

FORMATION OF SNAIL SHELL.—In "Comptes Rendus," current volume, page 512, Mons. Moynier de Villepoix states that when he described the formation of the shell of *Helix*, in 1891, he was not aware that already, in 1880, the pallial gland which secretes the lime and organic matter had been described by MM. E. Mer and Longe, under the name of "coin epithélial."

SHOWER OF FISHES.—Mr. W. C. V. Burton, J.P., of Carrigaholt Castle, co. Clare, Ireland, records in "Symond's Monthly Meteorological Magazine," as follows: "On June 15th, a very hot day, some heavy heat drops fell about midday, when a number of small fishes, mostly about one and a half or two inches long fell in the pleasure grounds, where some men were working. I have a large one in spirits, and several people saw the fish."

SUDDEN DEATH OF PARTRIDGE.—On August 10th, I saw a somewhat remarkable instance of death, or rather sudden powerlessness, arising from sheer terror. As I was watching a train coming at a rapid rate towards Arbroath I saw a flock of birds approaching, evidently with the intention of crossing the line. The foremost birds had already passed over, at a height of perhaps twenty feet, and the engine of the train was quite thirty yards away, when suddenly one bird, in the centre of the flock, dropped to the rails and lay motionless. The other birds all flew away quite unconcernedly. On going to see the bird, I found it insensible and in a dying condition. It was a partridge, and otherwise apparently in perfect health.—*G. B. Neilson, Bank of Scotland House, Glasgow; August*, 1895.

DRY-ROT.—The following extract from Rivington's "Building Construction" will probably help Mr. Hodgson out of his difficulty (*ante* page 137). "Dry-rot is generally caused by ventilation. Confined air, without much moisture, encourages the growth of the fungus, which eats into the timber, renders it brittle and so reduces the cohesion of the fibres that they are reduced to powder. It generally commences in the sap-wood. An excess of moisture prevents the growth of the fungus, but moderate warmth, combined with damp and want of air accelerates it." Rivington further quotes from Britton as follows:—"There is this particular danger about the dry-rot, viz., that the germs of the fungi producing it are carried easily, and in all directions, in a building where it once displays itself, without necessity for actual contact between the affected part and the sound wood." I have had similar trouble to Mr. Hodgsons, and have generally treated it successfully by the entire removal and destruction of the wood, and the provision of efficient ventilation, which should be so arranged that in no part of the building is air left to stagnate. The danger of an attack of dry-rot is very considerably increased where a floor is covered with oil-case or other air-tight covering. —*Thos. Winder, Assoc. M. Inst. C.E., Ashdell Rise, Sheffield; August*, 1895.

NATURAL HISTORY EXHIBITION.—The South London Society will hold its annual exhibition of natural-history objects at St. Martin's Town Hall, Charing Cross, London, on October 17th next.

MARINE AQUARIUM.—I think Mr. Blundell can obtain all requisites for starting a marine aquarium from Mr. Hornell, Biological Laboratory, Jersey. I have had many different kinds of specimens from that institution, and have found them entirely satisfactory.—*J. Burton, West Hampstead.*

AMERICAN ZYGÆNIDÆ.—In January last (vol. i. N.S. p. 258) an enquiry was made relative to certain American burnet moths. I have had the opportunity of examining and comparing them, and find they are (No. 1) *Saurita cassandra*, Linn., and (No. 2) *Charidea fastuosa*, Walk. = *fulgida*, H.S., both species belonging to the Syntominæ.—*W. H. Nunney, Bloomsbury.*

BIRD NOTES.—I have been rather interested in the doings of a pair of blackbirds this year, and as their habits have been out of the ordinary course, I venture to forward these notes.—On May 20th, I found a blackbird's nest with four eggs in a plum-tree trained against the north wall of a garden of a friend. Three of the eggs duly hatched on May 28th. Nine days after, on June 6th, the young had their eyes open, and a week later (June 13th), the brood flew. Now comes the extraordinary part (at least, as far as my own experience goes). Happening to pass the nest on the 20th of the same month, I was surprised to find another egg; the next day there was another, and on the 23rd and 24th respectively two more eggs were laid, three of which in due course were hatched on July 7th, the eyes of the young were open on the 12th, and the nest was again empty on the 28th. This appears to me quick work for a pair of birds, but it is rendered all the more remarkable by the use of the same nest, and the comparison of dates. During the time the hen bird was sitting on the second clutch, the male bird was still looking after the welfare of the first brood. In the first case, one notices the young birds were in the nest sixteen days, but in the later only thirteen days. In the first nest the young were blind nine days, but in the second only five days, and in each case, moreover, one egg proved infertile. In the same garden, on the north wall of the house, in a pear-tree, was a hedge-sparrow's nest eleven feet from the ground. Is this not unusually high, and a strange situation? It may be only a coincidence, but both the blackbirds and the hedge-sparrow seem to show a partiality for north walls, although the southern aspect afforded quite as good, or if not better situations. So many discussions have taken place as to whether the cuckoo cries on the wing, or if the female's note is "cuckoo," it might be interesting to add the following observations. One evening, last June, whilst I was sitting under an oak, my attention was attracted to a cuckoo on the telegraph wires by the rail-road, making the queer "bubbling noise." Presently I was surprised to see it turn round and face the oak-tree and cry "cuckoo." It then came and settled for a moment in the tree and "cuckooed" loudly. Doubtless having seen me it did not remain, but circled round the tree twice, "cuckooing" while *on the wing*, and then made off. I should take the bird to be a female on account of the "bubbling note." I have at present alive a male example of the peregrine falcon that was shot at and slightly wounded in Surrey this year. There was no mark to suggest it had previously known captivity.—*H. Mead-Briggs, 37, Nunnery Fields, Canterbury.*

## ZOOLOGY

A New British Beetle.—*Otiorrhynchus auropunctatus*, a Pyrenean weevil, is added to the British list, having been found in some numbers in Eastern Ireland. It is described fully in the "Irish Naturalist" for August.

Rare Butterflies in Kent.—I have the pleasure of possessing *Pieris daplidice*, *Argynnis lathonia*, two *Aporia crataegi*, and one *Vanessa c.-album*, all taken within twenty miles of Canterbury last summer (1894). With regard to *Aporia crataegi*, I am aware many entomologists assert the insect is extinct in Kent, but I have no hesitation in saying I could produce five which have been caught in the county within the last seven years, including the one I captured myself at Ramsgate, in June, 1888 (*vide* "Entomologist," vol. xxi., p. 184). The latter two were taken by a gardener of this town and are of no value beyond their associations, having received rough treatment owing to his ignorance and inexperience of entomology. I am also glad to record the re-capture of *Vanessa c-album* in Kent.—*H. Mead-Briggs*, 37, *Nunnery Fields, Canterbury; August 18th*, 1895.

Dragonflies Captured by Sundew.—On July 31st, near Oxshott, in Surrey, I found within a yard or two of each other, two small blue dragon-flies (*Enallagma cyathigerum*), each of which was being held by the posterior extremity of the abdomen, by a leaf of the round-leaved sundew (*Drosera rotundifolia*). The tentacles had closed over and secured the prisoners, which were still, when found, quite alive. I had previously more than once seen one of these azure insects in the clutches of *Drosera*, but in each case it was held by the wings, more than one leaf assisting in the operation. It is doubtful whether under such conditions, the plant could have made a meal off the insect. On one occasion, also, while walking with a friend, who was carrying in his hand a specimen of *Drosera*, a little blue dragon-fly flying past, accidently came in contact with the leaves, and was held fast by the vegetable trap.—*W. J. Lucas, Knight's Park, Kingston-on-Thames; 3rd August*, 1895.

Nesting of the Sedge-warbler.—I should like to confirm the observations of Mr. H. Mead-Briggs on this subject (*ante* page 156). It is strange, indeed, that so many authorities should have overlooked the fact that the sedge-warbler undoubtedly suspends its nest occasionally after the manner of the reed-warbler. I find mentioned in my note-books one such nest which I found on a stream at Wembley, Middlesex, May 20th, 1889. I also found at least two more on a pond near Epsom in 1893. All these nests, however, were not suspended among reeds, but in the tall sedges, the name of which I am ignorant, and were supported by three or four stems passing through the wall of the nest. I have always considered that suspended nests are the exception with this species, as the instances mentioned are the only ones among many scores of sedge-warblers' nests which I have seen.—*H. K. Swan*, 10, *Harrington Street, Regent's Park, N.W.; August 16th*, 1895.

## TRANSACTIONS

The South London Entomological and Natural History Society.—July 11th, 1895; T. W. Hall, Esq., F.E.S., President, in the chair. Mr. Fremlin exhibited a long and variable-bred series of *Phorodesma smaragdaria*, all of which were set with the aid of a blow-pipe, also a bred series of *Geometra papilionaria;* Mr. Oldham, a *Sirex gigas*, from Wisbech, and a number of lepidoptera taken during the Society's field meeting at Oxshott, June 29th, including *Eurymene dolobraria*, *Macaria liturata* and *Hadena pisi;* Mr. Adkin, a yellow var. of *Ematurga atomaria;* Mr. T. W. Hall, a pupa of *Sesia sphegiformis* and a bred series of *Eupithecia valerianata;* Mr. Edwards, a specimen of *Papilio sesostris*, var. *xestos*, from South America.—July 25th; President in the chair. Mr. Hall, a long, variable-bred series of *Dianthecia carpophaga*, the larvæ having been found on *Lychnis vespertina*. One specimen had all the usual markings nearly obliterated, and gradations led to the opposite extreme of a specimen with the markings much extended and intensified. Mr. Robson, a var. of *Smerinthus tiliæ*, without the usual dark band across the forewing, and an exceedingly pretty suffused form of *Zonosoma pendularia*. Mr. Dennis, a bred series of *Cosmia affinis*, from Horsley. Mr. Turner, a series of *Lycæna ægon*, from Oxshott, showing amalgamation of spots on the under sides, blue-splashed females, and one female undistinguishable on the upper side from *L. astrache*. Mr. West, of Greenwich, a fruit of the Macartney rose (*Rosa bracteata*).—August 8th; President in the chair. Mr. T. W. Hall, specimens of *Hadena oleracea*, in which both the reniform and orbicular stigmata were scarcely to be traced; Mr. Adkin, a series of strongly-marked *Eupithecia tenuiata*, from Drogheda; Mr. Perks, an apple-snail (*Ampullaria*) from South America; Mr. South, a number of series of lepidoptera taken near Macclesfield during the present season, including four forms of *Xylophasia rurea*—all forms of *X. monoglypha*, except the very dark Durham form, *Miana strigilis*, were all dark, not a single type-form having been taken—and two forms of *Hepialus velleda*, with a var. *carnus* taken at different elevations. He also remarked on the absence of Melanism in a district apparently favourable for it, and stated that he had only obtained one black *Phigalia pedaria*, a female, and one var. *doubledayaria* of *Amphidasys betularia*. Mr. A. E. Hall, a specimen of *Argynnis adippe*, var. *cleodoxa*, and a remarkable *Triphæna comes*, with intense black markings. Mr. Moore, a specimen of *Epinephele janira*, with a considerable increase of the fulvous area, an *Orthopteron* of the genus *Petasia*, from South Africa, and a sample of Spanish moss (*Tillandsia usneoides*) from Florida, an epiphyte of the family Bromeliaceæ. Mr. Frohawk, a fine series of undersides of *Epinephele hyperanthes*, showing all gradations from var. *arete* to var. *lanceolata*. Mr. Step, a specimen of the pugnacious squat lobster (*Galathea squamifera*) from Portscatho, and made interesting remarks on the spider crab (*Maia squinado*) and the boar-fish (*Caprosater*). Mr. Turner, a var. of *Euchelia jacobeæ*, with a small additional spot, and other Lepidoptera. August 22nd, T. W. Hall, Esq., F.E.S., President, in the chair. Owing to the holidays and a heavy thunder-storm, the meeting was unusually small. Mr. South exhibited smoky varieties of *Rumia luteolata* taken this year near Macclesfield, also series or specimens of *Hypermecia cruciana*, *Tortrix cinnamoneana*, *Eupithecia venosata*, and *E. pulchellata* from the same locality. Mr. Hall stated that he possessed similar varieties of *R. luteolata* from Scotland. Mr. Moore, series of the following Arachnidæ, from St. Augustine's, Florida, viz.: *Nephila clavipes*, *Atreus americanus*, and *Gasteracantha cancriformis*. Mr. West, of Greenwich, specimens of *Chrysomela gœttingensis*, taken this year at Bookham and Box Hill, and remarked that he had never taken the species before. Mr. Turner, specimens of *Scodiona belgiaria*, from Oxshott and Shirley, and a series of *Hadena pisi*, bred from larvæ obtained at Barnes and showing considerable variation from almost uniform reddish-brown to forms having a deal of greyish-white marking. Several members reported having seen or captured *Colias edusa*, and one var. *helice* had been taken in the Isle of Wight.—*Hy. J. Turner* (*Hon. Report Sec.*)

Accrington Naturalists' Society. — The fortieth annual meeting of this society was held on July 6th, in its rooms at Oak Hill Park. The following officers were elected: President, Mr. Henry Miller. Vice-Presidents: Messrs. John Rhodes, F.E.S., R. Wigglesworth, J. Holman, and R. Beagham. Committee: Messrs. Edward Haworth, J. Riley, M. P. Richardson, R. S. Lincoln, A. E. Ball, and F. Sutcliffe. Treasurer, Mr. William Lawson; Analysts, Messrs. Isaac Stephenson and J. A. Pickup; Librarian, Mr. P. Whalley; Assistant, Mr. Riley; Secretary, Mr. Joseph Knowles; and Assistant Secretary, Mr. Walsh. There was afterwards exhibited by Mr. Isaac Stephenson an example of the hepatic plant or liverwort (*Marchantia polymorpha*), bearing female reproductive branches or archegoniophores. Mr. P. Worden exhibited a number of flowering plants.

City of London Entomological and Natural History Society.—At the usual meeting held on July 16th, the exhibits included: Mr. Battley, a female specimen of *Saturnia pyri*, from North Italy. Young larvæ bred from eggs laid by this specimen were at first black with red warts and short bristles, but after the second moult, they became pale-green with yellow warts and long spatulate hairs. Mr. J. A. Clark, showed a pair of pale-spotted *Argynnis paphia*, from the New Forest. Mr. Bacot, a series of *Boarmia repandata*, bred from a dark female from South Wales; all the specimens except one, showed a strong tendency to melanism. Dr. Buckell, a larva of *Biston hirtaria*, which had been "stung" by an ichneumon while hanging by a thread. The fly, which was also exhibited, managed, after a certain amount of objection on the part of the larva, to deposit two eggs on the skin of the larva, near the head.—Tuesday, August 6th, the exhibits were by: Mr. Battley, series of *Miana strigilis* and *M. fasciuncula*, from Clapton and neighbourhood, showing gradations in the former, from the ordinary black and white marbled form to var. *æthiops*, and both the red and the yellow form of the latter. Mr. S. J. Bell, two cocoons of *Saturnia paronia*, in which the customary means of exit was wanting; they were almost spherical in shape, and not so large as usual. Mr. Bate, *Orthosia suspecta*, from Dulwich Woods.—*C. Nicholson*, *A. W. Battley* (*Hon. Secs.*)

# NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s*. 6*d*. for twelve months (including postage), are now due.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

## EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Wanted, foreign land-shells in exchange for other foreign shells or butterflies.—Col. Parry, 18, Hyde Gardens, Eastbourne.

Over 300 well-mounted botanical specimens; exchange for chess, Mendelssohn's or Mozart's piano works, Chopin's mazurka's, nocturnes; books, or old stamps.—E. J. Lambert, 4, Wildwood Terrace, Hampstead, N.W.

Duplicate shells and fossils offered for species not already in my collection.—Rev. John Hawell, Ingleby-Greenhow Vicarage, Middlesbrough.

Offered, British marine, land and freshwater shells, British and foreign Lepidoptera and British dragonflies; desiderata, corked store-boxes.—W. Harcourt Bath, Ladywood, Birmingham.

Offered, Helix naso, tayloriana, kubarzi, rehsei, broadbenti, Nanina cairnii, hercules and a few other rare species from New Guinea; desiderata, rare exotic Helices,—Miss Linter, Arragon Close, Twickenham.

Offered, good Cornish rocks and minerals. Wanted, fossils, micro. slides, minerals or geological specimens.—George Penrose, 17, John Street, Truro, Cornwall.

Helix lapicida, H. rufescens, varieties of H. hortensis, H. nemoralis and others; desiderata, others not in collection.—W. Domaille, 37, Argyle Road, St. Paul's, Bristol.

I want a few hundred marble galls, and shall be glad if collectors living where they occur will send me some; carriage refunded. — Chas. Mosley, printer, Lockwood, Huddersfield.

Splendid specimens of the celebrated semi-fossil, Helix nemoralis, from Dog's Bay, Connemara, offered in exchange for good varieties of Helix nemcralis, hortensis, arbustorum or aspersa; also foreign land shells for others not in collection.—Edward Collier, 1, Heather Bank, Moss Lane East, Manchester.

Wanted, large ammonites and various microscopic slides in return for rare British marine shells, etc.—A. Sclater, 43, Northumberland Place, Teignmouth.

Wanted, eggs of cuckoo with those of foster parents; good exchange in other eggs.—W. Wells Bladen, Stone, Staffordshire.

Offered, South African bird-skins, in fine order and bright plumage for British or foreign bird-skins, in same order.—J. G. Brown, New Market, North End, Port Elizabeth, South Africa.

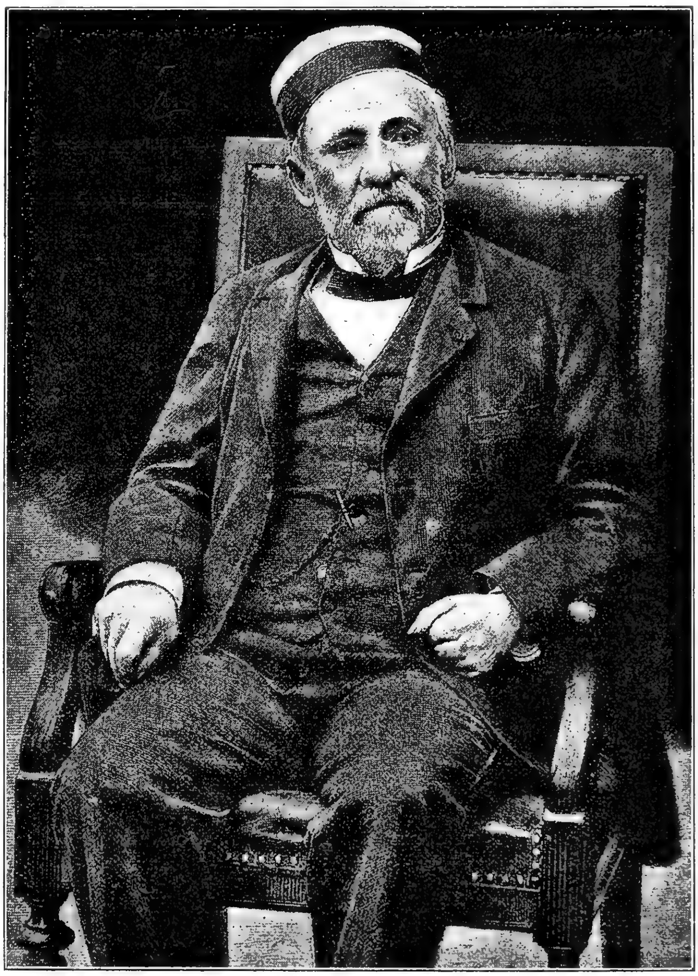
Offered, good botanical micro. slides, for books or interesting natural history objects.—J. Collins, 201, Green Lane, Birmingham.

Science-Gossip for 1883-88, and *Knowledge*, vols. i.-vii. What offers?—Jno. Wood, Panmure, Carnoustie, N.B.

Offered, Fish remains from the Greensands of Bedfordshire; exchange for lepidoptera.—W. Bond Smith, Potton, Bedfordshire.

# LOUIS PASTEUR.

LOUIS PASTEUR was born at Dôle, in Department of Jura, in Eastern France. His father, who had been a soldier and decorated on the field of battle, was a working tanner. The house where Louis was born, in the little Rue des Tanneurs, now bears the inscription, "Ici est né Louis Pasteur, le 27 Decembre, 1822." To the exceptional intelligence of his mother much of the success of his early education was due, but his father directed his attendance at school. It was from the first their intention to make Louis a chemist, though he pleaded hard to become an artist. Many of his early sketches are in existence, notably one of his mother, which hangs in the dining room of his Paris residence. These show much talent, and had not fate decided in favour of the parents' desire, and for the good of mankind, he might have become a celebrated painter.



THE LAST PORTRAIT OF LOUIS PASTEUR.
*(From a photograph taken in June, 1895, by M. Mairet.)*

Pasteur's education commenced in the Communal College of Arbois, where his parents had removed; then a year was spent in the College of Besaçon, from which, at fourteen, he entered the Ecole Normale in Paris. Although a most successful student, he was not considered brilliant. The story of his youth is well told in that charming book, "Histoire d'un Savant par un Ignorant," published in Paris a little time ago anonymously, but since Pasteur's death known to be by Mons. Vallery-Radot.

In 1847, Pasteur took the Doctor of Science degree, and became Professor of Chemical Physics at Strasburg. In 1854, he was Dean of the Faculty of Sciences at Lille, remaining there three years, during which he founded his researches into fermentations and the bacteria which are associated with them. In 1857, he was elected Director of Studies in the Paris Ecole Normale, and afterwards he became successively Professor of Geology, Physics, and eventually of Chemistry, at the Ecole de Beaux Arts, and through the influence of Napoleon III. he occupied the chair of chemistry at the Sorbonne. Our Royal Society first honoured him, in 1856, with the Rumford medal for his discoveries in the polarisation of light; again by electing him foreign member in 1869; while he received the Copley medal in 1874. Eight years later Oxford conferred on him the honorary degree of Doctor of Science. The blue-ribbon of French science, Membership of the Academy was conferred in 1881. In 1887, he was appointed perpetual secretary of the Academy of Sciences, but failing health compelled his retirement two years later.

Pasteur's reputation will be handed down to posterity in association with his discoveries in the connection of bacteria with fermentation, and animal diseases. His successful investigation and alleviation of the silk-worm diseases saved a national industry from extinction. Latterly his whole energies were devoted to the practical application of the science of bacteriology, and to the protection of animal life from disease. His success is demonstrated by the work of the Pasteur Institute of Paris, and the revolution in the treatment by the medical profession of zymotic diseases. Anthrax, fowl-cholera, swine-erysipelas, and hydrophobia are now curable, whilst the dreaded cholera and diptheria have lost their terrors to the modern physician.

Science, like other branches of human knowledge, does not proceed with even speed but by unexpected bounds at irregular intervals. These intervals are occupied by the elaboration of the former discoveries. Such "bounds" are long between, but they form the basis of definite thought and research. Among them may be mentioned Galileo's discovery of the Solar System, Newton's Theory of Gravitation, Dalton's Atomic Theory, and Darwin's of the Evolution of Species. To these will be added Pasteur's discoveries of the place of bacteria in the economy of nature, and their connection with fermentation and disease.

As a man, Louis Pasteur was earnest and taciturn, seldom seen to laugh in public, and his absent-mindedness became a proverb; but as an original thinker in scientific research he had few equals. He had not been strong for some time past. Twenty-seven years ago he had a paralytic stroke, from which he never really recovered; heart and kidney troubles following. He died at his country house near the Parisian suburb of St. Cloud, on September 28th last. His public funeral was alike an honour to the French nation and to the scientific world at large. J. T. C.

## SUNDEW AND ANTS.

By Miss E. J. Temple.

On a long bank of bright green sphagnum moss, on the edge of a pool near Oxshott, I found the sundew growing in profusion. The plants imparted quite a warm reddish hue to the bank, especially as the orbicular leaves of the marsh pennywort (*Hydrocotyle vulgaris*) were in close juxtaposition. The plants were small, most of them having four or five leaves. Two varieties, *D. rotundifolia* and *D. intermedia*, were found. The hairs were shining in the sun and under the lens looked like sparkling rubies against the green background of the leaf. I brought home several plants, putting them in a saucer with plenty of water, but I suppose the smoky air of a London flat did not agree with them, for they drooped rapidly and seemed to have lost their power of feeding. Some few weeks later I came across the plant in another part of Surrey. For an hour or so I watched the plant to study its *modus operandi* in catching insects. There were plenty of ants about running over the path. A crumb of meat attracted their attention, but wherever I put it out of their reach, moving it to different sides of the plant, they always went round the plant and never over it. When an ant was tipped on to the nearest leaf, the lower part of its body, being heavier, was pressed down upon the leaf. The hairs began to bend over, the creature struggled and became more involved. I took it away, and found that the lower part of its body was covered with a coat of slime. After a short time for recovery, it crawled away and rejoined its comrades, carefully avoiding another plant of sundew that stood in its path It seems to me that insects must know something of the nature of the plant, for I only saw one unwary little spider fall upon the leaf; there were plenty of small beetles and flies near. The strength of the viscid filaments that surrounded the object too astonished me, for it required quite a stout piece of branch to rescue the spider. I brought home some more plants, and remembering my former experience put them into a saucer with plenty of water under a bell-jar. The dry atmosphere of the room, with particles of dust and dirt, are poison to the plants, but under glass in the sun they flourish. Mine are in beautiful condition now; I left them for about ten days without food; then I put some tiny pieces of raw beef into the centre of some of the leaves, about one help of meat to each plant. The hairs contracted and surrounded them. At the end of the day, the meat had lost all its redness, it was just a glutinous looking mass of dirty white tissue in the middle of the leaves. After a short time, the hairs stiffened and stood up erect and bedewed. The young leaves of the sundew appear very pretty before they are unfolded. They look uncommonly like the hooked end of a golf club, and are of a beautiful pale green. Some of the sundew plants that I found were hidden among heather roots. These had not got half the red colour of the plants exposed to the sun, although their tentacles were healthy and full of dew.

*50, Clovelly Mansions, London; Sept.,* 1895.

# PLANTS OF THE BLACK POND.

By H. B. Guppy, M.B.

WE have done so much to deprive the ponds and lakes around London of their natural character, that a visitor to the Black Pond at Oxshott, in Surrey, gazes with agreeable surprise on a lakelet that still owes some of its most striking features to nature. Brakes of the common reed (*Arundo phragmites*) conceal its waters from the view until one stands at its borders. The cotton-sedge (*Eriophorum polystachion*) flourishes at its margins, and the boggy ground is in places literally carpeted with the sundew (*Drosera*). In its shallow waters occur dense beds of *Hypericum elodes*, and frequent patches of *Potamogeton oblongus*. Floating masses of *Scirpus fluitans* rest on its surface, and in the bog moss that fills its recesses and forms its edges, there grow *Hydrocotyle vulgaris*, *Viola palustris* and *Calla palustris*. Another interesting plant, *Pilularia globulifera*, lives in the pond, though I only came upon portions of its fronds in the floating drift. Its existence in the immediate neighbourhood is recorded in Salmon's Flora of Surrey. Those familiar with the Black Pond will observe numerous omissions in my list, but enough has been said here to illustrate this paper.

The plant of strangest aspect here, is certainly *Calla palustris*. At home in the swamps of Europe, Siberia and North America, this aroid of the north thrives in the bog-moss at one corner of the pond, and there flowers and matures its seed seemingly as it does in Lapland. According to Watson's "Topographical Botany" (1883), this plant was supposed to have been introduced here by a medical man, whose labours in this direction were not appreciated by that eminent botanist. However, in the spring of 1894, I committed a similar impropriety by throwing numbers of the seedlings in the large pond in the Home Park that lies near the Kingston Gate. This plant has a larger geographical range and considerably greater opportunities of dispersal than are possessed by *Arum maculatum*. The berries in the last case can only float for a week or two, whilst the seeds sink ; nor do I think that birds would often assist in distributing the plant by swallowing the seeds. On the other hand the seeds of *Calla palustris* float, as I have found, for an indefinite period both in fresh and sea water, and retain their powers of germination after floating for six months in the sea. But most probably in aquatic birds we have its principal means of dispersal. The seeds would, no doubt, be able to pass uninjured through the digestive system of a bird, especially if it had previously satisfied its hunger to repletion. The mucilage that invests the seed freshly fallen from the plant enables it, as I have ascertained by experiment, to adhere firmly, on drying, to a bird's plumage. The probability of this mode of transportal by adhering to feathers, has been also pointed out by M. Kolpin Ravn. This gentleman, in his paper on the floating capacity of the seeds of aquatic and marsh plants (Særtryk af Botanisk Tidsskrift, 19, Bind, 2 Hefte, Copenhagen, 1894), supplies an explanation of the great buoyancy of the seeds of this plant (a character which he also observed) in the account he gives of the structure of their integuments, in which occur very large air-cells containing crystals of oxalate of lime.

Another plant of this locality, *Viola palustris*, presents an interesting theme to the student of geographical distribution. Of our six species of violets, it is only this species that finds its habitual station in a marsh that occurs in North America. Like the other species, *Viola palustris* produces seeds that have no buoyancy, and we must connect its station with its wide distribution, and its wide distribution with aquatic birds. It resembles *Viola canina* in ejecting its seeds with considerable force, the process being the same in both cases. Sometimes during the two or three days preceding the dehiscence of the fruit, the peduncles display marked movements of circumnutation, which cease a few hours after the discharge of the seeds. Since the plants often lie partly concealed in the bog-moss, these movements may aid the free propulsion of the seeds into the air. Sir John Lubbock, in his "Flowers, Fruits, and Leaves," gives some interesting particulars of the various methods employed by our violets in dropping or in ejecting their seeds.

It is not easy to see what real advantage, in the matter of distribution, certain plants acquire from the faculty of ejecting their seeds. Not the least important section of Kerner's "Pflanzenleben" is that which is devoted to this subject; and the main point to grasp in perusing those pages is the total dissimilarity of the processes employed, as for instance in our species of *Viola* and *Oxalis*. I have spent many hours in watching the operation so prettily performed by *Montid fontana*. Here the propelling power is to be found in the instantaneous springing up of the valves of the capsule. The three valves lie flat back, leaving the three seeds exposed like eggs in a nest. A rapid movement follows, which the eye cannot detect, and one sees the fruit empty and the valves standing erect, like three scrolls, in the centre. Under ordinary conditions about one-third of the ejected seeds fall back amongst the little plants, and only ten per cent. fall more than a foot from the edge of the tuft, none dropping more than two feet away. The seeds, although they will float on smooth water, sink at a touch. Though this plant is doubtless indebted to aquatic fowl for the transportal of its seeds across the ocean to Kerguelen and Bermuda, it probably owes its wide distribution in all the continents to the refuge it has always found during revolutionary epochs beside the perennial spring.

*Hypericum elodes* has a curious method of propagating itself from the detached extremities of the stems and branches that float, through the winter, in the seed-drift of the pond. In the middle of winter the beds of this plant are to be observed mostly dead and entirely submerged. The terminal buds, however, retain their vitality, and as the plant decays, the ends of the stems and branches become detached and float up, a process often assisted by the ice. These detached extremities, which are from a quarter to one inch in length, are to be found floating in numbers during spring. They assume the vertical position, the terminal bud uppermost; and when the bud expands, the young leaves protrude a line or two above the surface of the water. Like the water-spider that abounds in this pond, the young leaves of the opening bud exhibit in a remarkable fashion the properties of the surface-film, a subject made familiar by the illustrations of Professor Miall. They cannot be wetted, and when pushed under reappear before long with their surfaces perfectly dry. As the spring advances these floating portions grow in length, and when about two inches long they project half an inch above the water, roots being developed from the submerged nodes. Since the seeds sink, this is the only means of dispersal by water possessed by this plant.

In propagating itself in the spring from free-floating portions of the plant, *Hypericum elodes* follows much the same method which I described in this journal in the case of *Ceratophyllum demersum* (Science-Gossip, vol. i., N.S., p. 195). Other aquatic plants reproduce themselves in the spring from buds that float through the winter. This is notably the case with *Hydrocharis morsus-ranæ*, its buds floating in numbers at the surface of the Wanstead lakes. Kerner gives a beautiful illustration of these *Hydrocharis* buds. He implies that they pass the winter at the bottom. I find, however, that a good proportion never sink. *Triglochin palustre* in the ditches of Bushey Park, behaves in a similar manner. The plant there produces slender fugacious stolons terminating in buds, which float throughout the winter and propagate new individuals in the spring. These buds are freed by the death of the delicate stolons as winter approaches. Neither in Syme's work, nor in De Candolle's "Monograph. Phanerog" (1881), do I find these buds referred to. On account of the lack of buoyancy of their fruits or seeds, the floating buds of *Triglochin palustre* and *Hydrocharis morsus-ranæ* alone furnish these plants with the means of dispersal by water. (See Kerner, Engl. edit. ii. 810, on the Transportal of *Triglochin* Carpels in Birds' Plumage.)

Much interest also attaches itself to the seed-drift of the Black Pond, which, as it floats on the surface from the autumn to the spring, affords information as to the buoyancy of the seeds and fruits of the plants of the pond. We do not observe here the fruits of *Eriophorum polystachion* or the seeds of *Viola palustris;* and experiments show that they possess little or no floating powers. We find throughout the winter numbers of the floating fruits of *Hydrocotyle vulgaris* and of *Potamogeton oblongus*, together with the grains of *Arundo phragmites*, all of which can float for many months. This last-named plant is one of the very few amongst our hundred species of grasses that have grains with any buoyancy worth speaking of. Nature performs a grand flotation experiment in the seed-drift of our ponds and rivers, the grasses being scarcely represented. Even the grains of *Poa aquatica* and *Leersia oryzoides*, which, from their station, we might have expected to display floating powers, sink, according to M. Kolpin Ravn, after a few days.

In the floating seed-drift of the Black Pond we have that of a pond lying in a boggy district, and mostly isolated by its elevation from surrounding drainage areas. Ponds in low-lying regions, communicating directly with rivers and fed by their tributaries, resemble rivers closely in the character of their drift. There we find, floating in numbers through the winter to the spring, the fruits of *Ranunculus sceleratus*, *Bidens* sp. sp., *Lycopus europæus*, *Scutellaria galericulata*, *Alnus glutinosa*, *Sparganium ramosum*, *Iris pseudacorus* (seeds), etc., etc., with duckweed, bulbs, buds, and, amongst miscellanea, the bulbiferous leaflets of *Cardamine hirsuta* and *C. pratensis*. This matter is treated with more detail in a short paper I contributed in 1892 to the "Journal of the Linnean Society." I would recommend anyone interested in this subject to collect a quantity of river-drift in November and keep it floating in a bowl until the spring. The young naturalist will find here a multitude of things to exercise his observing powers. He need not be acquainted with the name of a single seed; but when they germinate in his bowl in the spring, he can put them in soil and raise the plant, and where this is not possible he will find an object of many a ramble in his search for the parent plants.

One curious feature in this pond is to be found in the abundance of caddis-worms and the consequent absence of duckweed (*vide* March, 1895, *ante* p. 11).

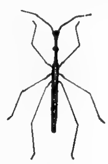
6, *Fairfield West, Kingston-on-Thames;*
*September*, 1895.

# HABITS OF HYDROMETRA STAGNARUM.

By Gilbert J. Arrow.

PROBABLY no specimen of this strange insect has hitherto been watched during the entire period of its development, and as I have been fortunate enough to rear a brood of them from the eggs to maturity, it may be interesting to record a few observations which I have been able to make. Even though these may not be of any very conspicuous scientific value, they will in all probability have the merit of originality.

For the benefit of those who are not yet acquainted with the species, I may begin by stating that it is a hemipterous insect belonging to the surface fauna of our ponds and rivers, being chiefly remarkable for its extremely attenuated form, although a member of a group characterised by great slenderness. The length of a full-grown specimen is slightly more than half an inch, whilst its greatest breadth never exceeds one twenty-fourth of an inch. Of this length the head occupies one third, being exceedingly narrow in the middle, near which the eyes are situated in very prominent hemispherical masses, and widening towards the



Hydrometra stagnarum. (*Enlarged.*)

thorax and the extremity, where the antennæ originate. These, as well as the legs, are proportionately long and slender, resembling fine hairs. This attenuated structure is very beneficial to the insect, as it renders it practically invisible even to the keenest eyes except at very close range, and therefore, in spite of its very remarkable appearance, it is little known. It is a common insect, nevertheless, and when carefully looked for may usually be found without much difficulty close to the margins of ponds or slowly-running streams. When detected it is much more easily caught than its more familiar and more active relations of the genus *Gerris*. Unlike these and most other members of the surface fauna, it is not gregarious, although when one is found there are generally plenty more in the vicinity.

There are apparently two generations of *Hydrometra* in the course of the year, for I have seen newly-born specimens as late as the middle of August, although the brood to which I have above referred was hatched on May 25th. The eggs were deposited by the parent insect in an aquarium about three weeks previously, and the first larva reached maturity on June 27th, its development thus occupying almost exactly a month. The larvæ left the egg in a highly developed condition and underwent very little external change in their progress to maturity. They were active little creatures, about one twenty-fourth of an inch long, of a transparent reddish-brown colour, with long legs and antennæ. They were very slender, although not so strikingly so as the perfect insects, the disproportion between length and breadth increasing with their growth. Wings are absent in all stages, so that it would be hardly possible to mistake the identity of the larva.

For some days after their birth the young insects lived mostly upon *terra firma*, only occasionally venturing upon a short excursion on the water close to the edge. By degrees, however, they took more to the water, at last living almost entirely upon it. Until nearly full grown they fed entirely upon the minute springtail (*Smynthurus niger*), which was abundant on the surface of the water. Probably on account of its minute size suiting their capabilities, they at first refused all other food, but shortly before assuming the perfect form, they also took other small insects, such as aphides.

Quite unlike *Gerris*, which moves very rapidly over the water by long jerking strides, *Hydrometra* progresses in a regular, deliberate manner, which assists in rendering it inconspicuous. When in search of food, it moves slowly over the water, its long legs carrying the body high above the surface, and the antennæ bent downwards in front of the head, so that their tips are all but in contact with the water, appearing to "feel" it for the motions which indicate the presence of its prey. Although the eyes are very large and prominent, they seem only capable of detecting the insects upon which the *Hydrometra* feeds when at a very short distance; for, unless this is the case, the latter never moves directly towards its victim, but reaches it by repeated "tacks," each bringing it more in the desired direction, the antennæ being all the time engaged in "feeling" the surface of the water. At last the doomed insect is exactly between the forelegs of its captor, and after a few preliminary flourishes of the antennæ, apparently to satisfy itself that it is fit for food, the long rostrum is slowly and deliberately brought out of its position along the underside of the head, "presented" for a moment at the victim, and then with a movement of the whole body, which brings the head down between the front legs, plunged into it, or rather the rostrum is pressed against it, and the exceedingly fine piercing instrument, which occupies a groove along its upper surface, bores a passage through which the juices can be extracted. Before commencing its meal, however, the *Hydrometra* invariably raises its prey from the water, and, holding it aloft on the extremity of its rostrum, enjoys it without fear of any hindrance in making its escape in case of surprise by a mightier insect. The piercing instrument is not barbed as in other insects, but seems to be enabled to retain its hold by the power of muscularly bending the tip. In lifting its prey from the water the *Hydrometra* always exerts the pull in an oblique direction, thus overcoming to a large extent the attraction of the water; but, in spite of this, it appears to require the exertion of all its strength to raise its burden.

When resting it has the strange habit of lifting one or both of its hind legs high in the air, in a manner suggestive of the similar habit of many of the gnats of extending their front pair of legs so that they resemble antennæ, but which I have never observed in any other insect. Possibly in both cases the object may be to perceive the approach of enemies by the sensitiveness of these delicate limbs to atmospheric motions.

This insect undergoes very little external change during its progress from the larval to the mature state. There is, of course, no intermediate quiescent stage, and as there is hardly a trace of wings in the perfect insect, there are no rudiments of these organs to indicate arrival at the state of pupahood, so that this stage of existence may be said to be entirely omitted. For the same reason, it is a matter of some difficulty in the case of this insect, as of some other apterous hemiptera, to ascertain by examination of a living specimen whether it is really mature or not. Perhaps the best means of deciding this point is by the colour, for at the last change of skin they generally, although not invariably, assume a dead-black appearance, whereas the immature insects are always some shade of reddish-brown.

*53, Union Grove, Clapham, S.W.;*
*Sept., 1895.*

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

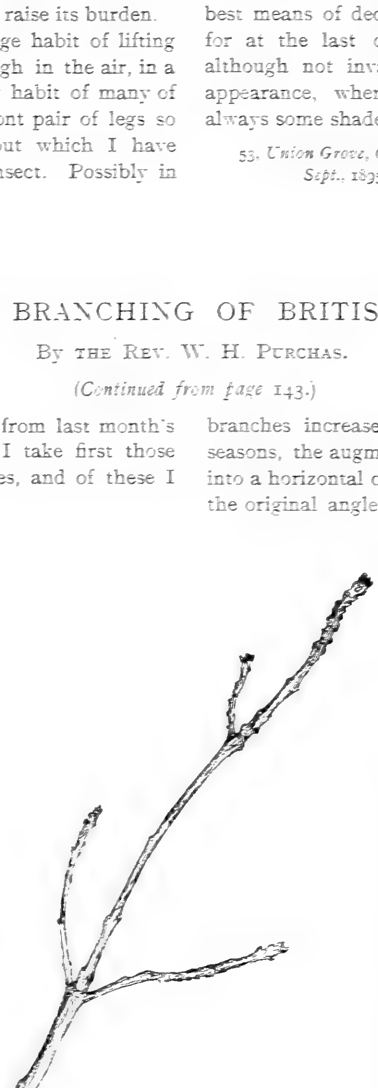
By the Rev. W. H. Purchas.

*(Continued from page 143.)*

CONTINUING my remarks from last month's issue of SCIENCE-GOSSIP, I take first those trees which have opposite leaves, and of these I begin with *Fraxinus excelsior.*

## The Ash.

The leaves of the ash are opposite in pairs, each pair standing at right angles to the pairs immediately above and below it. It is only in abnormal growths that there is any departure from this arrangement. It will follow, therefore, as already stated, that since branches originate in buds, and that buds are normally formed in the axils of leaves, the branches will stand opposite to each other as did the leaves. The angle at which each branch comes off from the main stem, and the side-branches from the larger ones, is, if measured above the point of junction, about forty-five degrees, not often less than this although frequently larger. As the branches increase by the growths of successive seasons, the augmented weight tends to bring them into a horizontal or deflexed position, but even then the original angle is usually preserved for a foot or two after leaving the main stem. In the younger growths there is a strong tendency to ascend, and thus the younger shoots make a less angle than forty-five degrees with their parent branch.



Ash in Winter Habit.

As the branches lengthen the weight of foliage bends them downwards, but the strong tendency to ascend reasserts itself in each season's growth, and thus the ends of the branches are generally seen to turn upward to a degree which is characteristic of the ash. The elasticity of the wood of the ash, which makes it valuable to the coachbuilder, allows of this bending downwards more than would the texture of oak or elm wood. The distance between the successive pairs of leaves is in the ash greater than in most trees. In young quick-growing shoots, and more especially in the stem of a young sapling, it will sometimes be as much as six inches. This length of internode is especially seen in early growth and in the upper part of such ash-trees as do not flower, and it helps to show out the form of the pinnate leaves, thus contributing to that elegance which so characterises the young ash.

During the early life of the ash its shoots are chiefly long-jointed, and, unlike the case of elm and various other trees, few joints only are made in a year's growth, and most of these give rise to side-branches. But as the tree advances towards maturity, the side-branches, which are less vigorous than the leader from which they spring, become more and more short-jointed, the pairs of leaves being only two, one, or even only half an inch apart. The leader itself also will often take on the same habit of growth, the internodes being scarcely at all developed. With this tendency to produce short-jointed wood, there sets in the disposition to flower, and the more short-jointed the wood, the more exclusively does it produce flower-buds instead of leaf-buds. The panicles of flowers are in every case lateral, the terminal bud being always a leaf-bud, hence the shoot, whether leader or side-shoot, continues to preserve the same direction or line of growth. Very generally the end bud of the year's shoot, if at all vigorous, is accompanied by a leaf-bud at each side; these side-buds develop into side-shoots the following year, whilst the leader pushes forward. The flower-buds which have been formed along the lower part of the year's shoot are the first to expand in the spring, the panicles of flowers which they bear have no leafy growth at their base, and when the seeds are ripened they fall off, leaving a clear scar, from whence there never arises any further growth; hence the long, bare, knotted spaces which we see in the branches of the ash in its mature growth. These rugged, knotty branches are quite unlike the smooth surface of the early long-jointed wood, they are generally terminated by two or three pairs of leaves close above each other, and in the axils of these leaves are formed the flower-buds for the next year, the terminal bud being, as before, a leaf-bud. The fact that there is no further growth from the spaces whence the flower-panicles have fallen tends, together with the long joints of the early-formed branches, to make the branches of the ash much less numerous and close than in most other trees, hence the bare aspect of the tree in winter, more especially if it be one which has received scanty nutriment. It will have been seen that the lateral position of the flowers allows each shoot to pursue its original direction without interference, just the contrary to what occurs where the flowers are terminal. The thickness or diameter of the young shoots of the ash is, as has been already said, from three-eighths of an inch to one-quarter of an inch, a greater thickness than is found in the shoots of any other truly native tree.

Ash in Summer Habit.

(*To be continued.*)

## THE BOTANICAL CHAIR AT CAMBRIDGE.

DR. MARSHALL WARD, F.R.S., has been elected Professor of Botany at Cambridge, in succession to the late Professor Babington. He is a son of Mr. Marshall Ward, who has conducted the Nottingham Philharmonic Choir with conspicuous success for many years. Dr. Ward, who was a scholar and fellow of Christ's, was for some years assistant in the botanical department of Owens College, Manchester, and afterwards Professor of Botany in the forestry department of Cooper's Hill College. He is well known for his researches on plant disease, particularly in regard to the fungoid disease which some years ago played havoc with the coffee crop of Ceylon, and also for his work on the bacteria of the Thames.

# PRESERVATION OF COLOURS OF DRAGONFLIES.

By W. H. Nunney.

FROM the time when first dragonflies came to be collected there has been almost unceasing outcry against the extremely fleeting nature of their colours during preservation, and various have been the devices by which it has been attempted to provide a remedy, with, however, but little success. Although in certain species the brilliant colours may be retained for perhaps a few days after the death of the insect, the majority, so distinct in their colouration whilst in life, eventually by its total loss, become reduced to one dead and monotonous level. No sadder thing occurs in natural history, and in order to obviate this, I, some two or three years ago, entered upon a series of experiments which have extended almost to the present time. Although the results have by no means been entirely successful, they have been sufficiently so to warrant the hope that in time we may be able to retain in our cabinet-specimens the colours in their pristine beauty.

The older methods of preservation are in general well known, but may perhaps be reiterated here, inasmuch as they necessarily formed the starting point for my own experiments. The method most in vogue for the larger species of dragonflies is to carefully remove the contents of the body by way of a slit down the entire length of its underside, and to afterwards insert a roll of cotton wool or paper, both to act as a support, and to bring into relief what little of the insect's colour may remain after the operation. Some collectors remove the pigment altogether (delightfully Vandalic idea) replacing it by means of a coloured powder loosely shaken into the body cavity, by a coloured paper roll, or, what is better, by painting the required tones directly on the epiderm itself. These methods, however, are but of colour substitution, not preservation; I therefore pass on.

With the introduction of the method invented by Professor Steffanelli, described in the Bulletin of the Italian Entomological Society, a new era may be said to have commenced. His method is that of desiccation of the insect under the receiver of an air-pump, the exhausted air being replaced by the fumes of sulphuric ether, well known for its desiccating and preservative properties. The results are in general nearly all that can be desired. An air-pump is, however, not at everyone's command, and the colour-preservation of the insects is thus rendered unnecessarily complicated and expensive. Sulphuric ether alone, *injected* into the bodies of dragon-flies, will frequently preserve the colours.

My own method is the direct antithesis of that of Professor Steffanelli. Instead of desiccating the insects, I endeavour to keep them in a constant condition of moistness. For this purpose I have tried many chemical substances, amongst others chloride of calcium and glycerine alone, or combined in varying proportions, and a preparation known commercially as Professor Barff's boro-glyceride. In the use of the calcium chloride I have been fairly successful; it has, however, a tendency to discharge instead of preserve certain colours. With the boro-glyceride I have been successful almost to the elimination of failures, some of the results being extremely fine.

After making the usual longitudinal slit in the under side of the creature's body, I withdraw so far as possible the contents, and afterwards fill the cavity with the boro-glyceride of the ordinary commercial strength, without allowing the chemical to in any way soil the outside of the body. The result is, that whilst the colours are preserved, the body never entirely dries, and consequently cannot be broken off by any shock given to the cabinet, drawer or store-box, this last being another great advantage of the use of a slightly deliquescent antiseptic.

In the case of the smaller Agrionidæ, I inject the boro-glyceride, slightly weakened by the addition of water, with a very fine hypodermic syringe into the body extremity, and, if necessary, run in the usual bristle for strengthening purposes.

In concluding, I may mention that the colours of the body of an *Æschna cyanea*, treated by my method somewhat over two years ago, are at the present time as bright as when the creature was alive.

I have also applied this method of colour preservation to the delicately coloured Ephemeridæ, or day-flies, with, in some instances, better results than with the dragonflies, this probably being due to the usual freedom of the abdominal cavity from elements of corruption.

The method is, of course, equally applicable to the preservation of such soft-bodied creatures as lepidopterous larvæ and spiders, being, however, more useful for the latter.

Upon receiving two specimens of a species, together with stamps necessary for transmission, I shall be pleased to return one of them, treated by my method, in the order of arrival. The dragonfly season being now past, quite fresh specimens are, of course, out of the question. Those sent should, however, be as nearly fresh as possible, in order to obtain good results.

*25, Tavistock Place, Bloomsbury, W.C.;*
*September 7th, 1895.*

# A GARDEN IN SIAM.

By Mrs. K. Grindrod.

LESS a garden than a plantation, less a plantation than a jungle, yet somethirg of all three, and entirely delightful in each of its varied aspects. The simple folk around call it a royal garden, and although by royalty long since forsaken, it is still truly royal in the old oriental sense—in the barbaric profusion of disregarded wealth, in endless possibilities undeveloped, in brilliance without order, richness without taste. But what a garden for the amateur botanist, fresh to the glories of the tropics, and not yet recovered from the paralysing effect of the Botanical Gardens of Peradeniya or Buitenzorg, of Singapore or Hong Kong. This simple garden has had but little art expended upon it, and its treasures fairly represent the common products of the lowlands of Siam, or such of those treasures as can be induced to grow in the sunburnt, clayey soil of Bangkok. Fruit-trees, garden-flowers and wild weeds grow here together amicably. The period of neglect has as yet been too short for the obliteration of the marks of ancient culture, but a few years will doubtless change the face of things completely. Before it entirely reverts to jungle let me note down some of the treasures to be found therein.

Here in serried ranks, with rope-like roots clasping the shelving sides of irrigating creeks, rise in emulating loftiness of feathery heads the stately areca palms, bearing on high the yellowing betel-nut, beloved of the Far East. Between them and around, in all directions grows that most pleasing of palms, the graceful cocoanut, with its characteristic curving trunk, thick waving plumes and heavy green nuts. Close to the fan-leaved palmyra palm grows a plant which looks like one huge fan of perfect proportions, the misnamed traveller's palm, which is truely no palm at all, but a *Ravenala*, closely akin to the banana-bearing *Musa*. The banana's great broad leaves wave over the pathways in every direction, young uncurling leaves of vivid green, older leaves torn to ribbons by autumnal storms, faded leaves, yellow and brown, ready to fall with the next gale. The mango-tree is a frequent favourite here, with its long, drooping, finger-like leaves and its cones of tiny clustered flowers, spreading a faint acidity in the air, precursor of the luscious sweetness of the matured fruit. Conspicuous aloft on the mango branches the parasitical *Loranthus bicolor* is often to be seen, its scarlet and green flowers glittering like gay insects in the sunlight. Oranges of all sizes grow here, from the smallest mandarin to the largest pommelo, and the air is odorous all the brilliant summer with the fragrant white blossoms of a small ornamental *Citrus* shrub, whose lemon-shaped fruits grow no larger than hazel-nuts. Here, as a study in vivid contrasts, are to be seen side by side the brilliant scarlet flowers of the pomegranate, the modest russet-brown of the sapodilla plum, and the waxen reds and whites of the deceptively beautiful roseapple. Under the shadow of a lofty *Melia* nestles that most pleasing of small tropical trees, the South American papaw, introduced into Siam centuries ago by the Portuguese traders. Towering above all its neighbours, save the areca palm, rises the giant tamarind, a great tree indeed, but with the smallest and most delicate of leaflets, autumnal showers of which make an incomparably beautiful carpet of scarlet and green. Close to the tamarind grows the small compact jackfruit-tree, one of the most comely of trees, whose glossy entire leaves readily mark it off from its cousin the breadfruit-tree. The deeply-cut leaves of the breadfruit-tree are rarely seen so far west of Polynesia as Bangkok, although some fairly luxuriant specimens of the tree flourish at the gate of the British Legation. So too the famous teak-tree of Northern Siam is represented in Bangkok by a single moribund specimen, which drags on a miserable existence among the bales and packages on a certain wharf, while the allied chaste-tree is a frequent ornament to the roadside and in gardens. The olive and guava, custard-apple and jujube, carambole and other fruits innumerable, are frequent in this royal garden and doubtless in the days of yore, when it was indeed a royal demesne, the famous durian and mangosteen grew here likewise. Now they have withdrawn to quieter retreats, for fruits of so rare a lusciousness ripen not in the midst of trade's busy marts. The gorgeous flowers of *Poinciana regia*, the "flame-of-the-forest," and the yet more beautiful blossoms of *Lagerstrœmia regia* help to bear out the assertion that the most brilliant flowers of the tropics are on high trees. The banyan and the bo-tree, here as elsewhere, tokens of former priestly care for these historic trees, are, in their quieter garb, even more pleasing than their brilliant neighbours, for the pleasure is not that of sight alone but of association. Both trees are "sacred" to all races which owe their religion and their traditions to India. But to Buddhists the bo-tree, the *Ficus religiosa*, is pre-eminently a holy tree, for under its shade Gautama attained Buddhahood long ago, and wherever his disciples make their home there his tree is planted. In many a ruinous garden in Siam the long-stalked, long-pointed bo-leaves, shivering aspen-like in every breeze, whisper of the days when the garden was once the haunt of the brethren of the Yellow Robe, and irrepressible young saplings with leaves of ruby and green spring up everywhere to perpetuate the Master's memory. But turn to this broad creek and behold in most glorious profusion that other holy plant of Buddhism, the sacred lotus, the *Nelumbium speciosum* of the botanist. No one who has lived where the lotus blooms can wonder for a moment at the praise that has been lavished upon it. It is at all times beautiful, whether in early May when the young incurled leaves and flower-buds of perfect symmetry rise slowly from their mud-nursery to rest on the surface of the still water; or in later June when the creek is aglow with rosy blossoms in all stages of growth; or even in early August when the last of the great petals bestrew the surface of the creek, and the golden stamens fall away, and the unique fruit-case alone is left maturing, each little anise-scented fruit attaining perfection in its own separate cubicle, until the surrounding tissue decays and the fruitlets drop to the bottom of the creek and rest there until May comes round again.

Near by, in other creeks, grow the red and white water-lilies, the smaller *Nymphæa lotus*, whose leaves and flowers have a beauty of their own, but quite distinct from the charms of the lotus, as the untravelled may readily see in the water-lily house at Kew, where *Nelumbium* and *Nymphæa* grow side by side. But the lotus and the water-lilies are not the only creek-dwellers in our Siamese garden. If some care were not exercised in clearing the great creeks occasionally, lotus and lily would soon disappear in the unequal struggle against stronger forms of aquatic life. In the many neglected smaller creeks, the weeds have it all their own way, and what a wealth of native plant-life is there! Blue *Monochoria*, white *Sagittaria*, yellow *Alisma*, *Utricularia*, and a diminutive white *Nymphæa*, no bigger than the *Ranunculus aquatilis* of our home streams,—these and crowds of *Pistia stratiotes*, with smaller floating weeds, transform every choked-up creek into a well of fascinating mystery. As the years of neglect roll on and the Menam's tidal throb is more and more feebly felt in these far-off forgotten creeks, the abundance and variety of water-life increases. The struggle becomes daily fiercer, and one wonders what the end will be, whether *Alisma* or *Pistia* will triumph finally over all meaner rivals.

(*To be continued*.)

## NETTLE-TAPS FREQUENTING CROCUS-FLOWERS.

SOME time ago the Rev. H. M. Mapleton, of Badgworth, Somerset, mentioned in a letter that a little moth was in the habit of frequenting in numbers the autumn flowering species of crocus, growing in his garden. I asked Mr. Mapleton to forward to me specimens, which he kindly did on October 5th. I find these little lepidoptera are *Symæthis pariana*, one of the Tortrices, and the rarer or more local of what are more popularly known as the two "nettle-taps." Mr. Mapleton first wrote to Mr. C. A. Briggs as follows: "I have long intended to ask if you know and have the *Crocus speciosus*, and, if so, whether you have observed how it is frequented by a little moth that I have never observed on any other plant. *Crocus speciosus* flowers in the autumn, and each year I see these little moths frequenting it in numbers. They take no notice of *Crocus nudiflora*, which is close by, nor yet of *C. satirus* (the saffron), only a few yards off, nor yet of *Colchicum autumnale*. We have been much interested in watching their visits to this particular crocus, which each year they have regularly visited without fail since I first observed it." Writing to me on October 5th, Mr. Mapleton says: "I have procured three specimens of the little moth I had observed frequenting the blossoms of *Crocus speciosus*, and forward them to you. This year I have seen reasons to change my opinion as to their confining their visits to that particular species of crocus, as I have seen a few occasional visits to *Crocus nudiflorus*, and now and then to *Colchicum autumnale*. They show a marked preference for *C. speciosus*, for while there are many about it, a fair-sized patch of *C. nudiflora* has only occasionally attracted one or two, though the plants of both species are barely a yard apart. I have observed a few settle on flowers of a kind of Michaelmas-daisy *(Astor)*, which are generally covered with flies and bees. Until this year I had never observed these little creatures on any other plant but *C. speciosus*, though I had looked for them. This season the flowering of the crocus was later than usual, but no sooner was a blossom half open than it was visited by two or three of the moths." I am not aware that any similar observation of this character has been recorded. It may form a clue for those entomologists who have these scarce moths in their neighbourhood to more easily obtain specimens. The usual manner of capturing them is with a net whilst flying over nettles, but more frequently they may be taken at rest upon the palings of a wooden fence, in the neighbourhood of nettles. It thus occurs in autumn, sparingly, upon the well-known fence on the west side of Dartford Heath.

JOHN T. CARRINGTON.

# BUTTERFLY COLLECTING IN THE CANARY ISLANDS.

By A. H. Béchervaise.

I LEAVE Santa Cruz, Teneriffe, the capital of the Canary Islands, soon after daybreak on a hot, stifling August morning, by the public omnibus which crosses the island daily,—a fearful and wonderful vehicle, drawn by six gaunt and wretched-looking horses. We almost immediately commence the winding ascent to Laguna. Slowly and wearily the wretched horses proceed, being continually stimulated by the heavy and cruel-looking whips wielded by the driver. He has three—a short one for the wheelers, a longer one for general purposes, and a very long one for the leaders. With the latter he is very expert, and can drop the lash on a sore spot as accurately as a fly-fisherman could drop a dry fly over the nose of a wary trout. It is a cruel and revolting sight, and I am glad when we reach Laguna, nearly 2,000 feet above the sea, and where we find ourselves in a cool and bracing atmosphere. We change horses here, and, after a short rest, resume the journey. At 10 a.m. I alight at the village of Tacoronte and prepare for operations. I have with me a net of the "umbrella" pattern, a most useful and convenient instrument which has done me good service in many parts of the world. I buy a loaf of bread (Tacoronte is famous for its bread, and justly so, as it is certainly excellent, being made of whole meal and flavoured with small seeds resembling carraway seeds), and a small bottle of wine, also made on the spot and excellent in quality. Leaving the village behind me, I commence to ascend a narrow path with high bramble bushes on either side. Here I am amongst the butterflies. Though not numerous in species they swarm in numbers. The hedges are all a-dance with blues, *Lycæna bætica* being, perhaps, the most plentiful. I net a few specimens of this, also *L. lysimon*, a very minute butterfly much resembling the Bedford blue, *L. astrarche* var. *æstiva*, *L. webbiana*, a lovely little insect peculiar to the island, and until recently supposed to be only found near the summit of the peak; now, however, it is found to occur much lower down. I have taken it at less than 1,000 feet above the sea. *Polyommatus phlæas* is also fairly abundant. These five, with the addition of *Lycæna icarus*, which I have found in the outlying island of Lanzarote, are the only representatives of the Lycænidæ in the Canary Islands.

Of the three representatives of Satyridæ, two are extremely abundant here. *Epiphenele hispulla*, somewhat resembling the common meadow brown, though larger and brighter in the colouring, and *Pararge xiphioides*. The other, *Hipparchia statilinus*, I am not likely to see to-day, as it is extremely local in its habits, and rarely found far away from Vilaflor, on the south slope of the peak.

The sole Canarian representative of the Hesperidæ, *Pamphila actæon*, is not uncommon, and I consign several to papers.

The Pierinæ are fairly well represented. The commonest of all, as in England, is the small garden white; bath whites are fairly numerous. *Colias edusa* flashes about in all directions, with here and there the dual female *helice*. Here, as in most other places where I have observed *edusa* in large numbers, the males largely outnumber the females. I remember some time ago reading in Science-Gossip some correspondence on this subject. My experience is that this preponderance occurs with many other species of butterflies, though perhaps not so markedly as with *edusa*. I particularly notice it to-day, with *Pieris rapæ*, *P. cheiranthi* (a large "white" said to be peculiar to the Canary Islands), and more especially with that most beautiful Canarian butterfly, *Gonepteryx cleobule*, the males of which appear to outnumber the females by at least five to one.

The heat is now great, and I am glad to reach the Forest of Agua Garcia. It is worth the long journey to see this place, one of the few spots on the island where timber is still found. For over 400 years the process of denudation has steadily proceeded in the Canaries, as everywhere else where Spaniards or Portuguese have settled. They have cut down trees ruthlessly, never thinking of replacing them by others. Consequently forests have disappeared, rainfall has decreased, and former fertile and smiling lands have been reduced to aridity, or, at the best, made cultivation only possible to be carried out by means of artificial irrigation. Destructive insects, if they do not increase, at least do far greater injury to man, for as the area of vegetation becomes restricted they must, perforce, subsist on cultivated plants. Contrast this ruinous policy with that of the early Dutch settlers at the Cape, who enforced a law that for every tree cut down, three should be planted. This beneficent law has greatly helped to make the South African Colonies what they are to-day. However, I am thankful that even this small piece of woodland has so far been spared. Beneath the shade of the huge trees butterflies abound. *Gonepteryx cleobule*, above mentioned, floats lazily about, and when pitched actually allows itself to be picked off the brambles by the fingers. I secure a number in this way. The two species of *Argynnis* fonnd in the Canaries are abundant enough, but not so easily captured. *A. pandora*, a grand insect, soars gracefully high up amongst the trees, occasionally resting on a branch a yard or two out of reach, but by dint of watching, and an occasional clamber up a steep bank, I bring two or three to bag. The beautiful little "Queen of Spain" is fairly abundant, and I net a goodly number. I have now nearly filled my card, and think it is time to take a rest. My card, by the way, is part of a system I employ when collecting large numbers of insects for exchange and other purposes. I write out on a small card the names of the insects likely to be met with, and the number of each species required. I also prepare ready folded papers in three or four sizes. As each insect is caught and killed it is placed in the paper, the necessary data written on the flap thereof, and a pencil tick made against its name on the card. In this manner I have frequently secured hundreds of insects in a few hours, being able to see at any moment the number bagged. This also avoids unnecessary destruction of insect life. I think with regret of the time and insects I have formerly lost through the old system of collecting-box and pins.

I seat myself beneath the shade of a huge cork-tree and produce the bread and wine which I consume in solitude. The scene is exceedingly pretty. Away below me lies the scattered village of Tacoronte, and far above the horizon I can discern the distant mountain tops of the Island of La Palma, whilst behind the noble peak rears its summit 10,000 feet above me. The immediate surroundings are full of interest. The wood is alive with insects, all fulfilling their purpose in the economy of nature. Although these islands are not rich in lepidtopterous insects, the other orders are very largely represented. Of orthopterous insects, locusts, crickets and grasshoppers fill the air with their music, and I have noticed to-day three distinct species of Mantidæ. Neuroptera supplies dragon-flies innumerable, some of large size and startling beauty. Hymenopterous and dipterous insects are specially plentiful, and would doubtless yield many new species to an assiduous observer. Fossores and ichneumons of many species abound. Strange to say, although I search for them I see very few beetles, although they are by no means scarce in these islands. That indefatigable and painstaking coleopterist, Woolaston, as long ago as 1864, observed 930 species in the Canary Islands, a large proportion being endemic. To the botanist also there is much of interest in this wood. All around me are the huge balls of the *Laurus persea*, some at least twenty feet in circumference. Enormous tree heaths, locally known as "breso," which are here largely burnt for making charcoal; laurels growing to a great size, and many other trees whose names I do not know. Ferns are here in abundance, amongst them the "Killarney" fern, and others prized by fern hunters. I revel in this scene of quiet and peaceful beauty, and listlessly watch the numerous birds around. Above me, high up, three falcons are soaring in the air, recalling to my memory the graceful flight of the huge condor of the Andes. Small flocks of wild canaries flash to and fro. These birds in a wild state are something like the common linnet in colour, but in captivity the plumage gradually becomes yellow. Some acclimatization experiments are at present being carried out in Germany. A year ago, amongst other birds set free in the Black Forest were some yellow canaries: these, in a few months, lost the yellow colouring and became brown. Would not this indicate that the yellowness is produced by the food supplied in captivity?

To return to the butterflies. Over my head soars slowly a magnificent specimen of *Danais plexippus*, but as this butterfly is not on my card, I content myself with watching its graceful flight. It is a curious fact that that almost ubiquitous mimicker of the Danaidæ, *Diadema misippus*, has not followed them to the Canary Islands.

After a delightful rest, I prepare to retrace my steps to Tacoronte. On the way down I see *Pyrameis atalanta*, and its ally, *P. callirrhoe*, a splendid insect and usually very plentiful here. I reach Tacoronte at 4 p.m., and am most hospitably entertained at afternoon tea by an English family temporarily resident there. The public coach being then nearly due to pass here, I bid my hosts adieu and start on the road, walking slowly on and on, but the coach appeareth not. I cover nine miles and the night is dark before it overtakes me. It already contains seventeen people, although only constructed to hold ten. They, however, good-naturedly made standing room for me, and after a drive of two hours I reach Santa Cruz at 10 p.m., after a rather tiring but pleasant and interesting day. A day alone with Nature.

The following butterflies occur in the Canary Islands, there being represented four families, four sub-families, thirteen genera, and twenty-eight species:

Family Nymphalidæ, sub-family Danainæ: *Danais plexippus*, *D. chrysippus*, *D. alcippus*, *D. alcippoides*. Sub-family Satyrinæ: *Pararge Xiphioides*, *Epiphenele hispulla*, *Hipparchia statilinus*. Sub-family Nymphalinæ: *Pyrameis callirrhoe*, *P. atalanta*, *P. cardui*, *P. huntera*, *Argynnis pandora*, *A. latonia*.

Family Lycænidæ: *Lycæna bœtica*, *L. lysimon*, *L. alexis*, *L. webbiana*, *L. astrarche*, var. *æstiva*, *Polyommatus phlæas*.

Family Papilionidæ, sub-family Pierinæ: *Pieris cheiranthi*, *P. woolastonii*, *P. rapæ*, *P. daplidice*, *Colias edusa* and var. *helice*, *Gonepteryx cleobule*, *Euchlöe charlonia*.

Family Hesperidæ: *Pamphila actæon*.

Mrs. A. E. Holt White, in a monograph on the

"Butterflies and Moths of Teneriffe," also includes *Aporia cratægi*, *Thecla rubi* and *Danais dorippus*, var. *klugii*, but the occurrence of, at any rate, the former two, is, I think, extremely problematical.

On looking at the above list, one is at once struck by the fact that in these sub-tropical islands, lying near the African coast, the butterflies are almost entirely of North European type. If we except *Euchlöe charlonia*, a desert species, which is reported to have been found in the eastern islands, and probably wind-borne from the Sahara, no typical African species occur. Not taking into consideration the endemic species, *Lycæna webbiana*, there are seventeen species which are found in North Europe, and five which have their prototypes there, *Pieris cheiranthi*, *Epiphenele hispulla*, *Pararge xiphioides*, *Gonepteryx cleobule*, and *Lycæna æstiva* Indeed, it might be considered by some that these are only modifications of the species, due to climatic effect. Follow, for instance, the type of *Gonepteryx rhamni*. In North Europe the orange spot on the forewing of the male is quite small, increasing in size as it is found further south, until in Madeira (in *G. cleopatra*) it covers more than half the front wing, whilst still further south, in the Canary Islands, the entire front wing is diffused with it. In tropical Africa it is replaced by *Callidryas florella*.

The butterflies of the Canary Islands appear, then, to have a direct relationship with those of North Europe, and not those of West Africa, as might be expected. It is a pity that more is not known of the butterflies of Morocco, the examination of which might throw some light on this interesting subject.

Sir James Hooker and Mr. Ball, in their excellent work on Morocco, "Morocco and the Great Atlas," appear to have left unnoticed nothing but the insects of that country.

*Santa Cruz, Teneriffe ; September*, 1895.

## VARIABILITY OF ELDER-FLOWERS.

By C. E. Bretton.

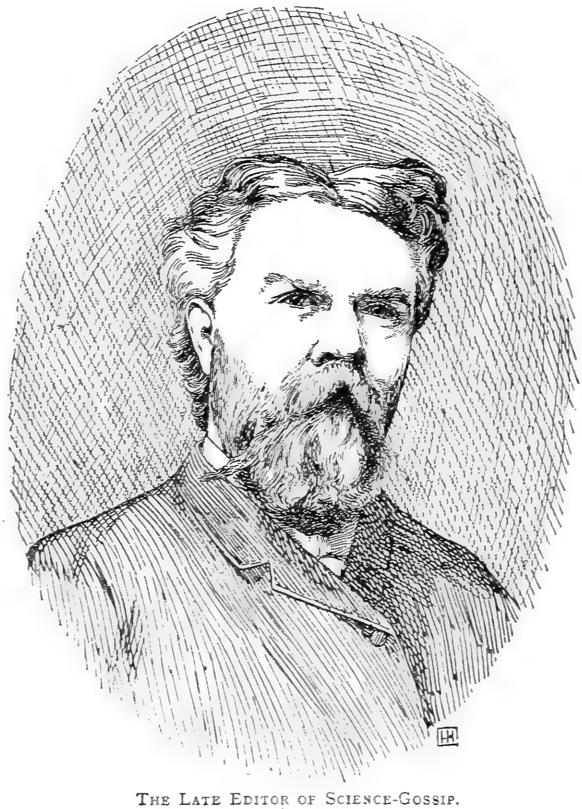
If an inflorescence of the common elder is carefully and closely examined, it will be noticed that some of the flowers differ from the structure of the typical elder-flower. There is a tendency to lessen the number of members composing each floral whorl, so that in place of pentamerous flowers, we notice flowers with the parts arranged in fours. An accepted theory, accounting for the occurrence of the tetramerous flowers, ascribes their origin to insufficient supplies of nutrient matters. Two inflorescences, taken from different trees growing close together, were carefully examined by the aid of a lens, and the number of flowers differing from the type, and the particulars in which they differed, were noted. Previous to this, it was found by counting the number of flowers of several corymbs, that a low average number of flowers in an inflorescence was 400. The first inflorescence, *A*, taken from one tree, showed thirty-six flowers deviating from the type. These were distributed as follows: Sixteen of the thirty-six showed a reduction of one in the number of members constituting the three outer whorls of the flower, the pistil being unaffected. If we put down the formula of the typical flower as S5 P5 St5 C3 = sepals 5, petals 5, stamens 5, carpels 3, we may contrast with this the formula of the sixteen non-typical flowers, S4 P4 St4 C3. Five flowers showed that a reduction by one member had affected all the whorls. The formula of these flowers would be S4 P4 St4 C2. Another series of five flowers showed that the reduction had affected the innermost whorl, the carpels only. We may denote the structure of these flowers by S5 P5 St5 C2. So far we have accounted for 26 non-typical flowers. Of the remaining ten, three showed a decrease in the number of members of the floral whorls, whilst seven showed an *increase*. Taking those showing a reduction first, we have flowers with the structure—(1) S4 P5 St4 C3, (2) S5 P4 St4 C3, (3) S5 P5 St4 C3. Two of the seven showing an increase in number of members of the whorls, had the structure expressed by the formula S5 P5 St5 C4. Two more, instead of having the carpels increased in number, had the other members increased, the formula being S6 P6 St6 C3. The following expressions denote the structure of the remaining flowers—S5 P6 St6 C3, S6 P6 St6 C4, S7 P8 St8 C7. The last formula is rather curious, and the abnormal flower may have been due to two growing-points of flowers arising in the place of one, or to the union of two originally distinct growing-points.

In the second inflorescence, *B*, taken from the other tree, more than one-fourth of the entire number of flowers were non-typical. To be precise, the exact number was 108. Whereas in the first inflorescence, *A*, the chief form of non-typical flower had the structure S4 P4 St4 C3, in *B* this type was represented only by seven flowers, as contrasted with seventeen in *A*. Again, in *B* the prevailing form of non-typical, amounting to sixty-seven of the total 108, was S5 P5 St5 C2. In *A* only five flowers were constructed on this plan. Also in *A* five flowers had the formula S4 P4 St4 C2 ; in *B* twenty-eight flowers were of this type. One of the remaining six flowers showed a great increase in the number of its parts, and was probably due to the same causes that produced the similar flower in *A*. This and the other flowers had the structure set forth in the following formulæ: S8 P8 St9 C8, S6 P6 St6 C3 (two flowers), S6 P6 St6 C2, S5 P6 St6 C2, S5 P5 St4 C2.

*189, Beresford Street, Camberwell, S.E.; Sept.*. 1895.

# JOHN ELLOR TAYLOR.

JOHN ELLOR TAYLOR, Ph.D., F.L.S., F.G.S., so well known to our readers as Editor of SCIENCE-GOSSIP for many years, died at Ipswich on September 28th, 1895. He was born at Levenshulme, near Manchester, about sixty years ago, but he appeared to be in some doubt of his actual age. His father was foreman in a cotton factory, and is long dead, but his mother still lives, and is upwards of ninety years old. In his youth Taylor was of an exceedingly religious frame of mind, being a strong Methodist. His chief reading was old sermons of Wesleyan divines. It is said he came across Hugh Miller's "Testimony of the Rocks," which brought about the necessity for choice between theology and science. His after life showed his decision. Dr. Taylor's first start in life was in the engineer's shop of the London and North-Western Railway, at Crewe. His evenings and intervals from work were devoted to self-education, which appears to have been all he possessed. He had, however, a remarkable faculty for using such knowledge as he obtained. On leaving Crewe, Dr. Taylor moved to Manchester, and there contributed articles to some newspapers, which were subsequently republished, forming his first book. About 1862, he became sub-editor of the "Norwich Mercury," under Richard Noverra Bacon, who, on establishing "The People's Weekly Journal" of that city, appointed Taylor editor. While at Norwich, during an epidemic of small-pox, he volunteered to visit the stricken people and describe their condition in the newspaper; in doing so he contracted the disease, which left its mark upon him.



THE LATE EDITOR OF SCIENCE-GOSSIP.

In 1872 Dr. Taylor succeeded Mr. Knights as curator of the Ipswich Museum, to which the Corporation added a lectureship. The Museum lectures continued until within recent years. It was from this beginning that he started his Science Lectures, which he has conducted with some success. Under his care the Ipswich Museum grew, according to the fashion of museum management of those days; but for various reasons Dr. Taylor did not adapt himself and his museum to the highly scientific arrangements in similar institutions at the present day.

Dr. Taylor was a prolific writer, and issued quite a number of popular books.

In 1885, Dr. Taylor journeyed on a lecturing tour of nine months to Australia. For some years past he has advocated search for coal in East Anglia, being strongly imbued with the idea of its existence in this region. But although he has found disciples in this belief who have furnished the means for borings, coal has not as yet been found of commercial value.

Dr. Taylor's chief faculty was the popularizing of scientific knowledge, and there is little doubt that his lectures and publications have formed the starting point for many persons who have devoted themselves to the study of one of the natural sciences. His chief interests have been in geology and botany. On the retirement of Dr. M. C. Cooke, as Editor of "Hardwicke's Science-Gossip," J. E. Taylor received the appointment, which he retained until August, 1893.

A man who quickly made friends, Dr. J. E. Taylor was, in manner, open, frank and genial, full of fun and narrative, being a good teller of anecdote.

# HAIR-WORMS AND THEIR HOSTS.

By Harry Moore.

At Betchworth, Surrey, just where the road crosses the River Mole, I picked up a specimen of *Pterotichus madidus*, Fab., from which, upon being placed in the cyanide bottle, a *Gordius aquaticus*, L., endeavoured to escape. About three inches of it extrude, and, judging by its girth, an equal or greater length remains inside, yet the abdomen of the beetle is but nine millimeters in length.

Nearly every observer of the slightest experience has some acquaintance with hair-worms, even if it is only a hazy recollection of the horse-hair legend of his school days. Numerous notes are scattered through the early volumes of Science-Gossip and a further one upon the variety of the hosts *Gordius* infests may not be unacceptable. The family Nematoidæ to which the *Gordiaceæ* belong, contains many species of more than ordinary interest, first on account of their curious cycle of development, and then their value in the economy of nature, for not only are they in a measure beneficial in checking over production in certain insects, but more or less dangerous when introduced into the human system. Their life history may be briefly described as follows: the eggs are laid in long strings; upon hatching, the young larva bores through the membrane, and for a short period lives a free aquatic life. It then becomes parasitic upon various fly larvæ, etc.; these hosts in their turn are devoured by other creatures, and the worms become incepted in their intestines, where they remain some months, finally making their way into the intestinal cavity and escaping *per ano* in due course.

It is rather singular, however, that, whereas hair-worms are most commonly found infesting beetles in England, they prefer the orthoptera (grasshoppers and allied insects) in America. In both countries spiders have been noted as hosts, in America the human being, and an instance has come under my own notice, where there was strong presumptive evidence the worm had been voided by a sparrow. Various writers cite fishes and frogs, and several mention caterpillars, but the parasites observed in lepidopterous larvæ probably belonged to the allied genus *Mermis*. In America, *Mermis acuminata*, Leidy, has been observed in the larvæ of the codlin-moth (*Carpocapsa pomonella*, L.) and a similar parasite has been seen in larvæ by several of our London workers.

In enumerating the hosts of *Gordius aquaticus*, the common European hair-worm, several difficulties arise, for whereas, as I have already mentioned, carnivorous beetles are chiefly infested this side of the Atlantic, the observers do not always seem to have determined their species. Several references of this sort will be found in Science-Gossip (vol. i., page 198, vol. xii., page 71, vol. xv., page 281, etc.). If any of our present readers can furnish something more definite, we shall be able to get along with our list. I have come across no mention of coleoptera being infested in America, in any note to which I have access; but the following are some of the authenticated instances among the orthoptera. *G. aquaticus* has been found in the cricket *(Gryllus neglectus)*, and in *Acheta abbreviatus*, Serville—the short-winged field-cricket found in woods beneath logs and stones; *Gordius robustus*, Leidy, infests *Stenopelmata fasciata*, Thomas, one of the stone or camel crickets usually found beneath stones and along the margins of woodland streams and logs, and in damp woods (Blatchley), and *Orchelimum gracile*, a grasshopper confined to low moist meadows; *A. Gordius* (species ?), eight and a half inches long, has been taken from a pupa of *Xiphidium ensiferum*, Scudder, whose perfect body measures but half an inch in length. The life history of this orthopteron is of exceptional interest, the ova being deposited from several up to one hundred and seventy "in the turnip-shaped galls, produced by a small fly belonging to the Cecidomyidæ on certain species of willow (*Salix cordata*, etc.)."

I have now but to mention *Caloptenus spretus*, Thomas, the Rocky Mountain locust, which is infested with *G. aquaticus*, Linn., and *G. varius*, Leidy, although repeated dissections by various American observers (Riley, Whitman, etc.), have shown that not more than a small percentage of the locusts are infested, yet when we consider the loss incurred annually in the United States from locusts alone is estimated at £8,000,000, anything which tends to mitigate the plague becomes of importance.

The question—how are we to account for the presence of these aquatic parasites inside terrestrial insects ?—upon consideration, is not of easy solution. Of course they are introduced with their food while in a minute immature state, but whether as ova or larvæ I think there is room for discussion. It will be noticed all the insects mentioned are associated with damp places that are more or less subjected to floods; but I do not think that sufficient reason for believing they have all fed upon the various aquatic fly larvæ in which the hair-worm larvæ are said to pass their first period of larval life, though in the case of grasshoppers, Packard thinks they swallow them as larvæ. I am inclined to believe there are several points in the life history of these parasites yet to be cleared up; perhaps some of our microscopists can elucidate them.

*12, Lower Road, Rotherhithe, S.E.; Sept., 1895.*

## SPAWNING OF COMMON SOLE.

MR. GERARD W. BUTLER, B.A., contributes to the "Journal of the Marine Biological Association of the United Kingdom," issued in September last, some valuable notes upon the spawning of *Solea vulgaris*, in the Association's Aquarium at Plymouth, during April and May of this year. So far as is recorded, this is the first occasion on which these fish have been known to spawn in captivity. Mr. Butler obtained unfertilized eggs on April 3rd and 7th, and on the 12th fertilized eggs were found for the first time. Again on April 20th and 21st, only unfertilized ova were taken. From that time forward during the rest of his stay at the laboratory, fertilized eggs appeared, sometimes on two consecutive days, at other times with intervals of from one to two days, sterile eggs being the exception. The time of day at which spawning occurred seemed to get earlier with the increased temperature of the weather. During the last week in April, the eggs were in the first segmentation stage between 6 and 7 p.m., subsequent observations pointing to their having been spawned about 4 p.m.; later on the egg-laying began about noon. Examination of the ovaries of one of the females, which was sacrificed for histological study, proved that the spawning period extends over three months or so. In this specimen the ova were of all sizes, the largest and most transparent are presumably those nearly ripe, being distributed singly among those less ripe, and they did not seem to be confined especially to one region of the ovary.

During the act of spawning the soles lay about the bottom of the tank apparently indiscriminately, and there was nothing to indicate anything in the nature of pairing. Each fish leisurely moved from one point to another, and appeared preoccupied only with its own share in the operation. In spawning, the sole lay on the sand, and raising its head brought it down again with force, the action agitating the whole length of the fish. The eggs appear to be shed one at a time, the vibrating movements being apparently to waft the egg clear of the fish. On three occasions when Mr. Butler attempted to obtain ova from the living fish failure was the result, but as these fish appear to deposit only a small number of eggs each day, it may have happened that he had not selected the right moment for their extrusion.

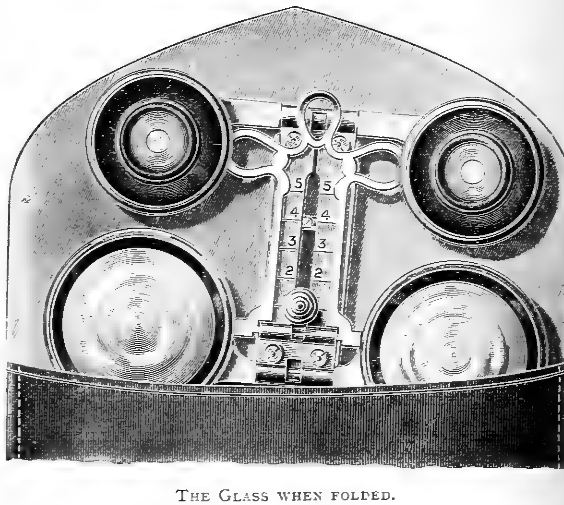
Captured eggs spawned in a tank on April 28th, hatched out in numbers on the seventh day, but eggs spawned a week later and thence onwards hatched on the fifth day, one degree of temperature higher being recorded in the water. The period of development of the young animal in the ovum is evidently largely controlled by temperature, being hastened by warmth.

## A PORTABLE FIELD-GLASS.

WE have received from Messrs. R. and J. Beck, Limited, of 68, Cornhill, London, a most ingenious pair of opera-glasses, which fold up into a space that will occupy no more than a lady's card case. They are, in fact, called by Messrs. Beck "The Card-Case Opera-Glass."


THE GLASS WHEN OPEN FOR USE.

To naturalists they will be invaluable on account of their portability and lightness; when folded they are only three-tenths of an inch in thickness. The difficulty of the ordinary field-glass is its size and weight. The glass before us, however, weighs only




THE GLASS WHEN FOLDED.

three and a half ounces, this being due to the absence of tubes in conjunction with the lenses. We have tried these glasses and find they will be equally useful for field work, the museum, and for the theatre or picture gallery.

## NATURAL HISTORY EXHIBITION.

THE annual exhibition of the South London Entomological and Natural History Society was held on October 17th, at St. Martin's Town Hall, Charing Cross, London, and was much appreciated by the very numerous company which came to see the many beautiful specimens which had been so tastefully arranged, and completely filled that large hall. The society's rooms are at Hibernia Chambers, London Bridge, where a large library and typical collections are kept for members' reference, as well as a lantern for demonstration purposes. At present, the number of members is about 200, and the annual subscription is only 7s. 6d. The secretary is Mr. Stanley Edwards, F.L.S., Kidbrooke Lodge, Blackheath, S.E.

In the British section of the exhibition, the President, T. W. Hall, Esq., F.E.S., exhibited a large and valuable collection of butterflies and moths—including a long series of *Chrysophanus dispar*, now extinct, a series of the rare *Lycæna arion*, a fine series of the now extinct fen moth *Noctua subrosea*, a fine set of Eupitheciæ, and the life history of *Sesia sphegiformis*. Mr. R. South, F.E.S., life histories of a number of lepidoptera. Mr. Hamm, a large number of rare varieties taken round Reading, including a diaphanous *Melitæa aurinia*, a very dark *Lithosia lurideola*, a grand series of *Xanthia aurago*, many specimens of both *Psyche opacella*, and *Fumea intermediella* with cases at different stages of growth. Mr. Jager, his extremely perfect series of the lovely *Callimorpha hera*, with its var. *lutescens*, and the intermediate terracotta-coloured form; and also his beautiful series of *Spilosoma lubricepeda*, with vars. *radiata* and *fasciata* and intermediate forms. Mr. H. W. Barker, F.E.S., a fine series of Arctias, and a drawer of several species of Lycænidæ, showing many beautiful variations. Mr. A. Mitchell, a case containing distinct and striking varieties of fourteen species, including an entirely fulvous *Epinephele janira*, a suffused var. of *Vanessa urticæ*, a melanic specimen of *Papilio machaon*, a banded *Polyommatus phleas* and a coalesced form of *Zygæna loniceræ*. Mr. C. H. Williams, a beautiful banded form of *Cheimatobia boreata*, a melanic form of *Oporabia dilutata*, and a specimen of the same species with yellow ground colour. Mr. J. H. Carpenter, his collection of *Argynnis*, *Melitæa* and *Vanessa*, including pale-spotted forms of *Argynnis paphia*, and a male of the *valezina* form. Mr. Hy. Tunaley, F.E.S., a case showing the protective resemblance of *Lobophora viretata* to its resting places on holly-stems and leaves. Mr. Hy. J. Turner, F.E.S., some seventy-four species of lepidoptera taken in his garden, near Nunhead station, in the suburbs of London. Mr. MacArthur, some fine specimens of Rhopalocera. Mr. H. A. Auld, his bred series of *Callimorpha hera*, a fine series of *Nola albulalis*, and a white var. of *Lomaspilis marginata*. Mr. J. A. Clark, F.E.S., a series of the extinct *Lælia cœnosa*, a *Bombyx rubi* without the transverse line, a black with white band form of *Abraxas grossulariata*, a striking var. of *Oporabia dilutata*, having a very dark band on a very light ground, a uniformly black var. of *Larentia cæsiata*, nearly white specimens of *Lomaspilis marginata*, and a new instrument invented by himself, consisting of a lens on an adjustable arm and stand, to aid in the setting of minute insects. Mr. C. G. Barrett, F.E.S., his long and varied series of Zygænidæ, Nolidæ, Psychidæ, Amphydasidæ, Boamiidæ and Xanthias, among which were specially to be noted his complete series of *A. betularia* and var. *doubledayaria*, with intermediate forms; series of all the rare and curious species of *Psyche*, his black *Tephrosia biundularia*, and a fine series of the rare *Nola albulalis*. Dr. Merrifield, a number of species which had undergone changes brought about by artificially increasing or decreasing the temperature during the pupal stage. Mr. R. Adkin, F.E.S., a fine set of specimens taken in the island of Hoy, Orkney, during 1895, his almost complete collection of Sesiidæ, arranged to show their peculiar method of pupation, and his series of the genus *Triphæna*, including a series of *T. comes*, containing many fine and unique varieties, especially from North Britain. Mr. J. W. Tutt, F.E.S., a number of drawers of species from his well-known collection. Mr. Chittenden, some very fine varieties of the Noctuæ. Mr. Percy Bright, F.E.S., a beautiful series of *Hepialus humuli* from North Britain, containing many remarkable varieties, together with other rare species of lepidoptera and forms.

In foreign lepidoptera there were numerous and splendid exhibits. Mr. A. H. Jones, F.E.S., showed some very fine bred series of Rhopalocera from South Europe, including *Thais cerisyi*, with a very dark female *T. polyxena*, and its var. *cassandra*, *T. rumina* and its var. *medesicaste*, series of *Euchloe belia* and its var. *ausonia*, series of *E. tagis* and its var. *bellezina*, and a very fine series of *Leucophasia duponcheli*, with its summer form, var. *æstiva*, all in the very finest condition. Mr. McArthur, a case of East Indian Papilios. Mr. Henry J. Turner, F.E.S., African Papilios and Danainæ. Mr. J. H. Leech, F.L.S., a large and fine collection of Rhopalocera, especially the Argynnidæ, from all parts of the palæarctic region. Mr. W. A. Pearce, about 150 species of Sphinges, Bombyces, Noctuæ and Geometers, captured by himself in Pennsylvania and Colorado. Mr. W. Mansbridge, many fine Rhopalocera, from the United States, the seasonal forms of *Colias eurytheme*, Papilios and the protective resemblance of *Anela andria* to a dead leaf being especial features. Mr. A. Hall, grand cases of palæarctic and nearctic Argynnidæ, South American Catagramminæ and oriental Nymphalidæ. Mr. Stanley Edwards, F.L.S., his very large and valuable collection of Ornithopteras and Papilios from all parts of the world.

Among the Coleoptera shown, Mr. W. West (Greenwich) sent almost complete series of Cicendelidæ, Carabidæ, and Dytiscidæ, as well as very fine specimens of all the genera *Chrysomela* and *Aphodius*. Mr. B. G. Rye, F.E.S., cases containing representatives of the families and genera of British Coleoptera. Mr. Oliver Janson, F.E.S., a case each of the largest species of coleoptera and lepidoptera from various parts of the world.

Mr. T. R. Billups, F.E.S., exhibited his inimitable collection of ants, bees and wasps, a fine set of British Hemiptera, and a large number of life histories of parasitical Diptera and Hymenoptera, with their lepidopterous hosts. Mr. A. Beaumont, a case of rare Diptera. Mr. John T. Carrington, a number of Canadian plants gathered in 1894, near Lake Manitoba, having insect galls upon them. Mr. Auld showed a hornet's nest. Mr. Stanley Edwards lent his series of diagrams showing the life history of typical species representing the various sections of Insecta and Crustacea.

Among the Orthoptera, Mr. C. A. Briggs, F.E.S., exhibited a beautiful and nearly complete collection of the British species, and living specimens of the recently naturalised cockroach, *Periplaneta americana*.

Mr. W. J. Lucas, specimens of dragonflies including *Æschna juncea* and *Æ. cyanea* taken *in copula* at Bournemouth. Mr. Ashdown, also local species and varieties of Odonata, including *Gomphus vulgatissimus* and an intermediate var. *Calopteryx virgo*.

In general zoology, Mr. Oldham exhibited the skin of a cliff fox from Folkestone Warren. Mr. M. H. Winkley, a reptilian happy family, including living specimens of tortoise, chameleon, lizard, and ringed snake and young. Mr. T. W. Hall, F.E S., a series of fine antelope horns. Mr. E. Step, living specimens of sea-anemones. Mr. Sauzé, a collection of beautiful foreign shells, among which were cones, murices, Cypræa, etc. Mr. Dedman, a number of species of British land shells, including rare varieties of *Helix hortensis*. Mr. R. A. Adkin, British land and freshwater shells. Mr. Gude, splendid shells from the Philippines. Mr. John T. Carrington, a collection of some thousands of British banded Helices especially arranged as a study in variation, in two large and admirable show cabinets designed by himself, to be placed on a wall, also a number of South European shells and a small collection of freshwater shells from Lake Manitoba, all collected by himself. Mr. Perks, a series of living water-snails with explanatory sketches. Mr. Manger, several cases of British and foreign Crustacea.

In the Ornithological section, Mr. C. A. Briggs exhibited eggs of the crested lark and the golden eagle, and a case of the little auk. Mr. H. Mead-Briggs, a pseudo-albino variety of the sparrow, and a well-arranged case of stoats and squirrels from Kent, set up by himself. Mr. McArthur, a beautiful white variety of pheasant and a case of grouse. Mr. Beaumont, a fine albino of the whitethroat. Mr. C. H. Watson, a living albino ring-dove. Mr. J. A. Cooper, a fine case of ferns and a very magnificent collection of British birds'-eggs, those of the sea-birds being notably varied and beautiful. Messrs. B. W. Adkin and Henderson also showed stuffed birds.

Botanical specimens were shown by Miss M. Adkin and Miss F. Winstone; the former some British plants, and the latter a very large number of admirably mounted specimens collected by herself in Manitoba and other parts of North-west Canada during the autumn of 1894. The fungi exhibit was a great feature, several of the members, under the guidance of Messrs. Briggs and Edwards, had, the previous day, taken some forty or fifty species at Oxshott, and Dr. M. C. Cooke was present at the exhibition to make remarks on the exhibit, and also gave an address in the lecture-hall adjoining on these curious plants.

Microscopes were lent and shown by Messrs. W. West, E. West, F. E. Filer, J. W. Hardy, H. Cooper, A. W. Dennis, W. Turner, C. West, W. Burton, T. W. Brown, and Mrs. Brown, and a number of beautiful living and other objects were exhibited and much appreciated. Mr. Henson, of Regent Street, had a beautiful display of minerals, including a set of models of the famous diamonds of the world and a number of rough and carved opals. Messrs. Cooke and Sons, entomological apparatus and zoological specimens.

Mr. R. Adkin showed entomological books to illustrate the rise of that form of literature, and Mr. A. E. Pearce, a large portfolio of beautiful drawings in water-colours, being studies of plants by himself.

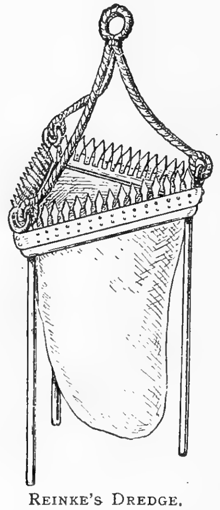
Mr. Enoch twice gave, in the annexe to the large hall, his attractive lectures, aided by the lantern, on "Insect Architects," and the musical arrangements were carried out by Mr. W. Latter, R.A.M., and a few friends.—*H. J. Turner, Hon. Reporting Sec.*

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*An Introduction to the Study of Seaweeds.* By George Murray, F.R.S.E., F.L.S., Keeper of the Department of Botany, British Museum. Pp. vii. and 271, 8vo, with eight coloured plates and eighty-eight other illustrations. (London and New York. Macmillan and Co., 1895.) Price 7s. 6d.

We have long been waiting for some authoritative manual of the British seaweeds, and although Mr. Murray's book is not a manual in so far as it describes every species, it is most valuable in bringing the subject up to date. Since the last of the four volumes of Harvey's great work, "Phycologia Britannica," was published in 1851, the study has been completly changed by the

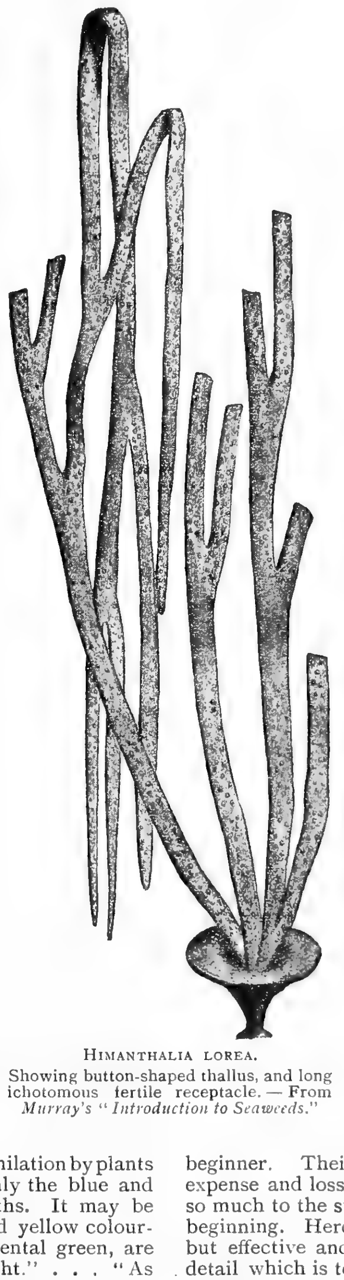


Reinke's Dredge.
From *Murray's "Introduction to Seaweeds."*

progress of research. To produce a properly illustrated manual of our seaweeds would be a heavy work indeed, and is one still open to the patient labourer in Phycology. The book before us consists of an admirable introduction in which seaweeds are treated historically, scientifically, and from the collector's view, to which is added a useful bibliography arranged systematically under the general divisions and geographically. The seaweeds themselves are dealt with in the book proper under five sub-classes, which are again divided into families. After shortly dwelling upon the sub-class, each family in it is carefully described with full and good illustrations, one of which, *Himanthalia lorea*, we reproduce by the kindness of the publishers.

We feel sure Mr. Murray will pardon us if we dip rather fully into his interesting introduction, for we consider it forms one of the most carefully written essays we have read for some time past

He commences with the regulation summary of what was known of seaweeds by "the ancients"; the three pages so occupied we will leave for the reader, when he gets the book, and proceed to quote Mr. Murray himself. "The first observation commonly made by the student of seaweeds is of the variation of their colours." . . . "An artificial classification of them according to their colours leads to the striking result that it nearly coincides with the natural classification of them according to their structure and development. Such an artificial classification became firmly established, and has left its mark on the names of the natural primary divisions or sub-classes of Algæ, viz., the Rhodophyceæ, or red seaweeds; the Phæophyceæ, or olive-brown; the Chlorophyceæ, or green; and the Cyanophyceæ, or blue-green. A simple experiment proves that fundamentally they are all green, and that the red colouring matter, phycoerythrine, the brown—phycophæine, the yellowish-brown — phycoxanthine, and blue—phycocyanine, are each something added to the chlorophyll, or leaf-green, that characterises vegetation in general, and by virtue of which plants form organic substances necessary for their nutrition. These additional colouring matters can be extracted by fresh water, leaving the previously red, olive, etc., plants green, and they differ from the green colour in this respect, since it is insoluble in water." . . . "It has been found that the colours of seaweeds are more or less indicative of their range in depth in the sea, and allowing for numerous exceptions, that there is a zonal distribution of Algæ, according to their colours." . . . The interception of sunlight by seawater brings about a state of total darkness at 700 fathoms, probably less, and though seaweeds do not penetrate to a depth approaching this limit of light, a further consideration will account for their failure. Not only is the quantity of sunlight reduced by its passage through the water, but its quality is affected, as spectroscopic investigation has shown. It is precisely those rays that are most efficient in the work of assimilation by plants that are first intercepted, and only the blue and green rays travel to greater depths. It may be taken then that the red, brown and yellow colouring matters, added to the fundamental green, are adaptations to the supply of sunlight." . . . "As light is a factor that determines the zonal distribution of seaweeds, and thus affects the local habitats, so temperature is the leading influence, among others of minor potency, that affects their geographical distribution." In connection with the subject of light and temperature, Mr. Murray reminds us that the contour of the earth's surface, which brings about the existence of alpine floras for example, has no corresponding influence on the marine flora, since the conditions of illumination check range in depth.



Himanthalia lorea.
Showing button-shaped thallus, and long ichotomous fertile receptacle. — From *Murray's "Introduction to Seaweeds."*

With regard to the artificial culture of seaweeds in aquaria, it has been found that forms from deep water are peculiarly susceptible to rise of temperature and light. So much so is this the case that their successful recovery and transport requires a cloudy day, and in summer the use of ice outside the carriers; a cool, darkened chamber must be selected for keeping the aquaria. One of the best ways of growing seaweed is by suspending them in baskets in the sea at proper depths from anchored buoys.

Mr. Murray next considers the distribution of seaweeds by ocean currents and artificially by their becoming attached to vessels. Naturally the ocean forms far less effectual barrier to the dispersal of land plants than continental areas do to seaweeds, which have no means of bridging them. Among other barriers in the ocean are areas of different temperature which effectually stop some species from invading new regions. "It would be difficult," says the author, "to select three instances of less geographical relationship than the Arctic Sea, the West Indies and Australia. The first has 259 species in 111 genera, the second 788 species in 150 genera, and the third has 1,132 species in 255 genera. The Arctic Sea has 42 genera and 30 species common with the West Indies, and the same number of genera and 21 species in common with Australia, while out of the two larger totals from the West Indies and Australia there are 109 genera and 135 species in common."

About six pages are devoted to the collecting and preservation of seaweeds, being illustrated with a picture of Reinke's Dredge. For these pages alone the book is invaluable to the beginner. Their perusal will save him time, expense and loss of temper. Nothing contributes so much to the success of an undertaking as a good beginning. Here are instructions which are simple but effective and unburthened with the elaborate detail which is too often confusing rather than of assistance at the commencement of a study.

We have now in "Murray's Introduction" a standard work on seaweeds which should be in the hands of every biologist worthy of the name, and on the shelves of every public library.

*A Monograph of the Land and Freshwater Mollusca of the British Isles.* By JOHN W. TAYLOR, F.L.S., Part ii., 64 pp. royal 8vo, with coloured plate and 148 figures. (Leeds: Taylor Brothers, Sovereign Street, 1895) Price 6s., or by subscription, 5s. per post.

In our first notice of this work (SCIENCE-GOSSIP, vol. 1, N.S., p. 230), we felt obliged to speak highly of this beautiful monograph. Now that the second part is out, we can endorse all we said in favour of the first instalment. The coloured plate is excellent and the subjects chosen for illustration of the principal phases of colouring in mollusca are attractive. The figures in the letterpress are also quite up to the form of those in part one. The literary style is good, as scientific facts and features relating to mollusca are told with ease and simple language that is sure to lead on the reader, as would an interesting narrative. Part ii. practically concludes the treatise of the shell, and we understand Part iii. will deal with the organization of the animal. The chapter on monstrosities in the part before us is most interesting, especially that portion which treats of sinistrosity, which subject is philosophically discussed and illustrated with figures indicating the process of dextral shells becoming reversed. We congratulate the author on his second part of this handsome book, and bid him be encouraged to keep up its high standard of perfection. When the author reaches the detailed account of the different species, we hope he will give due attention to the question of synonymy, which needs some overhauling among the British species, especially if authorities are quoted.

*An Introduction to the Study of Rocks.* 124 pp. large 8vo. (London: British Museum of Natural History, 1895.) Price 6d.

This is a guide book to the Mineral Department of the Cromwell Road Museum, issued by order of the trustees, the preface being signed by Mr. L. Fletcher. It is like other publications issued from the National Museums, far more than an ordinary guide, and is a book which should be in the hands of even advanced petrologists. To the beginner it will be invaluable and should soon lead an intelligent student up to a fair knowledge of the subjects. It is a small thing, but it would be very convenient if the names of these books were printed on the back, so that when put away on our shelves its identity could be readily seen.

*A Handbook to the Birds of Great Britain.* By R. BOWDLER SHARPE, LL.D., of the Zoological Department, British Museum. Vol. ii., pp. xix. and 308 8vo, with 28 coloured plates, also other figures in the letterpress. (London: W. H. Allen and Co., Limited, 1895—Allen's Naturalists' Library.) Price 6s.

We fully sympathise with D. Bowdler Sharpe in his remarks upon the difficulties of scientific nomenclature, as expressed in his preface. We fear that priority is the only rule to be followed, though at times irritating. As he says "It is certainly unfortunate that so many older names for common species have been unearthed during recent years, but that is surely not the fault of the authors themselves, but of their descendants, who have not taken the trouble to search the whole of the literature." The chief consolation is that there must come a time when there will not be any more literature to search. There are some such changes in this volume. Since the publication of Vol. i. of this work (noticed SCIENCE-GOSSIP, Vol. i., N. S., p. 110), two birds new to Britain have been recorded, viz.: the sub-alpine warbler (*Sylvia subalpina*) and Coues' Redpole (*Cannabina exilipes*), but they are not described in his work, though referred to in the preface. Commencing with the woodpeckers, vol. ii. includes the owls, hawks, kites and eagles, geese and ducks. The coloured plates are improved by being less brilliant than in vol. i. Dr. Sharpe has been helped by Mr. Howard Saunders, Mr. W. E. de Winton and Mr. R. Reed, in special groups. The second volume of this work is a nice book, which cannot fail to become popular and useful.

*Microscopical Teachings.* By WILLIAM CUNNINGHAM. 132 pp. 8vo, illustrated by mounted microphotographs. (Leeds: Samuel Moxon, 1895.) Price 2s. 6d.

This is the work of an enthusiastic amateur, and should be read from that point of view. The book contains much which will interest others besides microscopists. The photographs would have been better if reproduced in blocks and printed rather than mounted as originals.

*Elementary Physiology.* By J. R. AINSWORTH DAVIES, B.A., Professor of Biology and Geology, University College, Aberystwith. Blackie's Science Text Books. 229 pp. Foolscap 8vo, with 104 illustrations. (London: Blackie and Son, Limited, 1895.) Price 2s.

It would be difficult to condense the information given in this text book within smaller compass. The illustrations are well selected and appropriate to the subjects. Though quite a text book, it will be found useful to many young naturalists who desire the first step towards a better knowledge of animal life.

*Simple Methods for Detecting Food Adulteration.* By JOHN A. BOWER. 127 pp. 8vo, with 36 illustrations. (London: Society for promoting Christian Knowledge, 1895.) Price 2s.

To some minds the fact of not knowing what is contained in one's daily food is rather a comfort than otherwise. The author of this little work, however, has set himself the task of inducing us to dispel the bliss of ignorance and to make chemical and microscopical examinations of every morsel we are to eat. To those who are fastidious we recommend this little work on account of its simplicity and the comparative ease with which Mr. Bower's tests may be made by those who have not had any special scientific training.

*Nature's Story.* By H. FARQUHAR, B.D. 191 pp. 8vo, illustrated. (Edinburgh and London: Oliphant, Anderson and Ferrier, 1895.) Price 2s. 6d.

This is a series of reprinted popular papers with others added to suit young readers. It is prettily illustrated and amusingly written. It will appeal, however, only to the very young, as the method of dealing with science is that of half a century ago rather than of the present day, and it seems to us a pity to perpetuate this style when it is so easy to write separately of divine subjects and scientific facts. We should like to see how the author would treat mechanical science in the manner he has followed in the book before us.


| | 1895. | Rises. h.m. A.M. | Sets. h.m. P.M. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* ... | Oct. 1 | 6.2 | 5.38 | 11.30 | 3° 12′ S. |
| | ,, 11 | 6.19 | 5.15 | 13.6 | 7° 2′ |
| | ,, 21 | 6.36 | 4.54 | 13.43 | 10° 43′ |
| | | *Souths.* P.M. | *Sets.* A.M. | | |
| *Moon* ... | ,, 1 | 10.28 | 4.16 | | |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| | ,, 8 | 6.46 | 3 44 | | |
| | | A.M. | A.M. | | |
| | ,, 15 | 3.50 | 10.9 | | |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| | ,, 22 | 3.41 | 6.53 | | |
| *Mercury*... | ,, 8 | 1.16 | 5.46 | 14.23 | 17° 44′ S. |
| | 18 | 0.39 | 5.10 | 14.26 | 17° 29′ |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| | ,, 28 | 6.8 | 11.14 | | |
| *Venus* ... | ,, 8 | 3.54 | 9.56 | 11.7 | 0° 30′ S |
| | ,, 18 | 3.15 | 9.25 | 11.15 | 1° 3′ |
| | ,, 28 | 2.57 | 9.6 | 11.34 | 1° 4′ |
| *Mars* ... | ,, 8 | 6.15 | 11.50 | 12.59 | 5° 41′ S. |
| | ,, 18 | 6.14 | 11.36 | 13.24 | 8° 17′ |
| | ,, 28 | 6.13 | 11.22 | 13.49 | 10° 47′ |
| | | P.M. | A.M. | | |
| *Jupiter* ... | ,, 8 | 11.34 | 7.22 | 8.32 | 19° 13′ N. |
| | ,, 28 | 10.27 | 6.12 | 8.42 | 18° 42′ |
| | | *Souths.* P M. | *Sets.* P.M. | | |
| *Saturn* ... | ,, 8 | 1.14 | 6.17 | 14.22 | 11° 48′ S. |
| | ,, 28 | 0.4 | 5.3 | 14.30 | 12° 35′ |
| *Uranus* ... | ,, 28 | 0.41 | 5.13 | 15.8 | 17° 7′ S. |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| *Neptune* ... | ,, 28 | 6.35 | 2.38 | 5.7 | 21° 25′ N |

MOON'S PHASES.

*Full* ... Oct. 3 ... 10.47 p.m. *Last Qr*... Oct. 11 ... 2.34 p m.
*New* ... ,, 18 ... 6.10 a.m. *1st Qr.* ... ,, 25 ... 11.4 a.m.

| | 1895. | Rises. h.m. A.M. | Sets. h.m. P.M. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* ... | Nov. 1 | 6.55 | 4.32 | 14.26 | 14° 27′ S. |
| | ,, 11 | 7.13 | 4.15 | 15.6 | 17° 27′ |
| | ,, 21 | 7.30 | 4.2 | 15.47 | 19° 56′ |
| | | *Souths.* P.M. | *Sets.* A.M. | | |
| *Moon* ... | ,, 1 | 11.8 | 6.51 | | |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| | ,, 8 | 9.6 | 5.29 | | |
| | | A.M. | A.M. | | |
| | ,, 15 | 7.22 | 11.27 | | |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| | ,, 22 | 4.58 | 9.25 | | |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Mercury*... | ,, 7 | 5.12 | 10.34 | 13.41 | 8° 11′ S. |
| | ,, 17 | 5.36 | 10.38 | 14.23 | 12° 5′ |
| | ,, 27 | 6.27 | 10.58 | 15.21 | 17° 25′ |
| *Venus* | ,, 7 | 2.52 | 8.55 | 12 1 | 0° 13′ S. |
| | ,, 17 | 2.56 | 8.48 | 12.34 | 2° 8′ |
| | ,, 27 | 3.9 | 8.46 | 13.10 | 5° 24′ |
| *Mars* ... | ,, 7 | 6.13 | 11.8 | 14.15 | 13° 11′ S. |
| | ,, 17 | 6.12 | 10.55 | 14.42 | 15° 27′ |
| | ,, 27 | 6.12 | 10.43 | 15.9 | 17° 31′ |
| | | P.M. | A.M. | | |
| *Jupiter* ... | ,, 17 | 9.15 | 4.58 | 8.46 | 18° 27′ N. |
| | | A.M. | A.M. | | |
| *Saturn* ... | ,, 17 | 5.58 | 10.52 | 14.40 | 13° 19′ S. |
| *Uranus* ... | ,, 27 | 6.18 | 10.47 | 15.8 | 17° 17′ S. |
| | | P.M. | A.M. | | |
| *Neptune*... | ,, 27 | 6.35 | 2.38 | 5.7 | 21° 25′ N. |

MOON'S PHASES.

*Full* ... Nov. 2 ... 3.18 p.m. *Last Qr*... Nov. 9 ... 11.7 p.m.
*New* ... ,, 16 ... 5.11 p.m. *1st Qr.* ... ,, 24 ... 7.19 a.m.

METEORS.—The two important November showers will occur on the 13th and from the 23rd to the 27th. The radiant point of the former is $\alpha$ 150° $\delta+22°$, and of the latter $\alpha$ 25° $\delta+44°$.

PROFESSOR C. L. DOOLITTLE has been appointed director of the new observatory at the University of Pennsylvania. The observatory has an eighteen-inch equatorial, a four-inch zenith telescope, and a three-inch prism transit.

DR. BERBERICH has deduced some elliptical elements of Swift's comet from observations on August 21st, 24th, 25th and 28th. The period is still doubtful, but Dr. Berberich thinks we may expect a return of the comet in about five years.

MR. W. W. CAMPBELL has made a careful deduction of the diameter of Mars from observations made at Mount Hamilton in 1894 and 1895. He used the thirty-six-inch equatorial. The equatorial diameter resulting from the Lick measures is 9″30.

WE notice from the report issued by the Mersey Board, that at the Bidston Observatory on the Cheshire side, opposite Liverpool, a re-determination of the latitude of the observatory has been made, the result of which is 53° 24′ 4″·8 N.

MERCURY, Venus and Neptune are well situated for observation. Mercury is a morning star, and attains his greatest elongation west on November 10th. Venus is also a morning star, and is at her greatest elongation west on the 29th. Jupiter will be in a good position by the end of the month.

COLONEL A. BURTON-BROWN recently read before the Royal Astronomical Society an important paper which is printed in the Society's "Monthly Notices," in defence of the selection of Norway for the observation of the total solar eclipse on August 8th next. It is accompanied by a map illustrating the path of the moon's shadow.

M. CAMILLE FLAMMARIAN writes in the "Bulletin of the Astronomical Society of France" for October, upon observations of the dark side of Venus, made at Juvisy, during August and September last. The planet was frequently observed in full sunshine by the writer and his assistants, the results being of a novel character. The colour of the unilluminated area was slightly violet in all conditions of observations. This tint he supposes to be due to the considerable refraction of the sun's rays by the atmosphere of the planet.

THE RETURN OF FAYE'S COMET.—M. Faye discovered the comet which bears his name on November 22nd, 1843, at Paris. Its periodic time is $7\frac{412}{1000}$ years, and the time for its appearance has come round this year. On September 26th this comet was seen at Kiel. At the time of its discovery by M. Faye, it was suggested by M. Leverier that it had been revolving in an orbit since 1747, at which time it passed so near Jupiter that its orbit was completely changed. This is the eighth visit of the comet since its discovery.

MR. C. J. CASWELL communicates to the "Journal of the Royal Astronomical Association" that on September 29th, he distinctly saw the appearance of a female figure on the edge of Sinus Iridum. He says, "I saw it first at 6.30 p.m.; age of moon 11 d. 1 h. 30 m., in a 4-inch Wray refractor, powers 30 to 90, and continued the observation until after the occultation of $\delta$ Capricorni at 8.48 p.m." He states that it was like a silver statuette of a graceful female figure with flowing hair, and formed the promontory of Cape Heraclides, seeming to be intently gazing across the Mare Imbrium, at the two craters Le Verrier and Helicon.

# SCIENCE GOSSIP

Dr. Duclaux, formerly sub-director of the Pasteur Institute, has been appointed to succeed M. Pasteur as director, and Dr. Roux is to be sub-director in his place.

Africa has claimed another scientific explorer in the person of Dr. F. M. Stapff, the well-known geologist, who has died while prospecting for gold on the eastern side of Africa.

We understand that the late Professor Babington left his herbaria to the University of Cambridge, which has also been enriched with a collection of shells bequeathed by Miss Saul.

The Montrose Town Council has been presented by Miss Paton with a bronze bust of Robert Brown, the botanist, who was a native of that town, having been born in 1773.

The programme of meetings of the Scarborough Field Naturalists' Society's autumn session is to hand. Several papers are announced to be read. The Secretaries are Messrs. R. Gilchrist and W. J. Clarke.

The next volume of the "Cambridge Natural History" is, we understand, to be mainly by Dr. David Sharpe, F.R.S., and devoted to insects. It will be issued by Messrs. Macmillan and Co. during November.

Mr. Leonard Huxley is anxious for the loan of letters or other documents of interest relating to his father, the late Prof. Huxley, in view of his issuing a biography. They are to be forwarded to Mr. Huxley, at the Charterhouse, Godalming.

We are informed by Mr. F. G. Kitton that the late Frederick Kitton's beautiful and typical collection of Diatomaceæ, numbering over 4,000 slides, has been purchased by Mr. Wynne E. Baxter, F.R.M.S., the well-known Coroner for East London.

We have received a catalogue of the works on butterflies by Samuel Hubbard Scudder, Cambridge, Mass, U.S.A. Dr. Scudder is so well known as an entomologist that his works should be perused by all taking an interest in butterflies of northern North America.

The Victoria Naturalist (Melbourne, June, 1895) contains a paper by Mr. C. French, jun., on "The Flowering Times and Habitat of some Victorian Orchids." This contains a systematic list of the Victorian orchids, with their habitats. Mr. French's observations extend over a period of nine years.

In the "Nineteenth Century," for October, the president of the Royal Geographical Society urges that the time has come when a scientific expedition should be made to the Antarctic Continent for the purpose of improving the knowledge of terrestrial magnetism. This is now at a standstill for want of more recent observations in the far south, and the growth of which science is of ever increasing necessity from the more extensive use of iron and steel in the building of ships.

The deepest sounding yet found in an ocean recently came near being found by H.M.S. *Penguin*, in lat. 23° 40′, S. long. 175° 10′ W. The wire cable had run out 4,900 fathoms, when it broke before touching the bottom. The deepest abyss yet sounded is near Japan, and measures 4,655 fathoms.

Slowly but surely the subject of auto-mobile carriages is coming before the world. At Tunbridge Wells there has been an important display of petroleum-driven vehicles. When we remember how slowly the now familiar bicycle came to its present popularity with certain classes in this country, we imagine that it is only a question of waiting for the horseless carriage to appear as commonly on our roads.

There was recently opened to the public in a small fishing village on the Cornish coast a museum, privately erected at his own expense by Mr. W. E. Baily, F.L.S., F.G.S. It is at Porth Enys, near Penzance, beautifully situated overlooking Mousehole Harbour. Many of the contents are of an educational character, to which have been added Mr. Baily's large private collections of objects appertaining to Natural Science.

Some larvæ of the dipterous family Stratiomyiidæ were found this year by the Hon. J. C. Hamm, in a hot spring, in Minta County, Wyo., U.S.A. The larvæ were found in a cup-shaped depression at the top of a small cone about twenty inches high, situated a few feet from a large sulphur mound, under which the boiling water could be heard. Through small apertures in the bottom of the cup the hot water rose and filled it. It was in this that the larvæ were found. Mr. Hamm estimated that the temperature of the water was between twenty and thirty degrees below boiling point.

The "Proceedings of the Royal Society," for September, 1895, contains "The Fourth Report of the Royal Society Water Research Committee," by Percy F. Frankland, Ph.D., F.R.S., Professor of Chemistry in Mason College, Birmingham, and H. Marshall Ward, D.Sc., F.R.S., Professor of Botany, Royal Indian Engineering College, Cooper's Hill. This report is profusely illustrated with diagrams and figures showing the stages of bacterial germination, also several tables giving the time of observation, the length of the segment at that time, the number of minutes between observations, the approximate rate of growth per minute, and the temperature. These experiments have a very important bearing in the study of epidemic diseases.

On October 2nd, Professor Elliott A. Rogers, instructor of chemistry at Harvard College, New York, died very suddenly. He dismissed his class in the afternoon as usual, and went into a room adjoining the classroom with a glass beaker, containing some chemical, in his hand. Before many minutes, Professor Rogers had sunk on to the floor with a groan; some of the students rushed in, but found him dead. The cause of death is supposed to be cyanide of potassium. Professor Rogers experimented largely in quick-acting poisons, and it is believed that he had just completed some experiment with the beaker he held in his hand. Mr. Rogers was about thirty-five years of age; he graduated in 1891, and had travelled much in Europe, especially in Germany, where he studied chemistry. He was considered one of the foremost men in this branch of education.

# SCIENCE ABROAD

Bulletin de la Société Philomatique de Paris. (Paris, 1895.) In an illustrated article on the salivary glands of *Apis mellifica*, neuter and female, M. L. Bordas, D.Sc., describes the six glands possessed by bees of the neuter gender, and the action of the secretions. He also gives an account of the same glands in the males which differ from those of the neuters.

Trinidad Field Naturalists' Club (Port of Spain, August, 1895).—Mr. T. D. A. Cockerell gives a description of a new Lecanium from Trinidad. The name is *Lecanium urichi*, and it is described as being "red-brown, very shiny, nearly circular, moderately convex, the segments marked on upper surface by black or blackish transverse lines interrupted at regular intervals." There are some "Notes on Scale Insects," by Mr. F. W. Urich, F.E.S., giving an account of a variety of *Dactylopius virgatus*, which is new to the fauna of Trinidad. This number contains the second part of Mr. Ewen's article on "The Economic Uses of the Compositæ."

Proceedings of the Portland Society of Natural History (Portland, Maine, U.S.A., vol. ii., part 3, 1895.) This part constitutes a *Supplement to the Portland Catalogue of Maine Plants*, by Merritt L. Fernald. The author states that there has never been a time when botanical science has had so large a following in Maine as at present. The active botanists in this State numbering considerably over one hundred. It is satisfactory to find that their labours have added so many as 158 species or varieties to the Maine flora. Mr. Fernald, who is attached to the Gray Herbarium at Cambridge, Mass, refers to the conscientious attention which is given by the Maine botanists to the investigation of their local flora; especially does this apply to work by Messrs. E. L. Rand and J. H. Redfield.

Feuilles des Jeunes Naturalistes. (Paris, September, 1895.) M. Bavay continues his articles on "The Collection of Mollusca." In this number he writes of the habits of hermit crabs which inhabit empty shells, also of the Pelargic Mollusca, that float on the ocean, and the freshwater species. Prof. J. J. Kieffer has an illustrated article on "Observations upon the Nymphs of Cécidomyies." He gives an account of the best means of preparing them for observation, and goes on to describe the places where they can be found. Many he said change into cecid on the plants on which they feed, but the greater number bury themselves in the earth for the metamorphis. M. Cassman commences in this number a series of articles giving an analytical and critical account of Paleoncology, in which he will analyze the principal works appearing upon this branch of science. His first article consists of analysis of "Die triadischen Gastropoden der Marmolata, und verwandter Fundstellen in den weissen Riffkalken Südtirols," by M. Ernst Kittl, a book published in Vienna in 1894, and of "The Pliocene Mollusca" of New Zealand, by F. W. Hutton.

The Proceedings of the Royal Society of Queensland (Brisbane, 1895) contains a paper "On the Mandible of Zygomatus," by Mr. C. W. de Vis; in it he gives his reasons for questioning the judgment of Sir R. Owen in pronouncing the fossil shell named by Macleay *Zygomaturus*, to be but the cranium belonging to his own *Nototherum* mandibles. There are also some "Botanic Notes," by Mr. F. M. Bailey, F.L.S., in which he gives a description of four new orchids recently received by him.

Bulletin de la Société Royale Linnéene de Bruxelles. (Brussels, June and July 1895.) M. Edward Couturier, in an article on Orchards, gives an account of the best kinds of soil for the growth of fruit trees, the mode of the grafting and the arrangements necessary to ensure healthy growth and fine fruit. In an article on the insects of the cabbage, M. J. Hesnault writes of the larvæ of coleoptera and lepidoptera that attack and feed on cabbages. He gives in each case the best means of destroying these enemies.

The Canadian Entomologist (London, Ontario; September, 1895) is an exceptionally good number; it contains an important article by Mr. W. H. Edwards, of Coalburgh, on "Collecting Butterflies in Western Colorado, with a particular account of certain Papilios." He writes of a trip taken by himself and Mr. David Bruce, another entomologist, to Glenwood Springs, in 1894, to continue some experiments commenced by Mr. Bruce in 1888, on the dimorphism of certain Papilios. Mr. Edwards considers that *Papilio bairdii* and *P. oregonia* are dimorphic forms of the same species; there being nothing like this dimorphism in the North American butterfly fauna. Mr. H. F. Wickham, Iowa City, continues his articles on "The Coleoptera of Canada." His subject in this month's is "The Cleridæ of Ontario and Quebec." There are four illustrations. Some "Miscellaneous Notes on Coccidæ are given by Prof. T. D. A. Cockerell, Las Cruces, Mexico.

Proceedings of the Academy of Natural Sciences of Philadelphia (Philadelphia, 1895). Professor T. D. A. Cockerell has an article on "Some New Bees of the Genus *Perdita*." There are, he says, thirteen given species of *Perdita*, of which, however, four are considered only doubtfully referable to the genus. Mr. J. B. Ellis gives an account of some missing specimens of Pyrenomycetes mentioned in the preface to "The North American Pyrenomycetes." These specimens were found in a package which had lain unnoticed for some years in the Herbarium of the Academy of Natural Sciences, Philadelphia. They are evidently authentic, the papers in which they are wrapped being marked in Schweinitz's handwriting, with the abbreviation L.V.S. (for Ludivocus von Schweinitz). Mr. Ellis has given short notes on each species to enable some of the Schweinitzian species that have hitherto been only imperfectly understood to be recognized. Mr. Gilbert D. Harris gives an account of some "New and otherwise interesting Tertiary Mollusca from Texas." He says that in the lower Claiborne beds there are many fossil shells, some of forms which are still common in Louisiana, Mississippi, Alabama and South Carolina. There are also some new forms which he describes in detail. "The Eocene Tertiary of Texas east of the Brazos River" is described by Mr. William Kennedy in a lengthy article.


Variety of Beech Foliage.—There is an interesting note in Science-Gossip (*ante* p. 137), describing a curious beech-tree, in which part of the foliage was much narrower in the leaf than usual. It may be of interest to mention that I have for many years noticed an exactly similar tree in a garden thicket here. The proportion of ordinary foliage has been steadily decreasing, and to-day there is only one small branch of it left. —*Arthur E. Boycott, The Grange, Hereford; July 25th*, 1895.

Impatiens fulva near Newbury.—I have noticed the orange balsam (*Impatiens fulva*) on the banks of the Enborne stream, near Newbury, for the past three seasons. It seems to have been originally introduced at Milford Lake, Highclose Park, some twenty years ago, and from thence it has spread along the stream for some miles, and appears to be well established, particularly at Washwater, where it is abundant.—*A. B. Jackson, Mapledene, Enborne Road, Newbury; October 12th*, 1895.

Cohesion of Crabtree and Hawthorn.—Some time ago I came across a rather curious tree growing in the Forest of Dean. At first sight it appeared to be an ordinary crab-apple, branching near the ground into four, but on closer inspection I found that one of the branches was a hawthorn which seemed to be entirely fused into the crab. The bark and wood of the trees are so similar that it seems impossible to tell where the crab ends and the hawthorn begins. Whether the latter had been grafted on, or grown from a seed in a hollow formed by the three other branches, I was unable to find out. I suppose grafting might be successful with trees so nearly allied.—*F. J. Provis, Coleford, Glos.; September 7th*, 1895.

Effect of Snow on Plants.—As a proof of the fertilising influence of snow on plant life, I have to mention among things which have come under my notice this season, the following observations in connection with the plants of this district. After a winter of unprecedented severity, we had a comparatively genial spring, and all plants flowered with exceptional luxuriance, the blooms being superior specimens and the colours very brilliant. The summer was not, as a whole, very favourable for plants, but the style of flowering which commenced so auspiciously in the spring was continued through the rest of the season. The whole of the leguminous plants have flowered better, and borne more pease than generally. In fact this extends from the true natives here of this peculiar and important order, to the cultivated or naturalised exotics in our gardens, fields, or sheltered surroundings. It is true that many hay-fields were deficient of red clover, but I believe that this was due to the wet and uncongenial fall more than the snowy winter. What plants were in existence were well-grown, rich flowering specimens, showing that the soil contained a good supply of the ingredients required to produce superior specimens. I may follow this up by noticing that many plants of broom (*Spartium scoparium*) were destroyed in winter, but those that escaped gave good flowering and seed-producing results. Broom is about the easiest destroyed plant through severe weather which we have here. Birds-foot trefoil (*Lotus corniculatus*) produced an enormous quantity of pease, this being more remarkable because that I could scarcely find a pod at all the preceding season. The vetches had also splendid returns of pease. Touching on the Rosaceæ, there was also in this case remarkable brilliancy of flowers, while I have not seen such a magnificent crop of fruit from the indigenous or naturalised fruit bearing representatives of that order. Both cherries and raspberries were a superior crop. I have never seen such a splendid crop of fruit upon the rowan or mountain-ash (*Pyrus aucuparia*) as there is to record this year. All the representatives of the family had superior flowers. We may notice the grass of parnassus (*Parnassia palustris*) as one among some others that flowered over a wider area than usual. That is to say, the plants were enabled to flower over spots where they generally do not do so. The habit of this plant is that it occurs in patches in wet ground and a part of these flower regularly, the rest generally fail to produce blossoms, but this year the flowers appeared over more of these latter than usual. I noticed berries for the first time upon a plant of honeysuckle (*Lonicera periclymenum*), which has established itself on the open moor. Willow-herbs and bed-straws produced superior plants and flowers. The composite order did not fall behind. The field-daisy (*Bellis perennis*) might be given as an example, as in several cases I noticed more rings of petals on the flowers than are usual. Bell flowers are also worthy of notice in the same direction as the others. Then two of our indigenous fruit-bearing shrubs, bilberry and cowberry (*Vaccinium myrtillus* and *V. vitis-idaea*) have produced very large quantities of excellent fruit. The latter probably broke the record in this direction; berries being also abundant in many places where they scarcely bear any at all in ordinary seasons, just a series of practically barren plants which were brought to produce an excellent crop. I also observed a specimen of marsh-speedwell (*Veronica scutellata*) producing flowers this year in a habitat where a plant has been under my observation for several years, but did not produce flowers in any of them, while the other plants of the same order, viz., Scrophularinæ have generally yielded superior flowers and seed. Now for a word on the Orchidaceæ. These vary much from year to year, as far as numbers and standard of flowers, as well as seed, are concerned. The flowers were about an average in numbers and above average in quality. The most remarkable incident which came under my notice was finding upwards of twenty plants in flower of marsh-orchis (*Orchis latifolia*) on a patch of damp ground where they could not have flowered in previous years without being observed. It is equally unlikely that they had got there for the first time. They must have been there for some years and gained by the winter's invigoration and flowered thereafter. The lower orders of flowering-plants, such as sedges and grasses, obtained similar results as their more conspicuous neighbours; while ferns have produced superior fronds, deeply studded with spores, with the other flowerless plants generally following them in the same category.—*William Wilson, Hillock, Terpersie, Alford, Aberdeenshire; September*, 1895.

# IN MEMORIAM

Frederic Kitton, Hon. F.R.M.S., etc.—Mr. Frederic Kitton, a frequent contributor to Science-Gossip during a period of twenty years (1865 to 1885), died at his residence, West Kensington, whither he had removed from Norwich, in July last, at the age of sixty-eight. He was chiefly known in the microscopic world for his life-long devotion to the study of the Diatomaceæ, having discovered several new forms, some of which are known by his name. As an honorary member of the Royal Microscopical Society, the Quekett Microscopical Club, and Société Belge de Microscopie, he contributed a number of papers to each. His correspondence with continental microscopists was large, and numbered among them Ehrenberg, Van Heurck, Cleve, Weissflog, Tempère, and other specialists. Mr. Kitton was also a corresponding member of the American Microscopical Society, and of the Dublin Microscopical Club. His notes contributed to the microscopical journals on the mounting, cleaning and preparation of diatoms, the cuticles of plants, the mediums used for mounting and for cells, are invaluable to microscopic students. He also made translations from German and French of fresh discoveries of the diatomaceous order by foreign microscopists, which appear in the journals of the societies. In conjunction with the late M. Julien Dèby (at one time President of the Belgian Microscopical Society), Mr. Kitton wrote a "Bibliography of the Microscope and Microscopic Studies," being a catalogue of books and papers on the Diatomaceæ in that gentleman's possession, a work necessarily involving great labour and research. A favourite subject with him was the polarisation of light, and to Dr. Edwin Lankester's "Half-hours with the Microscope" he contributed a chapter on the polariscope, which is remarkable for its lucid exposition. In Dr. M. C. Cooke's "Ponds and Ditches," 1880, will be found a chapter on diatoms, by Mr. Kitton, and two chapters on freshwater and marine diatoms in the same author's "One Thousand Objects for the Microscope." To Mason's "History of Norfolk," 1884, Mr. Kitton gave a list of the Diatomaceæ found in the county of Norfolk. In Andrew Pritchard's "History of the Infusoria" (4th edition), he verified the references to works there mentioned. Another favourite topic with the late microscopist was the formation of flint, upon which subject he read a series of papers at the meetings of the Norwich Geological and the Norfolk and Norwich Naturalists' Societies. Elected to the latter in 1873, as president, Mr. Kitton gave an address in which he strongly combated the doctrine of abiogenesis or spontaneous generation, then advocated by Dr. Bastian, and expressed his dissent from the theory of evolution, as propounded by Darwin; there is reason to think, however, that his views on the doctrine of evolution afterwards became modified. Mr. Kitton's assistance as a microscopist was often sought by the societies before mentioned, in determining the constitution of organic and inorganic structures. As the result of his industry in the department of microscopic science, he left behind a large number of slides (chiefly prepared by his own hand), amounting to over 5,000 specimens. As a labourer in that field in which he is principally known, Frederic Kitton had few compeers whose work is more unique. It may be added that his son, Mr. F. G. Kitton, author of some recent works delineating the life and genius of Charles Dickens, is preparing a memoir which will include a complete bibliography of the writings of his late father. S. C. S.

William Henry Tugwell, who died after a long and acutely painful illness on September 20th, was a Pharmaceutical Chemist, of Greenwich. He was born at Reigate in 1831, and for many years past has been known as an ardent collector of lepidoptera, and botanist. The large collection of butterflies and the larger moths left by him will be shortly offered for sale.

Professor Charles P. Riley, M.A., Ph.D., late U. S. Government Entomologist at Washington, died on September 14th, through an accident whilst riding on a bicycle. He was born at Walton-on-Thames, in Surrey, in 1843, going out to America when about seventeen years of age. His early tastes for entomology led him, after a somewhat adventurous life as soldier and journalist, to study the life history of noxious insects. He was State Entomologist of Missouri for about ten years, receiving his post at Washington in 1878, which he held until 1894. He founded, in 1888, the periodical "Insect Life," which was the vehicle for publication for the results of many of his valuable researches. His name among American and also many European naturalists, has long been a household word, for he was known as the leading master in economic entomology.

Robert Brown, M.A., Ph.D., F.L.S., a well-known botanist, traveller, and editor of scientific publications, died suddenly on October 27th, 1895, at Streatham, near London. Only son of Thomas Brown, of Campster, in Caithness, he was born March 23rd, 1842. He had exceptional educational opportunities after leaving school. First he studied in the University of Edinburgh, gaining prizes and medals; later years in the Scientific Schools and Universities of Leyden, Copenhagen, and at Rostock, where he received his degree, Ph.D. As a traveller he visited, in 1861, Jan Mayen, Spitzbergen, Greenland and Baffin's Bay. From 1863 to 1866, he visited, for scientific purposes, some of the Pacific Islands, West Indies, Venezuela, and, as Botanist to the British Columbia Expedition, Alaska and Behring Sea Coast. As Commander of the Vancouver Island Expedition, he introduced several new plants into Europe and charted the interior of that island; Brown's Range, Mount Brown and Brown's River having been named after him. In 1867, in company with Edward Whymper, he made the first attempt by Englishmen to penetrate the inland ice cap of Greenland, forming conclusions which have since been confirmed. Later he spent a short time in the Barbary States of North Africa. In 1876, Dr. Brown removed to London, since which time he has been connected with the publishing firm of Cassell and Co., editing "Science for all," "The Countries of the World," "The Races of Mankind," "Africa Past and Present"; he was also attached to the editorial staff of the *Standard* newspaper. Dr. Brown used to claim that he had, wholly or in collaboration, written thirty volumes of books and upwards of 4,000 articles and reviews in various languages.

# NOTES & QUERIES

SABINE'S GULL IN YORKSHIRE.—A specimen of this rare bird was shot on October 10th, 1895, and sent to us from the Wolds of East Yorkshire.—*T. Cooke and Son, 30, Museum Street, London, W.*

HELIX NEMORALIS AS ORNAMENT.—Although it is news to me that this species has been used for ornament as far back and in the several countries of our realm as stated by your correspondents (*ante* pages 109 and 138), it may interest them to hear that some ten years ago I made several pairs of bracelets with this species, and when mounted on black velvet they formed very artistic and novel articles of personal adornment.—*Edwin E. Turner, Coggeshall, Essex; September*, 1895.

VOLVOX IN A HORSE-TROUGH.—On October 7th, a friend sent me a small bottle of water taken from an old horse-trough in a village near Bedford. The water contained *Volvox globator* in abundance. When examined under the microscope, the *Volvox* were seen to have *Vorticella* attached to them, and I should like to know if this is a common occurrence, not having seen it before myself. I may mention that watercress (*Nasturtium officinale*), was growing in the water and was covered with a species of *Vorticella*.—*Arthur John Hulatt, 6, Silver Street, Bedford.*

NOTES FROM NORFOLK.—I send you a bunch of grapes (of good flavour, ED. S.-G.) grown and ripened entirely in open air this season. It is a fair average bunch. Vines are grown around here up the walls of cottages with a west or south-west aspect, and often do very well. Can any collector of algæ tell me whether *Hydrodictyon* is scarce this year? I have looked for it carefully, but have not found it where it was plentiful enough in preceding years. A species of *Cystopus* (*? Cystopus spinulosus*) has been very frequent on thistle leaves this year, especially on *Carduus arvensis*; the resting spores are comparatively large, and when ripe are brown. *J. Lewton Brain, Swanton Morley, East Dereham; October*, 1895.

AUTUMNAL FLOWERING.—As an instance of the mildness of the present season, I noticed at Enborne, near here, on October 11th, the honeysuckle (*Lonicera perichymenum*) and the dogwood (*Cornus sanguineus*) in full bloom. Wild roses are also still in flower in the neighbourhood. In a garden near my house, there is an apple-tree which is blooming for the second time this year.—*A. B. Jackson, Mapledene, Enborne Road, Newbury; October 12th*, 1895.

AUTUMNAL FLOWERING.—There appear to have been many instances throughout the South of England of exceptional inflorescence of various trees and plants during the past autumn. In the middle of September a large bunch of ox-eye daisy flowers was gathered, and hundreds of others left on a slope facing east on the South Downs of Sussex, between Lewes and the sea. Dogwood appears to have flowered generally in September throughout the South of England. Among cultivated plants, Mr. Bailey, of 75, Broke Road, Dalston, reported that chestnut trees, in the neighbourhood of Dalston and Islington, were bearing both flowers and fruit in October, and we hear of a laburnum tree bearing flowers in the same month, near Swiss Cottage Station, in North-west London. Miss F. Winstone participated in a large dish of raspberries of full flavour, gathered in her father's garden in Essex, on October 19th. We hear of apple-trees bearing flowers during October in various parts of the country, in some instances these second flowers producing small apples.

HOUSE MARTINS IN SHETLAND.—So far as I can find out, these birds only became regular visitors to the Shetlands after the Scotch fishing boats made annual fishings off these islands. This was, I believe, in 1881, after a great storm had destroyed the Shetland fishing fleet. The birds followed the boats over each year, but I am not aware of their nesting in South Unst before the spring of 1894. I have had ample opportunity of observing them during various collecting expeditions, extending over many months in each of several years since 1879. A pair of these birds, as just stated, built a nest inside the post-office at Cunningsberg, finding ingress through an opening over the door. Here, under the protection of the post-master, they reared a brood of four young ones from four eggs laid, and were the admiration of the people of the neighbourhood, some walking in from miles away to see these local curiosities. In 1895, one bird returned and stopped a week, frequently visiting the nest, and then disappeared for about another week. It returned again singly, but was, much to the distress of the post-master, shortly afterwards found dead in the nest. I could not hear of any other martins or swallows having visited Unst.—*H. MacArthur, 35, Averill Street, Hammersmith; October*, 1895.

SUSPENDED ANIMATION IN FISH.—A rather curious instance of suspended animation has recently come under my notice. On February 19th, 1895, a goldfish was brought to me to be stuffed. While handling it I noticed a very slight movement round the eyes and expressed my opinion that it was not dead, but as it had been out of the water for over forty-eight hours, and a large proportion of that time in the inside breast-pocket of the wearer's coat, the gentleman who brought it was loth to believe this. I suggested placing it in spirit for preservation. Two days afterwards I was informed that the fish was alive and swimming as merrily as had been its wont for the past seven years. The circumstances being peculiar I asked the owner to furnish me with complete details from which I subtract the following: "On Sunday, February 17th, at about 11 a.m., I noticed the fish lying at the bottom of the aquarium apparently dead. I removed it with the net and placed it on a cabbage-leaf and put it by to bring down to you. Next morning I put it in my pocket, but being busy I passed your shop and took it home with me again and placed it on the window-sill. On the 19th, I brought it to you. After leaving your shop, I went home and placed it in water to keep it fresh. About an hour afterwards, upon looking into the bowl, to my surprise I found it had revived." Was this case of suspended animation produced by the extreme cold of that period? I should not forget to add the fish was quite limp when it was brought in to me.—*A. E. Cook, Taxidermist, 31, Lower Road, Rotherhithe, S.E.*

# TRANSACTIONS

City of London Entomological and Natural History Society.—Tuesday, August 20th. The exhibits were: Mr. Clark, four *Cledeobia angustalis*, *Epinephele ianira*, two partially xanthic and one with light tawny patch on disc of each hind wing. Mr. Nicholson, a female *Bombyx quercus*, which strongly resembled var. *callunæ*, and a specimen of *Vanessa urticæ*, in which the yellow costal blotches were considerably tinged with white; both exhibits were taken in July, at Pwllheli, North Wales. Dr. Sequeira, a dark series of *Hypsipetes elutata*, *Gortyna ochracea* (Yorkshire form), and a fine *Bryophila perla*, suffused with brown, all from Scarborough. —At the meeting of Tuesday, September 3rd, principal exhibits included—Mr. Sauzé, a specimen of the sun-star *(Solaster pepposa)*, a slender-legged crab *(Stenorhynchus phalangium)* and some common starfish *(Uraster rubens)*, all from Deal. Mr. Bayne, a very sparsely dotted specimen of *Spilosoma menthastri* from Tottenham, and *Heterogenea limacodes* from the New Forest. Captain Thompson, a bred series of *Nonagria elymi* from Hornsea, Yorks., some of the specimens being much suffused with blackish scales. Mr. Clark, a var. of *Vanessa urticæ*, in which the large, square, inner-marginal black blotch on the fore-wings was entirely absent, and the twin spots were abnormally developed, almost coalescing; he also distributed living larvæ and pupæ of *Ephestia kühniella*, and exhibited a series of this species bred from Dr. Allinson's Food for Infants. Mr. Tutt, a long and fine series of *Erebia æthiops* from the Tyrol, showing considerable variation in size and colouring, according to locality.—*C. Nicholson and A. E. C. Battley, Hon. Secs.*

The South London Entomological and Natural History Society.—September 12th, 1895. T. W. Hall, Esq., F.E.S., President, in the Chair. Mr. Jäger exhibited a melanic specimen of *Agrotis vestigialis*, from North Wales, both upper and lower wings being black, Mr. Winkley, a species of *Dermestes* from Japan. Mr. Fremlin, a fine series of *Polia chi*, var. *olivacea*, from Cheshire, a bred series of *Phorodesma smaragdaria*, from Essex, and a bred specimen of *Prionus coriarius*, from Surrey. Mr. Tutt, a number of cases of a large species of *Psyche* from the Argentine Republic. They were mostly cocoons of the vermicular female and contained either young larvæ or ova. He stated that a similar species had recently been described in America as causing much damage. Mr. Adkin, series of *Dianthecia nana* and *D. capsincola*, bred from North Devon larvæ, one of the former being of a rosy tinge; also a curious bred specimen of *Bombyx quercus*, var. *callunæ*, with the outer half of each wing devoid of scales while the fringes were perfectly developed; and specimens of the wild British everlasting pea, *Lathyrus sylvestris*, from Eythorne, Kent. Mr. Hall, a male underside of *Lycæna bellargus*, from Folkestone, having the left secondary destitute of spots, the other wings being normal. Mr. Tutt, a large number of *Erebias*, and species of allied genera of butterflies from the Alps, and read a most interesting paper on their affinities, habits and localities; making special reference to the presence, absence and development of the eye-like markings. He also said that he had taken a large number of *Zygæna exulans*, some being of the semidiaphanous Scotch form. Mr. Enock exhibited and described at some length *Trichogramma evanescens* which was only a half mm. in length. He stated that he had made some 180 drawings of the various details of its history and structure, and called attention to the economic benefit of his observations if the farming of these minute creatures was carried out on a large scale, as these insects are parasitic in their larval stage upon the eggs of other insects.—October 10th, 1895. T. W. Hall, Esq., F.E.S., President, in the chair. Mr. Henry Tunaley, F.E.S., Brixton Hill, was elected a member. Mr. McArthur exhibited specimens he had taken this year in the Orkneys; viz., a series of *Thera juniperata*, with the ground colour much whiter, while the dark markings were intensified and somewhat extended; two almost white specimens of *Melanippe montanata;* three fine varieties of *Nemeophila plantaginis*, one having much darker hind wings, while another had yellowish red hind wings with fewer dark markings; and vars. *sedi* and *luneburgensis* of *Aporophyla lutulenta*. Mr. Winkley, on behalf of Mr. Montgomery, of Ealing, specimens of a second brood of *Argynnis selene*, from Abbott's Wood, also a beautiful underside var. of *Lycæna bellargus*, from Eastbourne, having a very light ground, a blue base, and many of the usual dark markings obliterated, while others were extended. Mr. Oldham, series of *Odonestis potatoria*, bred from Cambridgeshire, three males being of the female colouration; also *Colias edusa*, one *Leucania albipuncta*, and suffused red *Phlogophora meticulosa*, from Folkestone, also black forms of *Xylophasia polyodon* from Woodford. Mr. R. Adkin, a very beautiful series of *Noctua depuncta*, from Morayshire. Mr. Hy. J. Turner, a bred series of *Xanthia fulvago*, from Surrey, including var. *flavescens*, and the dark yellow form; a series of *Epinephele hyperanthus*, from Chattenden, including var. *arete*, and an intermediate form; specimens of *Silpha quadripunctata*, from the new Forest, and a dark var. of the same species from Chattenden; also a specimen of *Crioceris merdigera*, from the same locality. A discussion ensued upon the occurrence of *Colias edusa* during this season, and Mr. Winkley stated that Mr. Montgomery, of Ealing, had taken seventeen specimens at Eastbourne, and had already bred seventy-eight from the ova laid by captured females.—*Hy. J. Turner* (*Hon. Report Secretary*).

Greenock Natural History Society.—The seventeenth annual meeting of this society was held on September 26th, in the Museum, Kelly Street—the President, Mr. Andrew Kerr, occupying the chair. The report of the treasurer (Mr. G. H. Black) showing the funds of the society to be in a satisfactory state, having been read and approved, the secretary (Mr. G. W. Niven) submitted his report for the past session. From it we gather that during the session 1894–95, eight meetings were held, at which nine papers were read and two exhibits shown. During the summer session there were two afternoon excursions and one whole day excursion. On May 4th, some of the members joined Mr. Paterson's ornithological excursion to Loch Thom. On June 8th, members and friends, including representatives of the Paisley Naturalists' Society, had a pleasant botanical and entomological ramble over the hills from the Cloch to Ravenscraig. On August 10th, a most enjoyable day was spent at Loch Quien, Bute, the members being again indebted to Messrs. Ballantyne and Lyle. The report having been approved, the election of office-bearers took place.

NATURAL HISTORY SOCIETY OF GLASGOW.—The opening meeting of the forty-fifth winter session was held in the society's rooms, 207, Bath Street, on September 24th, Professor Thomas King, president, in the chair. It was intimated that the Royal Society of London had agreed to exchange publications with the society. Reports were given in of two excursions. The first had been to Rowallan, where is still seen a small part of the ancient castle, dating from the 13th century, with additions of three centuries later. The remains of the lake-dwelling or crannog at Buston (now in a drained and cultivated area) had been visited, also the castle-hill or moat-hill near Stewarton. An excursion to Torrance, East Kilbride, had been largely attended. Mr. A. Somerville, B Sc., F.L.S., exhibited on behalf of Mr. Arthur Bennett, F.L.S., corresponding member, the sedge *Carex fusca*, Allioni (*C. buxbaumii*, Wahl.), from Loch Sheil, near Arisaig, where it had been discovered by Mr. W. F. Miller; it is an addition to the flora of Great Britain, having previously only been recorded from Ireland, from the shores of Lough Neagh. There was also shown, on behalf of Mr. Bennett, the rare brown beak-sedge (*Rhynchospora fusca*, R. and S.), found by Mr. S. M. Macvicar in same quarter, an interesting addition to the flora of the Highlands. Mr. R. S. Wishart, M.A., laid on the table a number of plants from near Berwick, abundant there, though rare on the west side of Scotland. These included *Lathyrus aphaca*, L., *Hyoscyamus niger*, L., *Allium vineale*, L., and *Hordeum maritimum*, With. He also showed a "barren" shoot of raspberry, bearing fruit, though in its first year only; also a tall plant of the thistle (*Carduus pycnocephalus*, Jacq.), raised from seed, and—though the species is a biennial—bearing flowers in its first year. Other exhibits were made and papers read.

## NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

SUBSCRIPTIONS.—Subscriptions to SCIENCE-GOSSIP, at the rate of 6*s*. 6*d*. for twelve months (including postage), are now due.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

ALL communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to JOHN T. CARRINGTON, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

R. BORROWS (Darlington).—It is probably a nematoid or hair-worm. See p. 211 in this number.

MISS TEMPLE (London).—The enlargement of the thistle-stem is caused by a gall-fly. It is locally common, especially on the sea-walls and in meadows by the estuary of the Thames.

W. G. H. WILLIAMS (London).—The plant is common loosestrife *(Lysimachia vulgaris)*. It is frequently found by the banks of the Thames, and other streams and boggy places in rural districts.

### EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

OFFERED, Helix naso, latiasis, tayloriana, kubarzi, rehsei, broadbenti, Nanina cairnii, hercules and a few other rare species from New Guinea; desiderata, rare exotic Helices,—Miss Linter, Arragon Close, Twickenham.

WANTED, eggs of cuckoo with those of foster parents; good exchange in other eggs.—W. Wells Bladen, Stone, Staffordshire.

DUPLICATES of butterflies and moths for side-blown birds' eggs, one hole; send list.—F. J. Rasell, 67, St. James's End, Northampton.

OFFERED, about 50 micro. slides and a quantity of British shells. What offers?—E. Kitchen, 116, Eversleigh Road, Battersea, London, S.W.

PUPÆ menyanthides, vinula, quercus, carpini, freshly collected, for perfect insects, preserved larvæ, or beautiful shells, any size or kind.—J. M. McGregor, 30, N. Methuen Street, Perth.

LIMNÆA PEREGRA, var. burnetti, in exchange for other shells, British or foreign.—John Roseburgh, 54, Market Street, Galashiels.

EXCHANGE a few microscopical slides for others on approval; list of objects sent on application.—C. Lance, Brislington House, Bristol.

WANTED, dried specimens of sea urchins, star-fish and Crustaceans, also a good wasps' nest, in exchange for scientific books and micro. slides.—H. W. Parritt, 8, Whitehall Park, London, N.

WANTED, ½-plate lens, 5½-in. focus, for hand camera, in exchange for Rimmer's "Land and Freshwater Shells" or Williams' "Land and Freshwater Shells."—A. E. Kemp, 27, Birch Street, Ashton-under-Lyne, Lancashire.

VERTIGO EDENTULA, V. substriata, V. antivertigo and other shells offered for birds'-skins or eggs.—W. Gyngell, 5, Murchison Street, Scarborough.

A QUANTITY of well-mounted micro. slides in exchange for hand camera, books or offers.—A. Draper, 179, Cemetery Road, Sheffield.

WHAT offers for unused microtome, cost 18s.? Lists of Brit. Coleoptera or plants exchanged.—W. G. Woollcombe, 31, Prince's Road, Birmingham.

WANTED, good Trilobites, rare foreign shells and rare microscopic slides; state desiderata in exchange.—A. J. R. Sclater, naturalist, 43, Northumberland Place, Teignmouth.

WANTED, No. 301, January, 1890, of SCIENCE-GOSSIP; will give in exchange a useful pocket-box turned out of a piece of oak from the wreck of the "Eurydice," or cash.—C. H. Stephenson, Kew Road, Birkdale, Lancs.

GOOD micro. slides and unmounted material offered in exchange for similar objects; Foraminifera and objects for the binocular preferred. Lists exchanged.—A. Earland, 10, Glenwood Road, Catford, S.E.

OFFERED, "Cornhill Magazine," January to December, 1861, and 15 others; 24 numbers "St. James's Magazine" for 1861, 1862, 1863; 13 first monthly parts "Boys of the Empire," coloured, and rare duplicate mosses; exchange for Starks' or Hobkirk's book on mosses; shells, British or foreign mosses, birds' eggs, or offers in natural history.—J. Yates, Ellesmere Street, Astley Green, Manchester.

BACK parts of SCIENCE-GOSSIP, "Midland Naturalist," "English Mechanic," photographic and architectural journals, in exchange for back parts of archæological and antiquarian publications or traders' tokens.—T. Sladen, Conk Street, Leicester.

DUPLICATES.—Aippe, Selene, Edusa, Sibylla, Lucina, Ægon, Adonis, Corydon, Actæon, Russula, Fuliginosa, Viridata, Plumaria, Piniara, Obscurata and others; desiderata, British Lepidoptera.—S. Humphreys, 5, Regent's Terrace, Bournemouth.

SCIENCE-GOSSIP.—Wanted, vols. for 1875-6, or the nos. in those years which contain articles on the "Diptera"; exchange birds' eggs, Lepidoptera, etc.—Edwin E. Lowe, The Museum, Warrington.

WANTED, any Testacellidæ and living or spirit specimens of Testacella from as many localities as possible; exchange rarer British shells.—Wilfred Mark Webb, Editor "Journal of Malacology," Holmesdale, Brentwood.

WANTED, first-class microscopic slides for others, each on approval. I would be glad to correspond with my old friends of a few years back.—James Green, St. Peter's Road, March.

# SERPENTS' FANGS.

By Harold S. Ferguson, F.L.S.

THE general practice of dividing snakes into two divisions of poisonous and non-poisonous has been declared in the light of modern knowledge to be unscientific. It is well known that all poisonous snakes have poison-fangs which are grooved, and that down this groove is poured the poison into the wound made by the fangs; but it has been found that certain so-called harmless snakes are also possessed of grooved fangs. These fangs, unlike those of the very poisonous snakes, are situated further back in the jaw, hence the family of the Colubridæ to which they, equally with the poisonous sea-snakes, and the cobras, and bungari of the Elapinæ belong, has been divided into three divisions: the Aglypha—that is those not having grooved teeth—from two Greek words meaning "not" and "hollow"; the Opisthoglypha—those having grooved teeth situated in the back of the jaw; and the Proteroglypha, or those with grooved teeth in the front of the jaw. To the second division belong many of the tree-snakes, and Mr. Boulenger writes: "Experiments recently made on *Cœlopeltis*, a genus allied to *Psammophis* and *Dryophis*, have shown that these snakes are poisonous and that they paralyze their small prey before deglutition. It is probable that all snakes with grooved teeth will prove to be poisonous to a greater or less degree, as it is clear *a priori* that these grooved fangs are not without a function."

Another genus of tree-snakes, *Dipsas*, lends itself to this view, for the species comprising it have a repulsive look, and with their flat heads and grooved teeth might easily be mistaken for the deadly poisonous snakes. I have, however, never seen them exhibit any signs of having injected poison into their prey. The common green tree-snake of India is another possessing grooved teeth, but it is a very gentle snake, and the only one that the natives appear not to be in dread of, for they will handle it freely, though they take good care to tie up its head with a rag first. No other kind of snake will they on any account touch. The grooved teeth in this instance are quite at the back of the jaw. It is certain that the grooves must have been developed for some purpose, and it is therefore reasonable to conclude that they serve as poison ducts; but as far as one can judge from seeing these snakes feed in captivity, they simply seize their prey and swallow it at once without letting it go. There is no appearance of the prey, usually a frog, being paralysed by poison, and the whole act is performed so rapidly that there does not seem to be time for anything of the sort to occur; however, there are the teeth

There are then several degrees of perfection as regards poison-fangs represented in the teeth of snakes. First we have the grooved, fang-like teeth of the tree-snakes, whose salivary gland gives a secretion the properties of which can hardly be said to be poisonous at all, or, at least, only in a very slight degree, the fang-like teeth being situated behind on a lengthened maxillary bone. Then there are the deadly Elapinæ, whose poison-fangs are situated in front and the poison-glands of which secrete an active poison; here the fangs are more deeply grooved or folded over to form a channel; they are placed on the front of the maxillary, which has a slight power of movement; and lastly we have the highly developed poison apparatus of the vipers, where the grooving has been carried on so far that the two sides of the groove have coalesced and formed a complete channel, giving the appearance of a perforated tooth. In these snakes the maxillaries have a considerable power of movement, so that the fangs can be erected or depressed at the will of the snake.

To render these stages clear it is necessary to enter a little more into detail about the bones of the head of a snake. If the head of an ordinary harmless snake be examined, a bone will be found running from the point of the jaw as far back as the eye-socket, of which it forms the base: this bone is called the maxillary. In it are fixed a considerable mumber of teeth. It is joined to another series of bones, also studded with teeth, forming an interior row; the bone joining it is called the transpalatine, or transverse bone, and the bones holding this interior row of teeth are called the palatine and the pterygoid respectively. The latter extends backwards and meets a small bone called the quadrate, which unites it to the skull. This is the ordinary arrangement of the bones in the head of the common harmless snakes. Now compare the jaws of a cobra. Here the same three bones may be seen, the maxillary, the transverse and the pterygoid, but their relative proportions are considerably altered. The maxillary is much shortened and bears the grooved poison-fang, with only two or three solid teeth behind it; the transverse bone is lengthened, and as the maxilla and quadrate bones are movable on the skull, there is a power of movement of the fang through an angle of about forty-five degrees, so that in these snakes the fang is partially erectile. The perfection of mechanism, however, is reached in the vipers, especially in the Russell's viper of India. Here the maxillary is shortened excessively, and heightened so that it is higher than it is long. The transverse bone is proportionately enlarged and the maxillary is like the head of a hammer at the end of it. It bears the fang above, there being no solid teeth behind it. The effect of the snake opening its mouth is to guide forward the quadrate, which acts on the maxillary by means of the intermediate bar so that the lower side, containing the fang, is pushed forward and the latter can then be erected at the snake's pleasure by means of certain muscles. This movement gives the power of altering the position of the fang ninety degrees. When at rest, with the mouth closed, the fang is resting with its point turned backwards along the jaw towards the angle of the mouth, but when the mouth is open the fang can be erected at right angles to its former position.

In the sea-snakes, the maxillary is comparatively long, and there are two fangs with solid teeth behind. There is, in consequence, hardly any power of movement of the fangs at all.

A word as to the effect of the poison and the treatment. Generally speaking we may say that the poison acts upon the nerves, and that the patient dies of nervous exhaustion. Hundreds of antidotes have been tried, most of which have proved of no use whatever. Indeed, so little effect have they in India, and so eager were people there to proclaim, without sufficient trial, that they had discovered an infallible remedy, that the late Dr. Shortt, of Madras, who experimented for years on snake poison, had, at last, to require a deposit of fifty rupees before he would undertake to try the so-called remedy. This had the effect of checking the supply of pretended antidotes. The only remedy at present found to be at all efficacious is strychnine. This has proved successful in Australia, where the snakes are nearly all poisonous, and nearly all belong to the sub-family of the Elapinæ, that to which the cobra belongs, but their poison varies in its intensity, and none of them appear to possess a poison as fatal to man as is the cobra's. There are few cases on record of men recovering, into whose veins the poison of this snake has been injected. All the cases of so-called recovery are probably due to the fact that the snake has bitten without injecting poison.

As to the remedial action to be taken, it must be remembered that rapidity of application is essential. In man the circulation of the blood is completed in from twenty to thirty seconds. It is, of course slower in the capillaries, and proportionally more rapid in the larger veins and arteries. If then a man be bitten and the poison injected into one of the larger vessels death will come rapidly. If, however, the poison has only reached the capillaries the action will not be so rapid. Sir J. Fayrer recommends heroic treatment in cases of snake-bite, such as deep cutting of the wound, burning, and so on. All this will probably be found useless. The best chance for the sufferer is to suck the wound, if he can possibly get at it, and, as far as possible, to stop the circulation at the part by tying a ligature as tightly as possible near it. Medical aid should then be sought as soon as possible. The natives of India pin their faith on the efficacy of "munthrums" or charms. One once informed me that his uncle had been cured in this way. On enquiry, it appeared that his uncle had been bitten, but that he had not seen the snake that bit him. He was first taken to a woman charmer, who said she could do nothing for him. He was then made to walk twenty miles to another snake doctor. Arrived there he became unconscious, but soon recovered. Now, this is a case which clearly shows that if the man was bitten by a poisonous snake no poison was injected. For had it been he certainly could not have walked twenty miles. The symptons were due simply to imagination, which, it is well known, will cause such to appear. The man would have recovered without treatment of any sort, but his faith in the snake doctor did away with all the harmful symptoms produced by his imagination. As to the snake doctors themselves, they have a firm belief in their own powers, and are not actuated by mercenary motives in professing to cure their patients, for, as a rule, they do not receive any pay for their treatment.

*Trevandrum; October 7th*, 1895.

## A NEW BRITISH MOTH.

LEPIDOPTERISTS usually look forward each year to the addition of at least one species to the British faunal list. This season it is a handsome addition. On October 26th last, Mr. Thomas Salvage, of Arlington, in Sussex, which is a few miles north of Eastbourne, took in his garden a female specimen of *Mesogona acetosellæ*, Fab., and not knowing his capture, he submitted it to Mr. Robert Adkin, of Lewisham, with the rest of his this season's captures. The latter gentleman showed it to Mr. C. G. Barrett, who agreed it was that species. When at sugar its captor thought it was a very large specimen of *Tæniocampa stabilis*, which it rather resembles. *M. acetosellæ* occurs over the whole of South Central Europe, including Russia, but is locally distributed, rather than generally. It is not probable that this is by any means the first occurrence of this species in Britain, it being possibly overlooked on account of its late appearance in the season, and equally unlikely is it to be the last, because Mr. Salvage's specimen had deposited all its ova. It feeds in the larval stage upon oak, and has been seen on beech and blackthorn, as well as various low plants. At the end of May and during June, it pupates in the ground. The genus *Mesogona* follows *Pachnobia* in Staudinger's arrangement of the lepidoptera of Europe.

# PROTECTIVE COLOURATION IN BRITISH CLAUSILIAS.

By Wilfred Mark Webb, F.L.S.

THE notes that are made from time to time on the colouration of British non-marine molluscs are few enough and sparse enough, to be sure, but even these as a general rule, deal only with the tints or markings themselves, and not with their significance. Indeed the difficulty of ascertaining the conditions of existence to which the Mollusca in general have to conform, makes the knowledge on questions of colouring in the group exceedingly limited, and the literature on the subject exceedingly scattered. For these reasons it may be of interest to chronicle a resemblance to its surroundings, presumably protective, in the case of *Clausilia biplicata*, Mont., recalled to mind by a futile attempt to visit a well-known locality for this rare snail. The fact that experienced collectors are often taken in—and in such instances, there is a secondary, if not a primary pleasure when the deception is discovered — gives considerable weight to the "tit-for-tat" argument that the mollusc will in turn be mistaken for the object which in the first place was mistaken for it.

At various times the writer has collected some hundreds of specimens of *Clausilia biplicata* on the southern banks of the River Thames, in a spot once a swamp, now "improved" by the contents of many dust-heaps, fenced in and made useful, and from first to last he was often deceived by the shrivelled bud-scales presumably of the old osiers at the bases of whose stems the sought-for molluscs lived. In connection with this fact, one must mention a case in which the bloom-sheaths of the black poplar were taken for two slugs *Arion hortensis* and *Agriolimax agrestis*. (G. Sherriff Tye: "On a case of Protective Resemblance among Slugs."—"Journal of Malacology," vol. iii., 1894, page 21.) Mr. Tye, who fancied he saw a number of these slugs in his garden, says, "I thought this a fair opportunity for giving our pet thrush and blackbird a treat, so I 'went' for those slugs, but was surprised to find that I had been deceived —they were poplar budsheaths."

The fascination which the discovery of protective resemblances has for the biologist, makes it difficult for him to abstain from jumping to conclusions or from formulating theories based upon insufficient facts, but one may make the suggestion that *Clausilia biplicata* gains some advantage from its likeness to the bud-scales, and that there is here a case of protective resemblance as strong as that given by Mr. Tye. Mr. Sheriff Tye is not, however, quite technically correct in using the term, "protective mimicry," mimicry being restricted to cases where an animal derives a benefit from resembling another which possesses some special life-preserving quality. At the same time, the preference which the British Clausilias have for the neighbourhood of tree-trunks must be remembered, and following up the suggestion thrown out, it may be noted that the shell of *Clausilia laminata*, Mont., for instance, is comparatively smooth and generally resembles the bud-scales of the beech, a tree under which it is commonly to be found. With regard to *Clausilia rolphii*, Gray, there is another feature which it may not be out of place to mention here. The shell in this species, which at first is dark-coloured and glossy, rapidly takes on, when it has reached its full size, a dull and weather-beaten appearance: indeed, out of some sixty specimens collected by writer (Wilfred Mark Webb: "Mollusca at Limpsfield, Surrey, April, 1887."—Science-Gossip, June, 1887), only six retained their youthful brilliancy. Here there can be no doubt that through this weathering, which harmonized completely with the dead alder-twigs among which the colony lived, the same end is attained as by the covering of the shell with mud by *Buliminus obscurus*, Müll., and other molluscs.

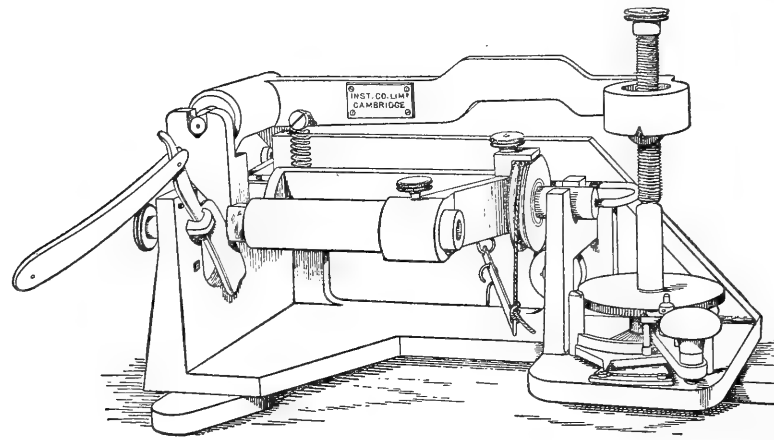
It is always being brought home to those who work for the advancement of biology, that what appears to them to be the easy and pleasant work has been already done, while the difficult subjects only lie before them for investigation, but if the question of the significance of colour be complex, it has at least an interest attached to it which cannot easily be surpassed.

Since the above lines have been put into type, the writer's attention has been called to a note read by his friend, Mr. Miller Christy, before the Essex Field Club, in 1882 (Proc. Essex Field Club, vol. iii., pages xcii.–xciii.). The following extract may be given: "Of the habits of *C. biplicata* in this country I know nothing, but on the Continent it lives upon wet rocks. Of the remaining three species, *C. rugosa* may be described as very common, *C. laminatata* as common, and *C. rolphii* as rare and local. It is a well-known fact that all three frequently live upon or under beech-trees. I have collected them all in such situations, the first two abundantly, and the last more sparingly, among the numerous clumps of beeches which fringe the Northern edge of the South Downs. Now, the bud-cases of beech-trees are in shape long and pointed, and in colour hazel-brown, thereby resembling very closely, in these particulars, as well as in size, the shells of the Clausiliæ, so that, at a glance, the difference between the two might easily be overlooked, and it seems to me that there may be something in this fact more than mere coincidence. These sheaths or cases fall off the buds in spring, and throughout the summer thickly strew the ground below the trees where the Clausiliæ live among the dead leaves." In the discussion which followed, it transpired that Mr. Christy remembered having found the shells of one species in the gizzard of a blackbird, which goes some way to prove the need of protective resemblance by Clausilias.

*"Holmesdale," Brentwood, Essex.*

## AN IMPROVED MICROTOME.

GREAT advances in recent years have been made in microtomes; it is not so many years ago that the internal structure of any soft animal tissue could only be examined by cutting sections by hand with a razor and mounting each section separately before examining it under a microscope. Skill was required in cutting these sections, and it was a slow process even with the most dextrous person. The sections were thick, no two sections were of the same thickness, and no section was of uniform thickness throughout. Some extremely good work was no doubt done in this way, and much new knowledge was obtained of the internal structure of small bodies. Early section-cutters were a great advance on hand work, the sections were far thinner and were of uniform and equal thickness, but each section had to be removed and mounted separately. In the latter forms, however, the "ribbon method," introduced by Mr. Caldwell, is used, and the time previously spent in the individual cutting and manipulation of each section has been saved. This point is in itself of great importance, but it is of no less importance that it is now easy to arrange hundreds of sections on one glass slide in rows, in the order in which they are cut. A whole series of sections are thus studied by merely moving the glass slide along and examining each consecutive section as it comes into the field of view of the microscope. The ribbon method is most simple: the object is embedded in a block of melted paraffin, and when set, the edges are cut so that the object is in the centre of a rectangular block. The outside of this block is then coated with some soft paraffin; the effect of this is, that when the sections are cut they stick together at their edges and form a ribbon. The ribbon can then be mounted in strips on the glass side ready for the microscope. When we consider the thinness of the sections and that they are only held together by the soft paraffin at their edges, the strength of the ribbon as well as the ease with which it can be manipulated, is most remarkable. It is not difficult to cut sections ·0001 inches thick with the modern microtome, and we will give an example to illustrate what this means. Suppose we take an ordinary paraffin candle and cut it up into sections of this thickness. We will suppose the candle to be 10 inches long and $\frac{7}{8}$ of an inch in diameter, this being the size of an ordinary candle. This would then cut 100,000 sections; if these sections were placed in a row touching each other, the row would be just over $1\frac{1}{2}$ miles long.



ROCKING MICROTOME, NEW PATTERN TO CUT FLAT SECTIONS.

The original rocking microtome was first brought out by the Cambridge Scientific Instrument Company, in 1885, and was one of the earliest section cutters using the ribbon method. It differed entirely in design from all other section cutters which had been made up to that date; it is, however, so well known, that we will not describe it in detail, but content ourselves by stating some of its special points. It first strikes one in appearance as more like an engineering tool than a scientific instrument, it has a heavy cast-iron frame and lacks the flimsy and brilliant appearance so characteristic of many scientific instruments. The essential parts are carefully made, but the rest is left rough and painted. It is clear that in designing this instrument, an appreciation of the importance of extreme stiffness was necessary, and hence the heaviness of the base. The "five point" or kynematic principle has also been largely used; that is, the moving parts are each supported by the requisite number of points to give the required freedom of motion and no more. This prevents any bending of the pieces, and ensures the absolute identity of two consecutive movements. This latter point is all important when we are dealing with such small quantities as the difference of the thickness of sections. The arrangement also for advancing the object the required amount after the section is cut, is new and works extremely well. The new pattern rocking microtome, of the same company, has many of the features of the original, but with one fundamental difference, the sections are perfectly flat. The sections in the original instrument are parts of a cylinder of radius ninety millimetres, and no doubt that with larger objects, such as can be cut with the new instrument, such a curvature would be a disadvantage. It is easy, however, to make too much of this point. If we have an object five millimetres wide in the old rocking microtome the extreme edge of the section will be ·034 millimetres distant from the flat surface. It is clear that it would be difficult not to distort any soft substance far more than this in mounting it in the paraffin block, and hence the error caused by the old microtome not cutting a truly plane section must be of little or no importance in most cases. Sections as large as thirty millimetres in diameter can be cut with the new instrument, and an object twelve millimetres long can be cut throughout its whole length without readjustment. The thickness of the sections can be read off a graduated arc at once, which, no doubt, is a great convenience. The object can be clamped clear of the razor, in which position it can be easily manipulated. The razor also can be clamped either at right angles to the direction of motion or else diagonally, so as to give a slicing cut, also by adjusting two screws the razor can be tilted so as to increase or diminish the amount of clearance between its back and the object.

## THE NEW LEPIDOPTEROLOGY.

MR. EDWARD MEYRICK has raised a standard of revolution in the land, and we have no doubt that there will be a considerable rallying of supporters. In fact, in general principle we should be among them, though after careful perusal of his new book ("A Handbook of British Lepidoptera," by Edward Meyrick, B.A., F.Z.S., F.E.S., Assistant Master at Marlborough College, 847 pp. large 8vo, illustrated. London and New York: Macmillan and Co., 1895. Price 10s. 6d.) we have come to the conclusion that the author will in a few years, as he extends his investigations, modify some of his conclusions with regard to certain British species.

Mr. Meyrick has produced the most advanced book which has been written during the present half century upon the British Lepidoptera; and though it will severely shock adherents to the old school to find the arrangement of our species commencing with Caradrinina,—the first in the list being *Oeonistis quadra*, with the butterflies wedged in in the middle of the book between *Gastropacha quercifolia* and the Pyrales, we consider that he is upon the right road towards scientific grouping of our moths and butterflies. From the preface we learn that the system of classification adopted by the author, though now fully published for the first time, is not based on the British species only, but is the outcome of his study of the Lepidoptera of the whole world.

The table of genera in his group Caradrinina includes *Sarrothripus*, *Halias*, *Hylophila*, *Lithosia*, *Oeonistis*, *Earias*, *Roeselia*, *Nola*, *Coscinia*, *Nudaria*, *Arctia*, *Uraba*, *Diacrisia*, *Phragmatobia*, *Tyria*, *Gnophria*, *Cybosia*, *Setina*, *Miltochrista*, *Callimorpha*, *Utetheisa* and others, including the genus *Plusia*. Following Caradrinina comes Notodontina with a number of genera which are now arranged among the Geometers, as well as Saturniadæ, Sphingidæ and others. Third is the group Lasiocampina, then follows Papilionina, which contains the butterflies, commencing with the Nymphalidæ, *Anosia erippus* (= *plexippus*) taking first place; *Argynnis* is next, followed by *Melitaea* and *Vanessa*. The genus *Lycæna* is divided with *Chrysophanus*, which includes *argiades*, *minimus*, *semiargus*, *astrarche*, *phlaeas* and *dispar*. The remainder of the blues are under the generic name *Lycæna*. These are followed by *Colias*, *Gonepteryx*, *Euchloe*, *Leucophasia*, *Pieris* and *Aporia*. Then follows *Papilio machaon*. The next are the Hesperiadæ, at the end of which we find *Pamphila*. Group number five is Pyralidina; number six is Psychina, a curious group, for it includes the genus *Psyche*, *Zeuzera pyrina* (*æsculi*), *Phragmatæcia* *castaneae* (=*arundinis*), also the "burnets" the genus *Procis* and *Apoda testudo*. Group seven is the Tortricina, the arrangement of species therein being entirely different to any previous formulation, and we properly find among them *Cossus*. Group eight is the Tineina, led by the clear-wings which are followed by the Gelechiæ. Group nine are the Micropterygina, which includes the swifts, and the very different looking genera *Micropteryx* and *Eriocephala*, at present to be found among the Tineina. The plumes are among Pyralidina. Besides great changes in arrangement, our author introduces many alterations in nomenclature, some of which, especially among the genera, can only be followed by looking up the species included, for few synonyms are given.

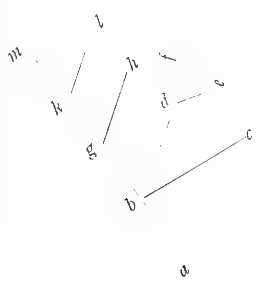
The introduction to this work is evidently the result of much thought, and as an essay upon the Lepidoptera is well worthy of our consideration, though we do not see in it much that has not already been set forth by advanced thinkers and workers in this division of biology. It was, however, only a question of time for such a book as this to be produced, all others hitherto published pertaining too much to the school of "collectors" which became so active about the time when the late Mr. Stainton published his "Manual," and the days of the "Intelligencer." Stainton's work, from a scientific point of view, was a great advance in its time, but with the organised plan of modern research and correlation of the information gained thereby, the arrangement at present adopted by our lepidopterologists was bound to be revised. For instance, it is only comparatively recently that they have discovered a perfect method of denuding the wings and studying the neuration of the Lepidoptera. Until then it had not received the attention which its importance demands.

The author will, we feel sure, permit us to quote from his introduction, paragraphs which will show the foundation on which the book before us has been raised. The introduction commences in the orthodox manner of stating of what the Lepidoptera consist. Then comes the structure of the imago, which is carefully worked out, each part of the animal being separately dealt with in a scientific manner, to quote, for instance, "the wings were perhaps originally tracheal gills, respiratory organs, afterwards modified for purposes of locomotion. In form they vary from triangular to almost linear, but the triangular shape may be taken as typical. The junction of the wings with the thorax is the *base*; of the two other angles the upper is the *apex*, the lower the *tornus*; of the three sides the upper is the *costa*, the lower the *dorsum*, and the outer the *termen*," and so on. The neuration is carefully described and illustrated by figures of the anterior and posterior wings of a lepidopterous insect, with each of the nerves numbered for reference. In going through the work, it will be found that the various families have the neuration typically figured; as the system of arrangement is largely founded on these features.

Shortly dealing with the pupa the author treats on the larva and ovum. Then comes variation, on which he remarks: "Probably variability is an original characteristic of all organisms; but the laws of inheritance, and the favouring of a particular type by natural selection, have tended to produce constancy. This constancy is, however, often imperfectly realised; that is to say, all insects show more or less variation in some particulars. Thus there is always some variability in size and proportions, often also in colour and markings. Variation in structure is less common; in certain groups there is variability in some details of neuration. Allied species may be expected to vary in the same way, but otherwise experience is the only guide, the same characters which are absolutely constant in one group being often highly variable in another. Varieties may be broadly classified as being of two kinds, viz., gradual and sudden; the former being connected with the type form by numerous slight and intermediate gradations, the latter not so connected. The former kind represent the outcome of those subjective tendencies to variation which have not been eliminated by the working of natural selection, and may be termed normal; whilst the latter are apparently due to some objective interference with the process of development, and are in that sense abnormal, the line between these two classes is not always easy to draw in practice, but the distinction is real. Gradual varieties attached to a particular locality or region are called local or geographical forms; those occurring at a particular time of year seasonal forms. Variation caused by the failure of colouring matter is termed albinism; that due to an excessive prevalence of black pigment is melanism; but the application of these terms to varieties which are merely lighter or darker than usual is erroneous. Specimens showing sudden variation in colour or marking are commonly termed aberrations; in structure, monstrosities. The most common examples of monstrosity are produced by multiplication of parts, as when an insect possesses an additional leg or vein; or by gynandromorphism, the term used when an individual of one sex exhibits on one lateral half the organic characters of the other sex, more or less completely."

In dealing with the principles of classification, Mr. Meyrick remarks that: "(1) No new organ can be produced except as a modification of some previously existing structure. (2) A lost organ cannot be regained. (3) A rudimentary organ is rarely redeveloped. . . . In applying the above-mentioned laws in practice, it must be constantly borne in mind that because two genera are more closely allied together than to any other, it does not follow that either is descended from the other; it is very frequently the case that both are equally derived from a third genus now no longer existent. . . . In determining the relative value to be assigned to different characters for the purposes of classification, those characters which are adaptive, *i.e.* liable to be affected by external agencies through the means of natural selection, are generally very untrustworthy. Conversely, a character which seems of little physiological importance, and not easily modified by ordinary external influences, is commonly of especial value. Thus colour and outline, the hairs of larvæ and the genital organs of imagos, are likely to be of slight importance in the definition of groups; whilst neuration occupies a high position."

The division headed "Phylogeny" (or the scheme of descent of a group) is carefully written. Under "Method of Arrangement," we find our author, saying, "the natural order of arrangement, which is that of a much-branched tree, cannot be adequately expressed by a simple linear succession, such as is alone practicable in a book. It is, however, possible to devise a linear succession which shall be consistent with the natural genealogical order, if some additional explanation can be given." This, we find, he has done by means of a simple figure, which we reproduce. "Suppose the




accompanying diagram represents a portion of the genealogical tree: then the order will begin at *m* and descend to *k*, recommence at *l* and descend to *k* and thence to *g*, recommence at *h* and descend to *g* and thence to *b*, recommence at *f* and descend to *d*, recommence at *e* and descend to *d* and thence to *b*, recommence at *c* and descend to *b* and thence to *a*, and so on. Thus the order begins with the most recently-developed forms and descends gradually to the earliest, or most ancestral, which are the last in the book. To understand the order in practice, it may be assumed that each genus is descended from that which immediately follows it in the book. This system has been adhered to throughout, and after a little use will not be found unintelligible. If adopted in the arrangement of a collection in the cabinet, it would be a good plan to indicate the recommencement of a fresh branch by a special mark, such as a red bar drawn across the first (or highest) species. In the arrangement of species within each genus the same plan has been followed; but since a more intimate study of very minute points than has been here possible would be required to ascertain accurately the mutual affinities of forms which are often very closely related together, it has not been thought necessary to enter into a very precise explanation of their order."

In our opening paragraph of this notice of Mr. Meyrick's book we refer to his having written it somewhat too early for his experience. What we mean is summed up in the last sentence quoted; and we may at once state that although we consider the general plan of his work good in theory, before it can be generally accepted it will require not only much more attention to detail on its author's part, but all the assistance and experience that others can give him in this direction. The tendency to "lump" together species is too evident, and we doubt whether the author's familiarity with our British species is sufficient to make his classification accepted without much question. While holding Mr. Meyrick's thoughts and work, as expressed in his book, with high respect, we feel that he has not taken into consideration a sufficient number of characters to found a system of arrangement which will last without modification. No one series of characters, whether they be of structure in the perfect stage, pupa, larva, or of the ovum, or, indeed, any one other series will found a basis for classification. Our view is that he has depended too much on neuration, important as is that feature, to the exclusion of other points equally worthy of examination. This refers especially to his group Psychina. The descent of some of our species, if defined by neuration alone, is belied when we examine the structure of the earlier stages and the life-history of the animals. As a model of what a student's manual should be we consider Mr. Meyrick's handbook to be almost perfect. The tabulation is good, the system of description excellent, and the absence of repetition remarkable. The pruning process after writing must have been unsparing, and if the book has a fault in construction it may be attributed to over-condensation; but this is a doubtful fault.

We believe this book will give a great impetus to the *study* of the lepidoptera apart from their collection and arrangement in "rows." It will do more to effect this than all the scorn of workers in other groups of biology, who have too readily referred to lepidopterists as only "fly-catchers," though not without reason.

It was necessary for some one to do this work in the first instance, and we congratulate Mr. Meyrick on its production, for, as we have said, the raising of the standard of revolution in the science of lepidopterology has come, and having once been raised, we seriously doubt whether any amount of conservatism or prejudice on the part of lepidopterists of this country can extinguish the fire which the author of this book has fanned into a blaze of light. The material for such fire has long been ready, and Mr. Meyrick will find a large number attracted to the beacon.

JOHN T. CARRINGTON.

THE Department of Agriculture at Washington has publishad a "Revision of the Aphelininæ of North America," by Mr. L. O. Howard, Government Entomologist. It is the first number of a proposed technical series of bulletins, intended especially for working entomologists, learned societies and libraries. It will form a most valuable contribution to the literature of scientific entomological research. The Aphelininæ are a group of very minute hymenopterous insects of great economic importance, since they comprise the parasites of destructive scale insects.

# NOTES OF A HOME NATURALIST.

By Mrs. Emily J. Climenson.

SINCE my return, at the end of August, from South Devon, I have set a few aquaria going again, and, in the first week in September, I caught one day, in one ditch, three most curious water-boatmen. They were not quite as large as *Notonecta glauca*; about half an inch long, their bodies more convex, they had curiously marked brick-red eye-places, the upper part of the back had a sort of exquisite mother-of-pearl appearance, with a sea-green under-colour, the end of the back had distinct stripes (foundation colour) of a sort of chocolate-coloured brown on sea-green.

That they were *Notonecta*, and not of the family *Corixæ*, was proved by their swimming on their backs with the same long-feathered oar legs as ordinary boatmen. Now, not in any of my books can I find a description of these insects. I fed them with ants'-eggs and a little meat. In changing them into a fresh-water jar one day I received from one a sharp sting from its rostrum, or beak, on the palm of my hand; the pain lasted for some seconds, when it ceased, but left a slight mark and redness. They lived for some weeks and then died. Since that I caught one other, but that soon died. They seem more difficult to keep alive than the ordinary *Notonecta glauca* which I find easy enough. At the same time I caught two water-scorpions *Nepa cinerea*, in adult condition. These lived in a glass jam-jar. One morning, on uncovering the jar, I perceived what I thought was a dead scorpion, but which proved to be its cast skin, which was so extraordinarily perfect—legs, tail, antennæ—all neatly skinned like a cast-off glove and no split visible to the naked eye. The scorpion which had shed his skin was easily recognized, looking much larger for his moult. I foolishly left off covering the jar with net, and the scorpions escaped, though the jar was not full of water.

On September 27th, I perceived, in a deep glass jar in which I keep water-spiders, a creature entirely new to me, and a rough sketch of which I enclose. It was a yellow leather-colour sort of tube, with a literal hump or knob sticking out of its side. At the top of the tube were seven tentacles which seemed to be placed at equal distances, and were slightly bent at the ends. This was all I could find out with a powerful pocket-lens. The body, with tentacles, was not half an inch long. With some of the tentacles it clung to the side of the glass, whilst with the others it seemed to feel about for prey. Unluckily, I could not remain long to watch it, and on my return I could not find it again. Since then, in a jar containing duck-weed, water-fleas, a few small leeches, etc., I have again perceived the strange creatures I first saw on April 7th this year,—the shape and colour of a screwed-up tea-leaf, or what is familiarly called "a stranger," not above five lines long, a blackish brown, and, as far as I could see, with four tentacles. They move in the water in a vertical manner, slightly working upwards, and in this position move fairly rapidly; when not moving they hook themselves on to the duck-weed underneath the leaves and then they resemble tiny sticks. Yesterday, October 15th, I saw one out of the three that I have perceived in the bottle, clinging to the side of the glass, obviously with two of the tentacles and feeling about with the other two at the same time. For the last week one has been increasing in size, and the top of the tube, or what is the head, I suppose, presents a whitish, swelled, sucker-like appearance. It is anchored against the glass, and I suspect it must be a female and that probably this increase in size and width may mean cellular division. From their minuteness they would be difficult to pack for recognition, but if any reader of Science-Gossip would tell me what they are I should be glad.

This season is certainly different from ordinary ones. The white Scotch roses, Persian-yellow briars, both single and double, the large white and mauve briars, have been in bloom ever since the end of August for the second time. We have had green peas which ought to have been ready in June, but which the drought checked. Apples, pears, plums and nuts are in great abundance here. Several instances of raspberries and strawberries being gathered ripe in the last month in the neighbourhood have come to my knowledge, and my "hen and chicken" daisies have been in bloom, evidently puzzled at what time of year they had arrived at.

On October 16th we found a perfectly ripe strawberry, two inches across, and a ripe raspberry in a garden belonging to us, also some apple-blossom, but more curious still, the same day a linnet's nest was spied in a plum-tree; on investigation three eggs were found in it. On the 18th these three eggs were hatched out, and the young birds continued to flourish till the cold weather set in on October 26th, when after a short struggle for existence the little birds died, despite of the mother's attention and care, and though alive on the 28th were found dead a day or so after. The cold was so great on October 26th, with twelve degrees of frost the preceding night, that though in a solid brick summer-house, my aquaria were all frozen over, and the glass jam-bottles, in which I keep small specimens, which were on a shelf at entrance of the summer-house, were not only coated but lined with ice. In some cases the creatures, such as *Corixa notonecta*, etc., were frozen to the ice at the sides of the bottle. I removed the ice and strangely enough, none of my frozen creatures died. The next few nights I placed coarse green tarlatan over the aquaria, and slight as the protection was no more ice was formed. We have now in the garden a pair of squirrels and a pair of nut hatches, both squirrels and birds have hoards of nuts in a grass bank of some three feet high that borders a rose bed. These they visit continually, and the nut hatches have found a convenient cleft in one of the cedar-trees close by in which they place the nuts to hammer with their strong beaks. Under the tree is quite a large litter of nut-shells, and as they are mainly American cob-filberts coming from our nut walks, which are much harder than ordinary hedge-nuts, the strength of a nut-hatch's bill can be readily appreciated.

On November 14th two tiny water-spiders appeared for the first time in one of my bottles in which some duckweed lies on the surface. I look upon duckweed as a real *mater genitrix* of all sorts of creatures, for as sure as one places some in a bottle of water and leaves it alone, will something or other appear from it, and for weeks, aye, months, one may, each few days, see something evolved from it afresh. As I do not think my very simple small aquaria jars are commonly kept by nature lovers, I may state that unless they contain creatures that require feeding I seldom empty them, and only occasionally put a little water in to freshen and replace the waste from evaporation. If I wish to exchange the water without disturbing the inhabitants I place a piece of fine Brussels net over the bottle and carefully pour away what I wish, the net preventing loss of any perceptible object.

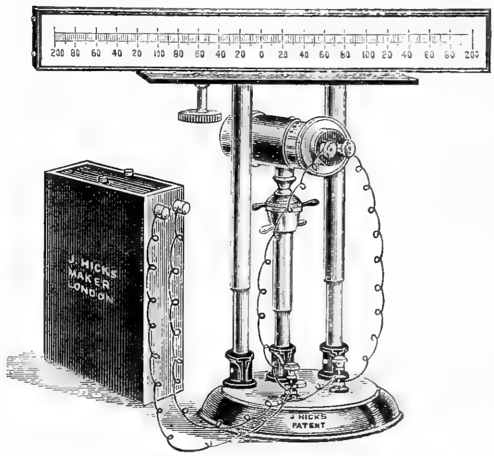
My old water-spider which lives in a glass to himself, together with the two babies in their separate glass are at this time of year very comatose, and close themselves tightly in an air bubble amongst the weed. In fact, yesterday I thought one of the little ones had disappeared, but on taking out a sprig of anacharsis I found him tightly fastened into a fold of a leaf. On being taken out he assumed the lovely grey bloom, like a plum, that a water-spider presents on being removed from the water.

Water-spiders which are caught at the same time will live occasionally in amity, but seldom if caught at different times, the elder inhabitant deeming fresh arrivals intruders. My spiders' commissariat is furnished by mixing with the river-water some stagnant water containing *Daphnia cypris*, and other small fry, also, when plentiful, a few dead flies, earwigs, etc., for the large spiders; the little ones apparently feed on creatures too small to be seen by the naked eye.

*Shiplake, Oxon.; November*, 1895.

## GALVANOMETER SCALE AND LAMP.

A NEW galvanometer scale and lamp has been patented by Mr. James J. Hicks, of London, upon Burstall's invention. We have had an opportunity of examining the instrument, which is remarkable for its portability and convenience for packing. The chief feature is that this instrument works with perfect facility either in daylight or in




BURSTALL'S GALVANOMETER SCALE AND LAMP.

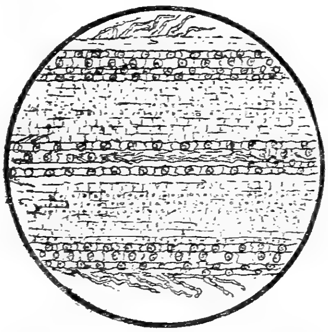
a brightly illuminated room. The focussing tube is carried on a ball joint. By means of a sliding tube it can be set at any required height, and when the exact point has been attained, the movable points can be locked, when focussing proceeds without fear of the spot moving on the mirror. The scale is divided in millimeters, and can be adjusted both vertically and horizontally. The source of light is a small incandescent lamp, worked by storage batteries; a fine line is etched on the object glass, and this line is focussed on the scale. The instrument constitutes a marked advance on anything of the kind hitherto produced. Its cost is £10 7*s*. 6*d*., with accumulator and extra lamp.

REVERSED HELIX HISPIDA.—In the October number of "The Annals of Scottish Natural History," Miss Janet Carphin, of Edinburgh, records the discovery, in July last, in Berwickshire, of a reversal specimen of *H. hispida*, which she thinks is unique, at least as no mention occurs of the var. *sinistrorsum* for that species in the Conchological Society's "List of British Land and Freshwater Mollusca."

## THE SHE OAK.

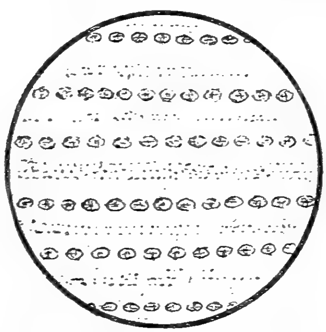
By Thomas E. Amyot.

THE Parish of Winfarthing, near Diss, in Norfolk, celebrated for its huge and venerable oak which was an acorn some fifteen hundred years agone, is also the home of another so-called oak, though why so called it is difficult to say, for it bears no more resemblance to a member of the genus *Quercus* than does the *Anustatica* to the Jericho or any other kind of rose, or a conger-eel to an Alderman's turtle, for which it seems to be



Magnified Flinty Skeleton of *Casuarina*.

frequently mistaken. However, in an unfurnished room of the Old Oak Farm grows this "she oak," alias a "beef-wood," or a "Botany-bay oak," otherwise "ironwood tree," known in science as *Casuarina*, the seed of which was brought over from Australia by the uncle of the present occupier some thirty or forty years since. It is now as high as the room will allow it to be, and judging from its appearance it has no disposition to grow higher. It is fairly healthy, and hangs its graceful horse-tails over a considerable area of floorage, bearing



Magnified Flinty Skeleton of *Equisetum*.

its fruit in due season. Never having travelled in Australia or the South Seas, and having probably overlooked the plant in greenhouses, owing to the attraction of others of more brilliant colouring, its extraordinary resemblance to the Equisetæ of our banks and ditches engaged my attention. This resemblance is said, in the modern botanical books to which I have access, to be merely superficial, but one striking character at least is common to both the orders, Casuarinaceæ and Equisetaceæ, the possession of an exceedingly beautiful flinty skeleton which is easily obtained by boiling in nitric acid. In both the details of structure are perfectly preserved, and in both the stomata are arranged in parallel rows. Their beauty would be enhanced by staining and the polariscope, for simply mounting in balsam renders them too transparent.

There are excellent descriptions of the Casuarina by Humboldt, Burnett, Lindley, and many other writers; but I have not found any reference to the silicious skeleton, though in one recent book its absence in this order seems to be alluded to as a diagnostic mark between it and the horsetails; and this must be my excuse for troubling you with this paper. A transverse section of the young but exceedingly hard wood shows central pith-cells, medullary rays, some few of which are far coarser than the others, and what Gœppert calls illusory concentric rings, that is rings that certainly do not mark annual growth. Persons of certain taste may be interested to hear, on the authority of Dr. Masters, that the Australian cannibals make forks, wherewith to eat their enemies or troublesome friends, of this very hard wood, and hand them down as precious heirlooms to their children. No other meat is eaten with them.

*Diss, Norfolk; October 7th*, 1895.

## UNANSWERED QUESTIONS IN BOTANY.

By John H. Barbour.

THERE are within the field of botany so many queries which require an explanation, that it is difficult for one to know which to take up and try to solve. Many of them are well-known to all your readers, others are only to those who have made the subject their especial study, but many an amateur botanist, all whom I conclude are among your readers, is eager to do something toward the solution of some of the problems. Many of them, however, cannot make up his or her mind what is best to work at, and it is for such that the following hints may be helpful; although I do not suppose that any of those of the second head will think them altogether beneath notice. In themselves they are of vital importance, but for their solution they require only a moderate expenditure of money combined with a large amount of careful watching and observation. If we look, for instance, at the Confervaceæ among algæ, we do not yet know whether they all have a sexual reproduction. We do know that *Ulothrix*, *Sphæroplea*, *Œdogonium* and some others have, but this does not prove that it is so in every instance, although a possible surmise is that there is; this too is the case in our common *Laminaria* or tangle-weed. Since tangle-weed is so abundant on our seashores a chance is given to all near the sea to observe it carefully and easily. In *Cutleria* we have yet to find out how the thallus arises from the straggling shoots which spring from the oospore: It has been suggested that it does so from ciliated naked cells, but no satisfactory proof of this is forthcoming. Even the Fuci are unknown to us in this respect also; theories are constantly being brought forward, only to be considered wrong.

Passing on to our fungi, most of us are aware that there is a degeneration of sexual organs, such as is sometimes found amongst animals, in some of them; but in many cases we are not sure whether a communication exists or not in the male organ (antheridium), or whether the fertilizing protoplasm passes through this communication or through the closed cell-wall of the antheridium into the female organ (oosphere). Such a doubtful stage is seen in *Peronospora*, a parasite in the tissues of dicotyledonous plants. The abnormal formation known as "bladder plum" in some fruits is due to a fungus termed *Exoascus*, which has a mycelium of unbranched septate hyphae, and this spreads around and through the fruit, causing it to swell up immensely. Though we know so much about this fungus and its peculiar ascus fructification, we have still to answer, how does this fungus penetrate into what is, apparently, a healthy tree? The disease known as "rust of wheat" is very easily procured in the right season, and though it has been much studied as a type of a group of fungi our attention has still to be given to the spermatia formed on the hyphae in cup-shaped receptacles (spermogonia) to find out whether they are of any use in fertilization or whether they fertilize at all. In lichens and red seaweeds they pass down the trichogyne to the carpogenous cells, and this suggests the possibility that here also they may be a useful product of energy. Our mushrooms furnish queries no less interesting. Has the *Agaricus*, with the veiled fructifying surface, developed from the one with the unveiled, or *vice versa?* We see an intermediate form in *A. campestris*; but how or why has this change been brought about? Is it for defence, or has climate been a main agency? Protection is required, but fertilization much more so. It appears to me that in whatever way we look at it the fertilization question is the main cause in this case.

The adder's-tongue fern (*Ophioglossum*) and moonwort (*Botrychium*) form another opening for the interested botanist. Only in *Ophioglossum pedunculosum* and *Botrychium lunaria* is the prothallium known to any extent. In the former it is a prosenchymatous tuber with stout shoots and no chlorophyll, while in the latter there is an oval body, brown externally, white internally, bearing rhizoids: *O. vulgatum* is at present an enigma to solve, and in fact a further investigation of all the above Filices is desirable. Many of our club-mosses (Lycopodiaceæ) are entirely unknown to us in their germinating stages; Dr. Bary has observed the development of the embryo of L. *inundatum* partially; other observers have seen a further developmental history in foreign species, but in no one species does the whole cycle of development seem to have worked out in its entirety. Many points of interest might be pointed out in *Selaginella* and *Isoetes*, but I think that enough has been said to offer paths among the Cryptogams for the student to tread, and in conclusion, though I need hardly do so, since so many things will suggest themselves to the reader ere he is half through this article, I will mention one or two instances which come to my mind just now about the Phanerogams.

The Onagraceæ, as well as most other orders, have been subjected to most minute examination in regard to their pollen-grains, their structure, origin and growth, but in some plants of the above family we often find more than four chambers, and we require a further knowledge of the development of other organs of this family, besides an explanation of the above facts. Again in the Santalaceæ, which includes the bastard toad-flax, etc., while the general rule is two synergidæ and one oosphere in *Santalum*, we have two oospheres placed far down in the embryo sac, below the synergidæ. The contents of the pollen-tube, when it is applied to the summit of the embryo sac, reach one of the synergidæ, both of which then disappear without developing any more, and the oosphere developes into the embryo without coming in contact with the pollen-tube. How do the synergidæ convey the fertilizing material of the pollen-tube to the oosphere, and what is the origin of the two?

It is not by the working of a few that the above questions are to be answered, but by the individual endeavours of all lovers of the field. Not by one observation, but by successive ones, made under different conditions and by different methods. I might have made the Bacteria another group, which we might consider, but I felt that to the amateur it would be almost useless; the study of Bacteriology is, comparatively speaking, only in its infancy, and we require powerful microscopes and elaborate cultures, in most cases, before we can attempt, with any degree of satisfaction to ourselves or others, to observe them. Therefore, it appears to me, we are forced, unwillingly often, to leave them to the professional man, or to the man of research, who has both time and money at his disposal. Let us hope that before very long, ways will be opened up to all to gain a fair knowledge of this most interesting branch of botany, but till then, there will always be more than enough of material to occupy the amateur in his leisure hours.

*Queen's College, Belfast.*

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

(*continued from page* 203.)

## The Sycamore.

THE leaves of the sycamore (*Acer pseudo-plantanus*) are opposite in pairs, each pair, as in the ash-tree, standing at right angles to the pairs next above and below. The internodes or spaces of stem between the neighbouring pairs of leaves are shorter than in the ash, commonly about two and a half or three inches in young trees and in vigorously growing parts of older ones. The angle at which the large branches come off from the main stem varies considerably; in some cases, especially in the lower branches, it is so large that their direction is almost horizontal; in other cases the branches are found to ascend at about an angle of forty-five degrees, but the secondary and smaller branches generally show a tendency to turn upward toward the sky. The branches are opposite in crossing pairs, the growing point, whether of stem or branch, continuing for a series of years to push forward in the original direction, opposite branchlets being thrown out at almost every joint when the stem or branch is vigorous, but where the growth is less active, the buds at the lower part of each yearly shoot will remain dormant, those only which are nearer to the point giving rise to new branchlets. So soon, however, as the flowering habit comes on the mode of growth begins to be altered. The inflorescence, which is always at the extremity of a short leafy shoot of about two joints (*b*), is produced first on the small lateral branches, generally on such as are third or fourth in order from the main branches, and since the inflorescence is thus terminal, no further lengthening of the shoot which bears it is possible. The raceme falls off when the seed is ripened, and leaves a clean scar; but a pair of buds (*c*, *c*) are formed in the axils of the leaves which stood right and left of the point whence the inflorescence originated. These in the next season give rise to a pair of branchlets, forming an angle with that from which they sprang; these again in their turn are tipped by buds which in another season give rise to other pairs of branchlets. All these branchlets turn upwards towards the sky, and thus the branch, if horizontal, has a level-topped series of branchlets along great part of its length; the main axil, however, continues for a while to push forward in its original direction. The flowering tendency extends itself more and more towards the point of the branch, and by-and-by affects the leader itself of the branch, a cluster of flowers being borne at its termination. From this time forward its leadership is at an end, being exchanged for the growth of pairs of branchlets crossing each other as to their point of origin, but tending upwards in direction; thus, instead of a single shoot at the point of each branch, we have a bushy head of spray wood, each main branch forming a compact rounded head, the leaves of which closely approach or overlap. Hence those bold rounded masses of foliage which receive the light and stand out apart from each other relieved by deep shadows as we look into the inner part of the tree. In winter too this mode of growth is very observable. Each branch is seen to terminate in a bushy mass of intercrossing sprays of nearly equal length, thus

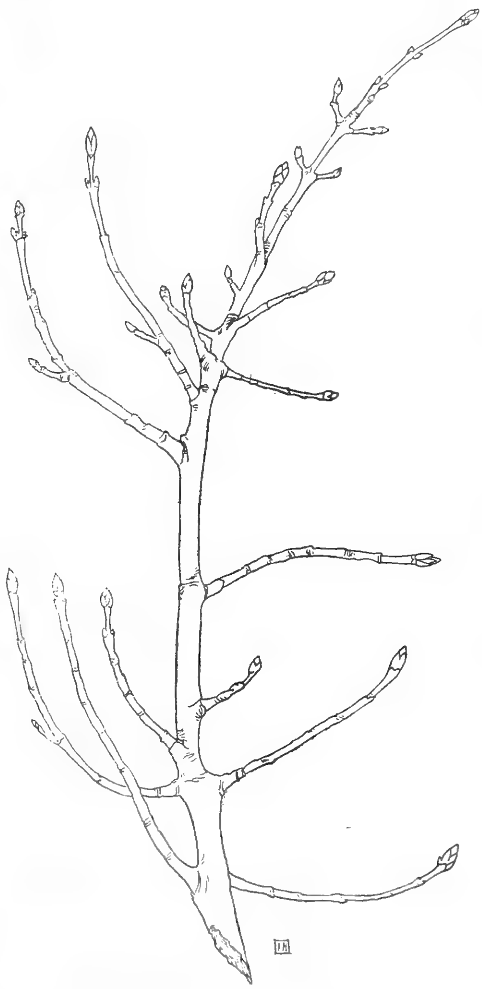
Sycamore, in Summer State.
*a*, End of previous year's and junction with present year's shoot.
*b*, Flower-bearing shoot of present year. *c*, *c*, Buds formed at base of inflorescence.

giving an even well-defined outline as seen against the sky, and contrasting strongly with the loose, irregular and parallel branchlets of the ash.

THE MAPLE.

The maple (*Acer campestre*, Linn.) is rather a small tree, and from its partiality for hedge-rows is often subjected to periodical cropping, and is thus prevented from exhibiting its full-grown and characteristic features, which, as will be seen, somewhat resemble those of its relative, the sycamore. The general arrangement of leaves and flowers, and consequently of branches also, is much as in the sycamore, the leaves being opposite in crossing pairs, and the inflorescence terminal on short leafy shoots of the current year. Instead, however, of being arranged in pendulous racemes, as in the sycamore, the flowers of the maple are borne in erect corymbs at the extremity of the small leafy shoots; and these shoots are longer in proportion, having often three (or perhaps more) joints or internodes with pairs of leaves, whilst in the sycamore there are rarely, if ever, more than two such joints.

The young branches of the maple are also more slender than in the sycamore, and the internodes shorter, thus the leaves, although smaller, are more crowded. There is a further peculiarity also in the tendency shown by the maple to form accessory buds about the base of the previous year's branchlets. A pair of such buds is often found just below the origin of the last year's branchlet, and again another pair or pairs above it. These buds eventually develop into small shoots, and thus cause the spray wood of the maple to be more crowded than in the sycamore. In its early growth the maple produces straight branches with internodes of about one and three quarters to two and a half inches in length where vigorous, whilst on the side shoots and weaker growths the internodes are only from a quarter to three-quarters of an inch in length. The branches give rise to secondary branches at the nodes or joinings, these secondary branches or branchlets being afterwards supplemented by the accessory shoots which have been mentioned.



SYCAMORE, BEFORE REACHING FLOWERING STATE.

The flowering tendency is first manifested, as in the sycamore, by the small lateral branchlets, their parent branch continuing meanwhile to lengthen, season after season, in its original direction. When, however, the terminal bud gives rise to a flowering shoot instead of a leafy one, there is no further lengthening of that branch; all further growth consists in the repeated forking of the small flowering branchlets which arise from the buds formed at the close of each season in the axils of the last pair of leaves, *i.e.* that pair which is immediately at the base of the inflorescence. The flowering shoots in the earlier life of the tree and branches are generally longer in proportion than in the sycamore; but as the maple advances in age, and the flowering sprays become more numerous, they become shorter and shorter, assuming more the character of spurs. I find also that, in age, the pairs of buds which are formed at the ends of the flowering shoots do not develop so uniformly as in the earlier life of the tree, one or other of these buds often remaining dormant, or at best giving rise to a much smaller shoot than its fellow; thus the opposite decussating (crossing) growth is somewhat departed from. The same tendency on the part of one of the pair of buds to remain dormant may also be noticed in the sycamore.

The large branches gradually, as in many other trees, become bare of living growth in their lower portion by reason of the gradual dying of the first formed lateral branches; but, as has been shown, they bear in their upper portion a bushy mass of small flowering shoots, which lengthen, but very slightly indeed, by their annual growth. These bushy masses of spray have generally in the maple a more flattened contour than in the sycamore, and they do not exhibit the same bold broad masses of light with deep shadowy hollows as in that, partly, perhaps, by reason of the much smaller size of the leaves, which do not overlap each other so much.

Gilpin, in his "Forest Scenery," says of the maple: "In the few instances I have met with of this tree in a state of maturity its form has appeared picturesque. It is not unlike the oak, but is more bushy, and its branches are closer and more compact. One of the largest maples I have seen stands in the churchyard of Boldre, in New Forest." This tree, adds Gilpin's editor, Mr. F. G. Heath, "was destined to be invested with a peculiar interest, for under its shadow is the grave of this true lover of nature." The frontispiece to Mr. Heath's edition of the "Forest Scenery," gives a representation of this tree in Boldre churchyard, and illustrates the peculiarities of growth and feature which I have endeavoured to describe.

*(To be continued.)*

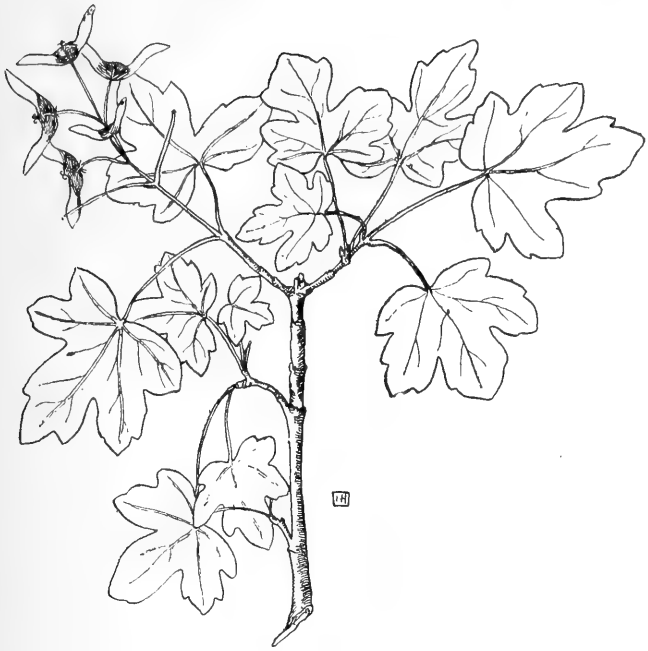

SYCAMORE, IN EARLY WINTER STATE.
(*See page* 236.)

## UNUSUAL NESTING OF PARTRIDGES.

I HAVE a garden containing about a rood of ground, enclosed by a wall five feet high. One half of my garden, and the part farthest removed from the house, was this year in grass, and here a brace of partridges, selecting a slight hollow, chose to have their nest. The nest, containing eighteen eggs, was discovered at the time the grass was mown, yet, notwithstanding the bare appearance of the plot and the frequent entries made into the garden for vegetables, the birds continued to sit. On June 24th, the eggs hatched fourteen living birds. On the 25th, our cat discovered the covey, and the female partridge, while protecting its young, was killed by it. We put away the cat, and to our surprise and delight the male partridge acted as a mother and kept its brood under its wing at night. On the 28th, the male got frightened by a dog, and as the evening advanced we heard the plaintive cries of the young, and thought they must die. We secured two of them, but though put into a warm ventilated box they expired next morning. Nevertheless, we had the satisfaction that the remaining birds all escaped from the garden that night by flying over the wall, where it was rather lower; only one was found, dead in the highway, showing where they had escaped.

JAMES SHAW.

*Tynron, Dumfriesshire; October, 1895.*



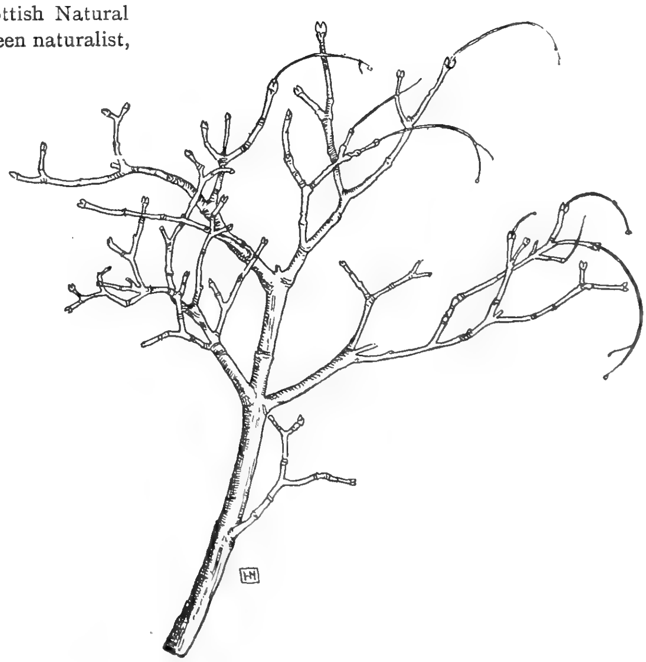
MAPLE, IN SUMMER STATE.
(*See page* 237.)

## ECHINUS ACUTUS IN SCOTLAND.

BY WILLIAM DOW.

PERMIT me to point out that in the October number of "The Annals of Scottish Natural History," Mr. George Sim, an Aberdeen naturalist, writes on the recent captures of this beautiful Echinoderm on the Scottish east coast. To elucidate the subject, let me quote briefly what the writer says: "Some of the specimens were taken off the Pentland Skerries, and two were brought in by one man, which had been procured forty miles off Aberdeen. On August 23rd last, I [Mr. Sim] had the pleasure of seeing another specimen in the possession of Mr. Thomas Scott, which he had caught on Smith's Bank, while conducting experiments in the interests of the Fishery Board of Scotland." This statement needs amplification. Since the days of Dr. Fleming, who first made this rare animal known to British science, under the name of *Echinus miliaris*, five specimens have been landed at Aberdeen. The first one occurred in November, 1894, thirty-eight miles east by south of Aberdeen, on shell and sand bottom; the second and third in March, 1895, thirty-seven miles east by north of Pentland Skerries, in thirty-two fathoms of water, on shell sand; the fourth is that caught by Mr. Thomas Scott, on Smith's Bank, in August, 1895; the fifth in October, 1895. The capture of four of the specimens is due to Mr. Herbert Howell, fisherman, who took them alive, along with such species as green-pea urchin (*Echinocyamus pusillus*), and purple-tipped egg urchins (*Echinus miliaris*) from the Pentland Skerries. I have several other small species, with long spines, which I cannot identify. Would any of your readers undertake to name them for me?

124, *Loch Street, Aberdeen.*



MAPLE, WINTER STATE, SHOWING DEAD FRUIT STALKS.
(*See page* 237.)

# ENTOMOLOGICAL NOTES.

By Edward Ransom.

THE season of 1894 cannot be regarded by lepidopterists as a very successful one, even those butterflies that are usually common everywhere only put in an appearance in limited numbers. This is hardly to be wondered at when we remember the remarkable absence of sunshine during the summer months. Some species, however, were abundant in the larval state. This was notably the case with *Vanessa urticæ;* during the whole summer the larvæ swarmed on almost every patch of nettles, and I successfully bred some hundreds of them. On August 28th, I found a brood of these larvæ, some of which I took. They were nearly full-grown, and they commenced to change to pupæ on September 4th. On October 11th, two imagines emerged, and the remainder emerged a few days afterwards. Another brood which I found on August 28th, only measured seven-sixteenths of an inch in length. They grew very rapidly and commenced changing to pupæ on September 24th, but unfortunately they never emerged. By the end of November, the colours of the wings were plainly visible through the pupa cases, and on opening them in the spring I found that they were perfectly formed but quite dead. I conclude that the weather was too cold for them to emerge, and so they became torpid and had insufficient strength to become perfect.

I do not recollect having seen during 1894 even one specimen of *Gonepteryx rhamni.* For the last two or three years this butterfly seems to have got quite scarce here. I do not know whether it is getting rarer in other parts of the country, and I should like to know if other collectors have noticed such to be the case. As to moths, it seems to have been a very unsatisfactory season everywhere, both light and treacle being at times a failure. I noticed, however, that the larvæ of some species were unusually abundant. On a willow-tree in a garden here *Dicranura vinula* literally swarmed, and the owner feared that it would be quite denuded of its foliage. I obtained a number of these larvæ and fed them on poplar, which they very readily took to, and did not appear to mind the change of food in any way, and I reared some very fine specimens of this moth. The larvæ of some of the hawk-moths were more than usually plentiful, especially *Sphinx ligustri.* I never remember these larvæ to be so abundant before. I also found a brood of nine larvæ of *Chœrocampa elpenor*, one of which was a very fine specimen of the green variety. They were feeding on the large willow herb *Epilobium hirsutum.* I took one from off a plant of woody nightshade (*Solanum dulcamara*), but I could not ascertain that it had been feeding on it: perhaps it was merely resting there. I afterwards found two more specimens, one of which I took off a species of rush on which it had evidently been feeding, although *Epilobium hirsutum* was growing profusely quite close. These larvæ are very seldom found here, although there is a great abundance of their food-plant growing on the river banks. I have sometimes observed that when I placed the larvæ of hawk-moths on damp earth as soon as they burrow, there is a species of mite attaches itself to them and irritates them to such an extent that they come to the surface again. I have taken as many as half a dozen of these mites off one larva. Can any reader give me any information about them?

The larvæ of *Bombyx quercus* was unusually abundant; so also was *Bombyx neustria.* I bred a very small male specimen of this moth. It only measures three-fourths of an inch in expanse. The larvæ of *Spilosoma lubricipeda* was also abundant. Two or three seasons ago I caught a specimen of *Spilosoma menthastri* of which the right hind-wing, although perfectly formed, was only about two-thirds of the normal size.

About the end of July a friend gave me a large number of the larvæ of *Arctia caja*, which had not been hatched very many days. Some of them grew rapidly, and on October 7th some commenced to spin cocoons. Until this time I had done nothing to force them, but kept them in an open shed; but as I was anxious not to lose them, I now removed them to a warmer place. Some of the larvæ remained very small and did not appear to grow at all, and these passed the winter in the larval state, but, unfortunately, died in the spring. There were, however, only a few that passed the winter this way, as all the others turned to pupæ during October and November. On November 10th the first imago emerged. It was a fine specimen, not crippled or dwarfed in any way. The remainder continued to emerge, sometimes as many as half a dozen in a day, until December 21st. Nearly all those that emerged after November 25th were crippled or dwarfed specimens. I paired some of them and obtained some fertile eggs which were hatched on December 23rd, but owing to my inability to obtain food for them they all died. I, of course, had to keep them in a place where I could get artificial heat. I think the above is somewhat unusual and worth recording. A few seasons ago I bred an interesting variety of this moth, in which the red of the hind-wings and of the body was replaced by a bright yellow.

*Sudbury, Suffolk.*

## ZOOLOGY

ROUGH-LEGGED BUZZARD NEAR WARRINGTON.—At a meeting of the Warrington Field Club held on November 1st, Mr. Geo. Mounfield exhibited a fine specimen of the rough-legged buzzard (*Archibutes lagopus*), which was shot on October 26th, at Rixton, near Warrington. This beautiful bird measured fifty-two inches across the wings and is the first of its species recorded in our district.—*Linnæus Greening, Hon. Sec. Warrington Field Club,* 5, *Wilson Patten Street, Warrington.*

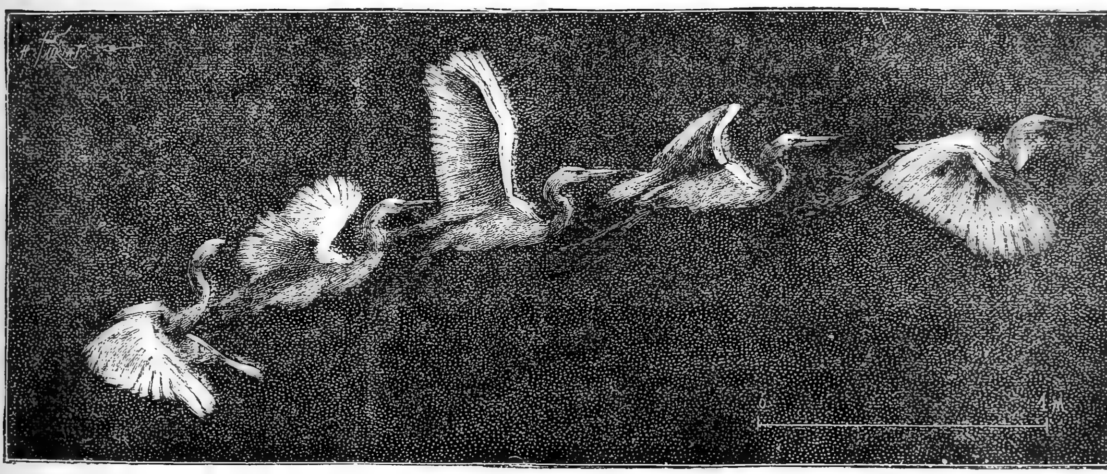
HAIRWORMS.—I have read the article upon "Hair-worms and their Hosts," in SCIENCE-GOSSIP (*ante* p. 211), with much interest, and infer that any note, however small, which may help to elucidate their life history will be acceptable. I have never found them in the Coleoptera, probably because I never thought of looking there for them; but I have repeatedly found them in the common earwig (*Forficula auricularia*), I should think almost to the extent of 15 to 20 per cent., although I have never attempted an actual comparison. On one occasion in last September, I noticed an earwig struggling on the ground, apparently held by its forceps, and upon attempting to lift it up, found it to be held by a hair-worm, part being in the body of the insect and part (about one and-a-half inches) in the ground. By gently pulling the earwig I withdrew the worm from the soil, and it remained hanging from the earwig. The subsoil in this neighbourhood is gravel, and frequently in hard, frosty weather, when trenches four feet deep have been sunk to obtain gravel, I have noticed torpid hair-worms coiled in a tight knot as deep as three feet six inches. The warmth of the hand soon causes them to uncoil and move about. I have invariably found them to follow an earthworm's burrow.—*Geo. Parish,* 124, *Kingston Road, Oxford.*

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Movement.* By E. J. MAREY, translated by ERIC PRITCHARD, M.A., M.B., B.Ch. 231 pp. 8vo, with 200 illustrations. (London: William Heinemann, 1895.) Price 7s. 6d.

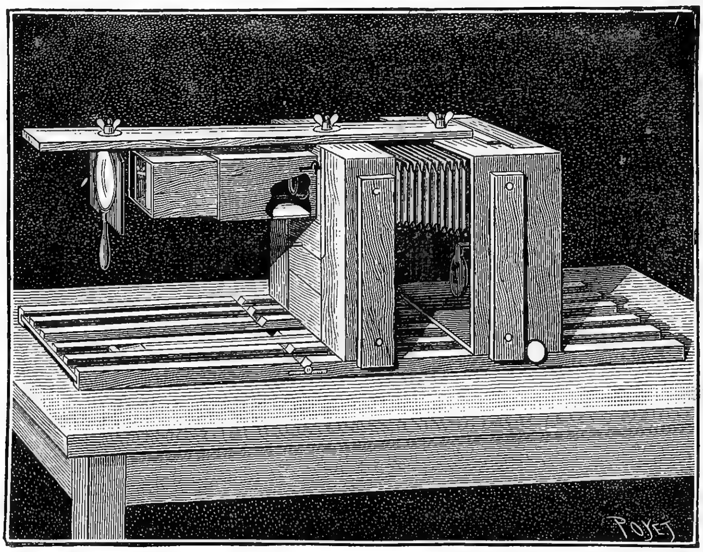
The author of this work, who, by the way, is a member of the Institute and of the Academy of Medicine, Professor at the College of France, and Director of the Physiological Station, is, like Mr. Muybridge of California, a pioneer in the application of instantaneous photography to the study of moving bodies. The study has latterly become so perfect as to have received the name Chronophotography. It seems only a short time ago that the writer of this notice took the chair at the Savage Club on the occasion, we believe, of the first exhibition in Europe, with the aid of a lantern by Edwerd Muybridge, of his then new study by photography of moving animals. Now, in but a few years since then, we have an important work on the subject by so clever an author as M. Marey, being the result of his investigations at the Physiological Station, an institution maintained by the Government of France and the City of Paris. Scientific investigators occupied in research into the habits of birds, insects, and other animals, will find this book invaluable, for it is full of suggestion and practical instruction for carrying out such experiments. Mr. Pritchard has been very successful as the translator, the book being concisely arranged and most clearly written. We have to thank Mr. Heinemann for permitting us to reproduce two illustrations from the book. One of these shows the flight of a heron demonstrating the movements of the wings. The metre scale at the right hand lower corner of the picture, makes it possible to estimate the rapidity of flight.



FLIGHT OF HERON (From "*Movement,*" by E. J. MAREY.)

*Catalogue of the Marine Molluscs of Japan.* By HENRY A. PILSBRY, Conservator, Conchological Section of the Academy of Natural Sciences of Philadelphia. 106 pp. demy 8vo, illustrated by 11 lithographed plates. (Detroit: Frederick Stearns, 1895.) Price, paper covers, $1; cloth, $1.50.

This handsome work is more than a mere catalogue, for it describes and figures forty new species and eight varieties of marine mollusca from the Japanese fauna, and is said to be a complete list of those animals, as far as known up to the date of publication; thus superseding Dunker's "Index Molluscorum Japonici." The catalogue before us contains upwards of 500 more species than the latter work. Much care has been taken with the collation of the discoveries, localities and illustrations of other authors treating the Japanese group. It is an excellent contribution to the study of geographical distribution of marine mollusca. Much of the new material described by Professor Pilsbry was collected by Mr. Fredk. Stearns. The number of species peculiar to Japan, apart from the Indo-Pacific faunas, has been largely increased. The old questions of nomenclature and classification crop up again in this work.



CHRONOPHOTOGRAPHIC CAMERA FOR STUDYING FLIGHT OF INSECTS. (From "*Movement*," by E. J. MAREY.)

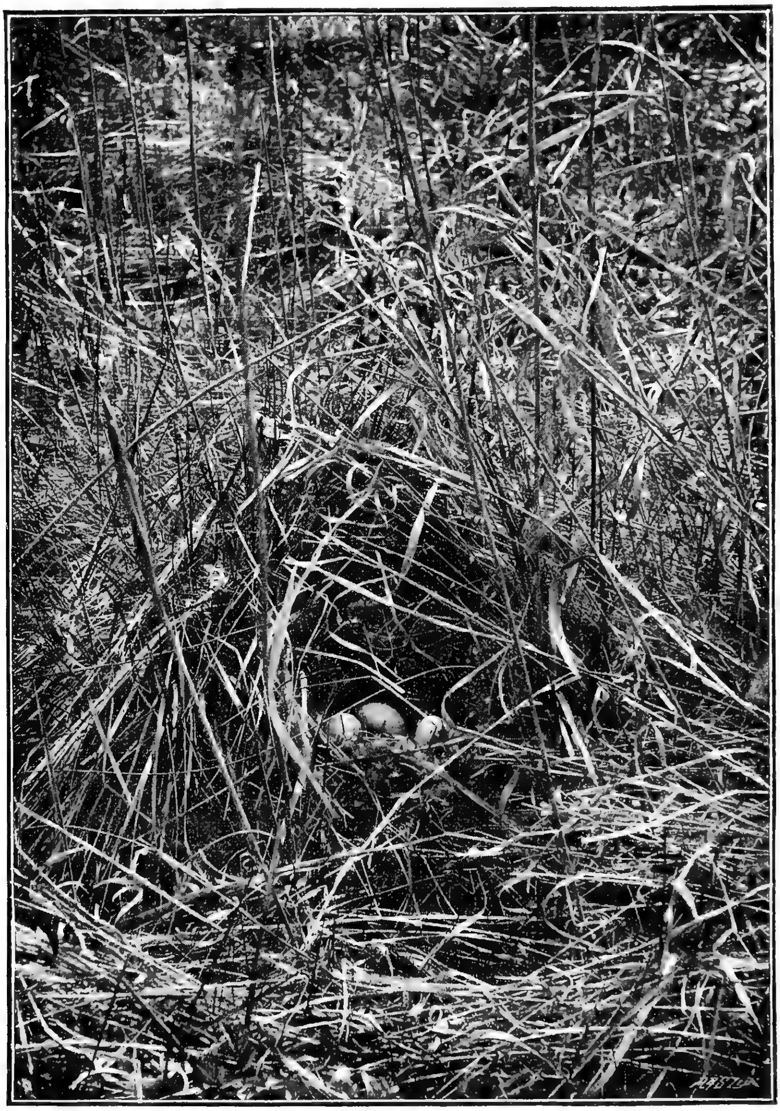
*The Royal Natural History.* Edited by RICHARD LYDEKKER, B.A., F.R.S. Illustrated with 72 coloured plates and 1,600 engravings. (London and New York: Frederick Warne and Co.) Published in 1s. parts.

Parts 23, 24 and 25 of this work are now before us. Part 23 is quite a sportsman's number, as it contains some of our familiar game birds and rails, also their allies in other parts of the world. Some of the illustrations are very good, for instance, a group of Spitzbergen ptarmigans on page 397. In Part 24 we come to the gulls, with their neighbours. Vol. iv. is concluded, with the birds, in this number, the ostriches and emeus coming last. Part 25 commences Vol. v., the first animals in it being the reptiles. Mr. Lydekker shows well in this and the last part, when considering fossil forms, how very closely allied are the reptiles to the birds. The comparative portion of the work has always been valuable, but in this instance it is especially so, for even the least thoughtful reader cannot help being struck with the development of Aves in one direction and Reptilia in another, from some common stock.

*British Birds'-Nests: How, where and when to find and identify them.* By R. KEARTON, with an Introduction by R. BOWDLER SHARPE, LL.D., pp. xx. and 368 medium 8vo. Illustrated with upwards of 120 photographs by C. KEARTON. (London: Cassell and Co., Limited, 1895.) Price 21s.

This is indeed a beautiful book; a work of art as well as one most interesting to the amateur ornithologist. As a rule the plates are a great success, being reproduced from photographs taken of the nests *in situ*. To accomplish this, it has been necessary to travel many thousands of miles and occupy much time in awaiting favourable opportunities. Not only have ordinary photographic cameras been used, but also Dallmeyer's telephoto lenses; such having been necessary in cases like the picture of a raven's nest, facing page 222, where it was impossible to get anywhere near the situation. The arrangement of the birds in this work is alphabetical. In the introduction, Dr. Bowdler Sharpe considers this book "marks an era in natural history, just as Gould's 'Birds of Great Britain' and Booth's 'Rough Notes' did in the past. The method of illustrating works on natural history has undergone as much development as the illustration of the animals themselves has done in our public museums." Certainly, when we compare the illustrations with those in the old standard works of the early part of this century, the present generation has much for which to feel thankful. Photography has its faults, but these have been reduced to a minimum in this work.

The Preface is well worth reading, and we sympathize with the author in his story on page xii., in which he describes how he suffered one night in the cause of science. Reading that story reminds one of a similar suffering for a bird's-nesting exploit, while at school on the moors not far from Penistone. There are other good stories in the same pages



NEST OF GADWALL. From KEARTON'S "*British Birds'-Nests.*" (Cassell and Co., Limited.)

which form an excellent opening to the book proper. With regard to this, we wish we had in the accounts of the various birds, still more of the author's original notes, which must be very voluminous after so much experience, and could not fail to be instructive as well as entertaining, We trust he may see his way at a later period to publish them in some form or other.

*The Structure and Development of the Mosses and Ferns: Archegoniatæ.* By DOUGLAS HOUGHTON CAMPBELL, Ph.D. 544 pp. demy 8vo, illustrated with 266 figures. (London and New York: Macmillan and Co., 1895.) Price 14s. net.

This remarkable group of plants is so interesting that it has had many champions, but none have produced a more mportant work upon these little-worked families. The author is Professor of Botany at the Leland Stanford Junior University. in California. He has, however, consulted many leading botanists both of America and Europe; and has worked on the national collection at the British Museum, South Kensington. The term Archegoniatæ includes a large number of plants which, while differing in many structural details, still agree so closely in their essential points of structure and development as to show close relation to each other. The word has been applied to these plants because the female reproductive organ, or archegonium is closely alike in all of them. A marked feature of the whole group is the alternation of sexual and non-sexual stages, in which they vary much in size and complexity. All this is very fully explained in the first chapter of Dr. Campbell's book. We are glad to note in the preface the author considers that "in view of the unsettled state of botanical nomenclature at the present time it was thought best to adopt a somewhat conservative attitude, and for the most part the names" used are those familiar to the botanical student. We are glad he has taken this position, for we always feel on finding a familiar name disappear much as we do when an eminent politician retires to the peerage, and sinks from public knowledge in his new title. Some alterations are necessary in classification, as might be certain when we remember the amount of general research and the author's especial study of the group. With such a scientific book as this for our guidance, there no longer remains any excuse for not more fully acquainting ourselves with the characteristics of many common plants which have been too sadly neglected by the larger number of botanists; not perhaps from carelessness, but rather from want of a trustworthy book for guidance.

*Journal and Proceedings of the Royal Society of New South Wales*, for 1894. Vol. xxviii. Edited by the Honorary Secretaries. Pp. xxv. and 368 large 8vo., and 46 plates. (Sydney: Published by the Society. London: Kegan Paul, Trench, Trübner and Co., Limited, 1895.) No price given.

This volume contains the President's address, twenty-eight articles, and various proceedings. In the former are some interesting remarks upon the poison of Platypus. The President, Professor T. P. Anderson Stuart, M.D., says, notwithstanding repeated denial, *Ornithorhynchus* develops at least a seasonal powerful poison. The males fight very fiercely while in the water, in the pairing season. Their scratches are mostly on the underside of the tail by the spurs in which the poison is secreted. In cases where dogs have been "stung" it is usually on the cheek. The effects follow quickly as in the sting of a bee, the swelling being indicated within a couple of minutes; it becomes very extensive, and lasts as long as thirty-six hours in the first instance. Repeated attacks reduce the length of time and extent of the swelling. It is not infrequently fatal, and always provocative of sleepiness and much pain. This volume is varied and contains several valuable papers on sundry subjects, some of which are fully illustrated.

*Elementary Inorganic Chemistry: Theoretical and Practical.* By A. HUMBOLDT SEXTON, F.I.C., F.C.S. Fourth Edition. 366 pp. 8vo, illustrated with 63 figures. (London: Blackie and Son, Limited. Blackie's Science Text Books, 1895.) Price 2s. 6d.

The principal changes in this edition are to bring the work in unison with the 1895 Syllabus of the Science and Art Department. The chapter on "Organic Chemistry" is omitted, and chapters are inserted on those non-metals which were not treated in the former editions; thus fitting the book for candidates for the London Matriculation and other similar examinations.

*Hidden Beauties of Nature.* By RICHARD KERR, F.G.S. 250 pp. 8vo, with 59 illustrations. (London: The Religious Tract Society, 1895.) Price 3s. 6d.

Like all the voluminous literature issued by the Religious Tract Society, this work is of an elevating character. Mr. Kerr has been happy in his selection of subjects, which are well illustrated. The book is pleasantly and simply written, and will form a nice present for any young person who shows a taste for enquiry about the other inhabitants of this world. The book is well produced and a credit to the publishing department of the Society.

*A Popular Handbook to the Microscope.* By LEWIS WRIGHT. 256 pp. 8vo, with 186 illustrations. (London: The Religious Tract Society, 1895.) Price 2s. 6d.

This is a popular work for the early beginner in working with a microscope. It will be found most useful, and, we hope, be the means of inducing many young people to take up microscopic work. When issued by a society such as the publishers, we naturally expect, and rightly so, a religious tone to pervade the work, but we think the opening part of the introduction might have, with advantage, been omitted, or at least been more generously treated. Such paragraphs are more calculated to repel than otherwise, and only draw attention to what the author, rightly or wrongly, desires to condemn. The rest of the book will be useful to a beginner, who will have the satisfaction of knowing he is being instructed by a first-class authority in microscopy. It is a good sound book.

*Consider the Heavens: A Popular Introduction to Astronomy.* By MRS. WILLIAM STEADMAN ALDIS. 224 pp. 8vo, illustrated with 29 figures. (London: Religious Tract Society, 1895.) Price 2s. 6d.

Mrs. Aldis has succeeded in giving us a brightly written work on popular astronomy. She does not attempt more than can be understood by the people, and it cannot fail to produce a greater interest among many who now only gaze ignorantly at the stars. The book is nicely illustrated and pleasantly compiled.

*Food and its Functions.* A Text-book for Students of Cookery, by JAMES KNIGHT, M.A., B.Sc., F.C.S., F.G.S. 286 pp., with one coloured plate and 35 illustrations. (London: Blackie and Son, Limited, 1895.) Price 2s. 6d.

We suppose its devotees rank cookery as among the sciences, but it is only when we get such a book as this that we are reminded how easily the art may become a science. The author's object is to prepare the enlightened cook with a knowledge of the bodies he or she is going to feed; also for the diseases to which those bodies are heir, so as to avoid their aggravation through ignorance in the preparation of food. These chapters are really the outcome of lectures given before schools of cookery, they are of much importance to the scientific cook and may be read by others with advantage.

*Earth-Knowledge.* A Text book of Physiography, by W. JEROME HARRISON, F.G.S. and H. ROWLAND WAKEFIELD. Part i., ninth edition, 274 pp. 8vo, illustrated with 123 figures. (London: Blackie and Son, Limited, Blackie's Science Text Books, 1895.) Price 2s.

The preface to this edition states that the alterations in the syllabus for physiography, lately made by the Science and Art Department are such, that this edition is much extended, and the figures have been more than doubled in number.


| | 1895. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| | | A.M. | P.M. | | |
| Sun ... | Dec. 1 ... | 7.46 ... | 3.53 ... | 16.30 ... | 21° 50′ S. |
| | „ 11 ... | 7.58 ... | 3.49 ... | 17.13 ... | 23° 1′ |
| | „ 21 ... | 8.6 ... | 3.50 ... | 17.57 ... | 23° 27′ |
| | | Souths. P.M. | Sets. A.M. | | |
| Moon ... | „ 1 ... | 11.30 ... | 8.26 | | |
| | | Rises. P.M. | Souths. A.M. | | |
| | „ 8 ... | 11.14 ... | 5.57 | | |
| | | Souths. P.M. | Sets. P.M. | | |
| | „ 16 ... | 0.8 ... | 3.23 | | |
| | „ 22 ... | 4.57 ... | 10.43 | | |
| | | Rises. A.M. | Souths. A.M. | | |
| Mercury... | „ 7 ... | 7.20 ... | 11.23 ... | 16.24 ... | 21° 50′ S. |
| | „ 17 ... | 8.6 ... | 11.51 ... | 17.32 ... | 24° 31′ |
| | „ 27 ... | 8.38 ... | 0.19 ... | 18.42 ... | 25° 3′ |
| Venus | „ 7 ... | 3.26 ... | 8.46 ... | 13 50 ... | 8° 42′ S. |
| | „ 17 ... | 3.47 ... | 8.49 ... | 14.32 ... | 12° 6′ |
| | „ 27 ... | 4.11 ... | 8.54 ... | 15.16 ... | 15° 20′ |
| Mars ... | „ 7 ... | 6.12 ... | 10.32 ... | 15.38 ... | 19° 22′ S. |
| | „ 17 ... | 6.13 ... | 10.22 ... | 16.7 ... | 20° 56′ |
| | „ 27 ... | 6.12 ... | 10.13 ... | 16.37 ... | 22° 13′ |
| | | P.M. | A.M. | | |
| Jupiter ... | „ 7 ... | 7.55 ... | 3.39 ... | 8.46 ... | 18° 33′ N. |
| | „ 27 ... | 6.28 ... | 14.15 ... | 8 40 ... | 18° 59′ |
| | | A.M. | A.M. | | |
| Saturn ... | „ 7 ... | 4.51 ... | 9.42 ... | 14.49 ... | 13° 59′ S. |
| | „ 27 ... | 3.43 ... | 8.31 ... | 14.57 ... | 14° 32′ |
| Uranus ... | „ 27 ... | 4.29 ... | 8.56 ... | 15.22 ... | 18° 13′ S. |
| | | P.M. | P.M. | | |
| Neptune... | „ 27 ... | 2.34 ... | 10.36 ... | 5.0 ... | 21° 15′ N. |

MOON'S PHASES.

*Full* ... Dec. 2 ... 6.38 a.m. *Last Qr*... Dec. 9 ... 7.9 a.m.
*New* ... „ 16 ... 6.30 a.m. *1st Qr.* ... „ 24 ... 5.21 a.m.
Full Moon December 31st, 8.31 p.m.

THERE will be a bright shower of meteors on the 10th. The radiant point is $\alpha$ 108° $\delta$ + 33°.

MERCURY is not well situated, as he is in superior conjunction on the 20th. Venus is in a good position in the morning, and can be seen with the naked eye well on towards noon. Mars is gradually coming up again, but his declination is so much south that he cannot well be seen yet. Jupiter is very well placed for observation. Saturn can be seen early in the morning.

SIR H. GRUBB has issued a new "Illustrated Catalogue of Astronomical Instruments, Observatories, etc." Accompanying the sketches of instruments are a number of reproductions of photographs taken with them.

A NEW comet was recorded from the Lick Observatory by Mr. Perrine, on November 16th, and another is announced from the Observatory of Geneva, U.S.A., by Mr. Brooks. It was discovered on November 21st, in R.A. 9h. 52m. and Decl. 17° 4′ S.

MR. E. WALTER MAUNDER, F.R.A.S., read his annual address as President of the British Astronomical Association, on October 30th last, congratulating the Society upon its progress. He further made lengthy reference to Eclipse Expedition to Norway in August next year, strongly urging the members and their friends to avail themselves of the opportunity of observing "all the phenomena the changing heavens have to present." The chances of watching such an event are rare.

## YORKSHIRE NATURALISTS' UNION.

THE excellent management of this association of lovers of natural history, is evident from the annual report of the general committee for the year 1895. One of the first parts of such a report to examine is the financial position, which indicates a balance in favour of the Union of no less than £241. The membership now stands at 449, twenty-one new ones having been added during the past year. The Union now includes thirty-six societies, with a membership of 2,567, who with direct members make a total of 3,016. Seven field-meetings have been held during 1895. The first was on May 13th to the Hole of Horcum, in the valley of Newtondale, near Pickering, a place of much geological interest. On June 3rd was a joint undertaking with the Lincolnshire Naturalists' Union to Broughton Woods, near Brigg. This excursion extended over several days and included meetings at Brigg and visits to the Gully of Twigmoor, and an inspection of the work of several peat moss litter companies who, to quote the report, are quite destroying the historic low-lying heaths of Gool Moor, Thorn Waste, and Hatfield Chace. June 22nd, found members of the Union at Flamborough Head, on the coast of Yorkshire; on August 5th, in the lower Swaledale, with a meeting at Richmond; on September 2nd, in Wharfdale, for exploring the gorge of Troller's Gill, near Bolton Abbey. A fungus foray was held near Huddersfield, from September 7th to 10th, and a special meeting at Filey Brig on September 21st, for the investigation of the marine fauna and flora at the equinoctial spring tide. These latter excursions were respectively under the management of the Mycological and Marine Zoology Committees of the Union, and were very successful.

The publications of the Union include: "The Naturalist," its organ, which is issued monthly under the editorship of Mr. W. Denison Roebuck, F.L.S., and the "Transactions." The latter have been in abeyance during 1895, awaiting certain manuscripts which are now well forward and refer to the lists of mosses, hepatics, and coleoptera of the county. The library of the Union has grown to proportions almost beyond control, so negotiations are in progress for its transference to a large public institution, where it will be more accessible to members of the Union and others interested in biology.

Much good scientific work is being done by the sectional committees of research, the Yorkshire Fossil Flora Committee having been active, as has also the Geological Photographs Committee. Other committees include the Coast Erosion Committee (which, by the way, reports that the annual erosion of the Yorkshire coast is, after all examination, found to be very slow), Micro-Zoology and Micro-Botany Committee, Wild-birds'-Egg Committee, and Mycological and Marine Zoology Committee, all of which have done more or less work in 1895. Certainly, as the proverb has it, in this instance "union is strength." We believe in these unions of amateur naturalists, for they encourage the members to continue their work, and interest others who may become workers in some or other branch of Biology. The President for the year 1895–6 will be Mr. John Cordeux, the well-known authority on the ornithology of the Humber district, and the Hon. Secretary is Mr. W. Denison Roebuck, Sunny Bank, Leeds. J. T. C.

# SCIENCE GOSSIP

An International Fisheries Exhibition is to be held next year at Kiel, from May 13th to the end of September.

It is stated that in the new edition, shortly to be issued, of the British Pharmacopœia, the metric system of weights and measures will be adopted.

The death is announced of Surgeon-Major G. E. Dobson, F.R.S., at the early age of forty-eight, a writer on zoology and comparative anatomy.

We understand that Professor F. Jeffrey Bell is the editor of a new edition of Gosse's "Evenings with the Microscope," which will be shortly issued.

We are glad to hear of the opening of Manchester Museum on Sunday afternoons. The free library of that city was among the first to invite readers on Sundays.

Mr. Vernon Herbert Blackman has been selected, by competitive examination, to fill the place of Assistant in the Department of Botany in the Natural History Museum, South Kensington.

The Carnegie Museum, Art Gallery, Free Library and Music Hall was inaugurated at Pittsburg, a short time ago. Mr. Carnegie has added to the gift an endowment fund of upwards of £200,000.

As an exhibition of Nature's magnificence, the November meteor showers were, this year, rather a failure, but one or two aerolites have been observed of great splendour, notably one, of much beauty, seen from Eastbourne.

There are still surprises in store for the Canadian geographers. Sir Robert Bell, of the Geological Survey, has discovered a large new river flowing north into James' Bay, which will rank among the finest rivers of the continent. It is to be called Bell River in his honour.

The "Monthly Weather Review" of the Weather Bureau of the United States of America, recently referred to a shower of dust which fell with snow in Indiana. It was found to consist of silt and organic matter, probably swept up by the wind previously to the fall of snow.

From the Report of Forest Administration for Travancore, for 1893-94, we find it estimated that not less than nearly six hundred species of forest trees occur within the Maharaja's dominion. A public herbarium is established in connection with the Trevandrum Museum and the Quilon Office.

What becomes of them all? is a natural question when we read that the United States Fish Hatchery at Wood's Hall, has this season hatched out seventy-five millions of lobster eggs, forty-five millions of codfish, and six millions of flat fish.

There died at Bendigo, Australia, on July 9th last, the only surviving son of Dr. Wm. Macgillivray, the eminent Scottish naturalist and author of a well-known book on birds. Dr. P. H. Macgillivray was only sixty-one when he died, and was himself a botanist and student of the polyzoa.

The Corinth Canal is being described in "Engineering" by Mr. E. P. Cotterell. This canal cutting should be most interesting to geologists, judged from the views given of deeply-cut sections in some parts of the canal.

M. Witckens, of Vienna, has found that two pure-blooded English horses transmitted the colour of their coats to their offspring in 586 cases out of 1,000. Where the parents were of different colours, he found the children, in most cases, took the colour of the mother.

In consequence of the death of Professor Charles V. Riley, Mr. L. O. Howard, Entomologist to the United States Department of Agriculture, becomes Honorary Curator of the Department of Insects. Mr. W. H. Ashmead is to be Honorary Custodian of Hymenoptera, Mr. D. W. Coquillett taking the same position with the Diptera.

The general movement towards the adoption of mechanically-driven road-carriages is progressing. Prizes have been offered by the "Times-Herald" of Chicago, for trials this autumn, and the proprietors of the "Engineer" now offer a thousand guinea prize for a 200-mile competition next autumn, in England.

Messrs. G. Adolphe Chatin and Achille Müntz have been examining the relative quantities of phosphorus in the common oyster (*Ostera edulis*) and the Portuguese oyster (*O. angulata*). The results are largely in favour of *O. angulata*, = 0·032 gram. for 0·020 gram. in *O. edulis* of phosphoric anhydride, in which form it occurs both in the animals and their shells.

An important Paper by Messrs. J. Cosmo Melville, M.A., F.L.S., and Robert Standen, of Manchester, upon a large collection of shells from the Loyalty Islands, is appearing in the later numbers of "The Journal of Conchology," and has been issued as a handbook to Manchester Museum. This fine collection was made by the Rev. James and Mrs. Hadfield, chiefly in the islands of Lifu and Uvea. It contains much novel material.

Dr. Albert Günther, F.R.S., draws attention, by a letter to "Nature," of the colonization in Kew Gardens of a small arboreal frog, native of the West Indies. It is *Hylodes martinicensis*, a shy animal of nocturnal habits. Although observed in the gardens ten years ago, it has been rarely seen among the flowerpots and orchid baskets, though its whistling notes have often been heard on still evenings.

Dr. Günther's retirement from the post of Keeper of Zoology at the British Museum has caused certain changes in Cromwell Road. In future, the director, Sir William H. Flower, K.C.B., will be responsible as Keeper of the Department, there being three Assistant Keepers. Dr. A. G. Butler is to have charge of the section of insects, Mr. Edgar A. Smith will have all other invertebrates, and Dr. R. Bowdler Sharpe the vertebrates. The arrangement appears to be a good one.

The matrix in which diamonds are found at Kimberley in South Africa, forms the material for a joint paper by Sir J. B. Stone, M.P., F.G.S., Professor T. G. Bonney, Dr. Sc., F.R.S., and Miss C. A. Raisin, B.Sc., in the November "Geological Magazine." It is a valuable contribution to the little understood subject of the origin of diamonds. Diamonds found at Kimberley vary in colour from deep yellow to blue-white, from deep brown to light brown, green, blue, pink, orange, pure white, and at times opaque,

## SCIENCE ABROAD

The Victorian Naturalist. (Melbourne: September, 1895.) Mr. D. M'Alpine has an article on "Entomogeneous Fungi," giving descriptions of an Entomophyte on cockroach *(Panesthia australis)*, being named *Isaria surmatodes* (n. sp.). Mr. Oswald B. Lower, F.E.S., continues his "Catalogue of Victorian Heterocera," in which he has reached the Pyralidina, including the "plumes," of which we note eight species in six genera.

The Canadian Entomologist (London, Ontario, Oct., 1895.) This number contains a portrait and obituary notice of Prof. C. V. Riley, whose death was noticed in the last number of Science-Gossip. Mr. F. W. Goding writes the third of his series of articles on "Studies in North American Membradicæ," the subject this month being the subfamily *Centrotinæ*. There is also an interesting note entitled "Some Notes on *Bruchus* in New Mexico," by Mr. C. H. Tyler Townsend. Mr. J. Alston Moffat, of London, Ontario, contributes a short note on "*Sphinx canadensis* of Boisduval," which was recently taken in Ontario, for the first time, by Mr. G. G. Anderson, at electric light. There is a contribution by Mr. H. F. Wickham, of Iona City, entitled "Notes on a Trip to the Bahama Islands," giving an account chiefly of the insect fauna of the islands.

Popular Science (New York; November, 1895).—This is a journal for readers who have not much preliminary acquaintance with science. There is an article illustrated by three figures, on "Sea-Horses," by Dr. R. W. Shufeldt. Mr. Angus Gaines has written an article entitled "Electricity and Plant Growth," giving an account of experiments which have been tried with regard to the influence of electricity on the growth of plants. Gardini tested the matter in the last century in a garden at Turin, by stretching wires over several beds of plants. He found that the plants, being deprived of the atmospheric electricity by the greater collecting power of the wires, withered, but recovered when the wires were removed. Several other men have tried experiments by subjecting seeds to an electric current before planting them, the result in every instance was that seeds which had been electrified will produce more plants than those which have not. There is the continuation of a series of illustrated articles by Mr. Thomas Wilson, LL.D., on "Grooved Stone Axes," and the second paper, illustrated by Mr. Gerard Fowke, on "Excavation in the Quarry Pits at Flint Ridge, Licking County, Ohio."

Feuilles des Jeunes Naturalistes (Paris, November, 1895). We congratulate our contemporary upon having completed its twenty-fifth year of usefulness. It appears to take much the same position with the French, as Science-Gossip does here. It is a bright and pleasant magazine with plenty of variety of subjects and illustrations. This number contains an editorial address upon the occasion, with a summary of the work done during the past quarter century. One feature is well worth imitation, namely: The foundation of a circulating library in connection with the journal, founded upon its exchanges with other journals of a like character. This library has reached some 30,000 items represented either in volumes or single numbers, accumulated during nine years. We regret, however, to see that complaint is made that this library is not so frequently used as is desirable. An evidently interesting article on the land and freshwater molluscs of the Department of Vienne in west-central France is commenced. The author bases his researches on a catalogue of the mollusca of the Department, by M. L. Mauduyt, of 1839. This contained 140 species, as many land as freshwater. The author now adds seventy-two additional, and eliminates several from the old list, as varieties or immature specimens of other species.

Contributions to the Queensland Flora, by F. M. Bailey, F.L.S., Colonial Botanist. This is Botany Bulletin No. xi. (July, 1895), of the Queensland Department of Agriculture, Brisbane, and is a continuation of Bulletin No. vi., issued in January, 1893, and refers to the Queensland *Algæ*. It is accompanied by fourteen uncoloured plates, descriptive of various marine and freshwater species. The sixty-three pages of letterpress contain references to a large number of species, several of which are new to science. Botany Bulletin No. xii., contains an article by Dr. M. C. Cook on "Pestiferous Fungi" and another upon "Some Peculiarities of the Queensland Flora," by F. M. Bailey, F.L.S., who points out the excessive richness of the flora of Queensland, which is not remarkable when we consider its geographical position and its coast line of some 2,500 miles. The economic woods number probably 1,000 different kinds, some of which are of great value. The barks of many are rich in tannin, the foliage abounds in fragrant oils, and the exudant gum and resin have risen to important articles of export. One of the recent discoveries of the Queensland botanists is that of Dr. Lauterer, who has found that the young twigs and foliage of *Cinnamomum oliverii*, yield a good percentage of camphor identical with that obtained from the Chinese tree *Cinnamomum camphora*. It is well to know that the colony possesses very few plants which are hurtful to man or animals; while large numbers of indigenous fruits are of great service both in a fresh condition and when made into jam. Mr. Bailey recommends the cultivation of some of these fruits, selected from fifteen genera, in all about thirty different kinds, and makes remarks upon each separately. With regard to naturalized plants and strays from cultivation, it appears that about 200 different immigrant plants have settled in Queensland. One third are European, another third are American, while only one-fifth are Asiatic and one-thirteenth are African. Some of these plants become very abundant in certain localities when they get a root-hold, but it appears a bad omen for the plant to become very prolific as in a few years decadence sets in and they gradually disappear altogether. Mr. Bailey gives an instance of this in our familiar water-weed frogbit (*Hydrocharis morsus-ranæ*), which about twenty years ago became most abundant in the still waters round Brisbane; but for the last fifteen years the author has not met with a single specimen, indeed, he stated he knows of no Queensland habitat of the plant.

# BOTANY

The Perthshire Society of Natural Science has arranged to issue "The Flora of Perthshire," which the late Dr. F. Buchanan White, F.L.S., had nearly completed before his death. Professor Trail, F.R.S., will edit the work. The book is to be six shillings, by subscription.

Silene Nutans in Sussex.—During a walk in August, from Brighton and Lewes, along the South Downs, I found a fine patch of this local campion. It was spread thickly over quite an acre of the Downs on a sunny bank with south-eastern aspect, but at least a mile and a half from the sea. The flowers were still well in bloom, and some seed-pods bore evidence of being eaten by the larvæ of a moth of the genus *Dianthecia*.—*John T. Carrington.*

Variety of Hawthorn Berries.—On a hawthorn tree (*Cratægus oxyacantha*) in our garden at Clapham, which this year is covered with red berries, I found a small bunch of a clear yellow colour. I believe that not far from us there is a tree which habitually bears yellow berries, but is it not unusual for berries of the two colours to occur on the same tree.—*K. Bowman*, 18, *Victoria Road, Clapham Common, S.W.; November*, 1895.

Hieracium aurantiacum, L., in Kent.—It may be of interest to mention that I found three specimens of this plant growing apparently wild in Kent this year, one in a copse near Eynesford, and two specimens in another copse near Otford; these two last were growing amongst some small plants of *Verbascum lychnitis*, *Atropa belladonna* (these two plants are rather plentiful about here), and some other hawkweeds. Both these plants have since seeded, so that it is possible that *H. aurantiacum* will become naturalized about Otford.—*Harry E. Guiset*, 27, *Marlborough Road, London, N.*

Abnormal Plants.—I send you a chrysanthemum with six flowers all crowded together, without any foot-stalks at the top of one stem. The effect at a short distance is to appear like one large flower.—*A. Henwood Tegue, Penzance, October 29th*, 1895.

Abnormal Plants.—Enclosed is a curiously proliferous specimen of ox-eye daisy. It has a bunch of seven white petals growing out of the centre of the yellow composite portion of the flower in a most unusual manner.—*Vernon B. Crowther-Beynon, The Grange, Edith Weston, Stamford.*

Abnormal Plants.—Herewith I send specimens of different flowers gathered from the same plant of *Helianthus plenus*, which is growing in our garden here. The one half double and half single I think tends to prove its origin. Many plants with us this year have produced monstrous flowers, among them Canterbury-bell, *Harpalium rigidum*, *Geum rivale*, *Reedbeokia newmania*, and dahlia. I also send a leaf and bloom spike of a very curious plantain (*Plantago major*) I found some years ago growing by a country road. I brought it home and planted it in a pot in a cold greenhouse, where it has been kept ever since. I have obtained seedlings from it and three have bloomed, two like the parent plant, and one produced a normal spike like *Plantago major*. I have several times noticed leaves on the bloom spike of plantain, but never before such a perfect rosette. There is not one normal flower spike on the plant I have.—*Joshua J. Ashley, Mill House*, 25, *Cornwall Road, Brixton Hill, S.W.; Sept. 11th*, 1895.

Variety of Beech Foliage.—At Scarthing Moor, a short distance from this town, there is a similar beech to that described by Mr. Pearce on page 137. This is a tall, finely-grown, narrow-leafed beech; three of the lower branches, which are long and thin, and all on one side of the tree, bear leaves of two different kinds, those of the narrow-leafed variety, and an approach to ordinary beech foliage. One branch bears the long, narrow, deeply serrated leaves, with long petioles, on the first half of its length, those at the end nearly resemble the leaves of the ordinary beech, but are not rounded at the base; the change takes place abruptly, without any leaves of intermediate form. Two other branches bifurcate at about one-third their length, one division on each bearing the narrow leaves, the other leaves nearly like those at the end of the branch already described, but rather narrower and more serrated at the edges. I enclose specimens of the three kinds of foliage taken from this tree. I have known the tree and its peculiarity for nearly thirty years, although I did not minutely examine it until I went to gather specimens after having read Mr. Pearce's note.—*W. A. Gain, Tuxford, Newark; August*, 1895.

Botanical Monstrosities.—Being very much interested in reading the Editor's remarks on ascidia found on cabbage and other leaves (*ante* page 119), and not having seen any literature on the subject other than that they are briefly mentioned and figured in our late Editor's work on "The Sagacity and Morality of Plants," it may be of interest to say that some four specimens have come under my notice in this parish, from two different gardens at a considerable distance apart; two of which had perfectly formed pitchers, and the remaining two had the same form, but the junction of their edges had not grown together. A second form also occurred on one of the same plants, where the mid-rib had separated from the leaf and instead of forming a cup had grown very like in profile to a young coniferous tree. The following abnormal specimens have also appeared: *Primula vulgaris*, with seven segments to corolla, seven stamens, and the stigma, style and ovary had a double appearance; *Ranunculus bulbosus*, having eight petals, one of which was half-sepal and reflexed with calyx; *Chieranthus chieri*, with fasciated stem two inches wide; *Linaria vulgaris*, stem one inch wide, garden rose having leaves growing from shoot in centre of flower; *Viola cinina*, white flowered. An old friend and clever botanist, since deceased, used to have a plant of this variety in his garden, of which he was proud, saying: "It was the only specimen ever seen"—hence this record. *Geum rivale* (garden)—flower-like monstrosity, being a whorl of leaves, composed of many fimbriated structures very like the foliage leaves in form, but coloured the same as petals; from this flower-like rosette of petal-coloured leaves arose a peduncle of about half an inch in length, bearing a perfect flower even to its bract. The petaloid leaves of the lower structure were narrowed at the place of their insertion in the form of petoiles.—*Edwin E. Turner, Coggeshall, Essex; September*, 1895.

# NOTES & QUERIES

Chaffinch and Hedge-sparrow using same Nest.—When in Hertfordshire last year, it was discovered that a hedge-sparrow and a chaffinch were both laying eggs in a chaffinch's nest. Though eager to watch the result, my curiosity was baffled by a jay which plundered the nest. My host assured me that the jays did more mischief in keeping down the breeding of melodious birds than all the boys in the neighbourhood.—*James Shaw, Tynron, Dumfriesshire; October*, 1895.

Land and Fresh-water Mollusca of Cheshire.—I am compiling a list of the land and fresh-water mollusca of Cheshire, and write to ask for the assistance of conchologists who have collected in the county. It is desirable to make such a list as complete as possible, and with that end in view I shall be glad to receive and acknowledge any information relating to the distribution and habits of even the commonest species.—*Chas. Oldham, Romiley, Cheshire; September 11th*, 1895.

Panchlora maderæ in London.—A specimen of this magnificent Orthopteron was captured in Covent Garden Market on November 8th, 1895, and subsequently came into my possession with some vitality left. After I received it, it deposited an (unfortunately immature) egg bag. This is the second specimen of the species that I have obtained from Covent Garden. Most probably they were imported in bunches of bananas. This cockroach is seldom recorded as occurring in Britain.—*C. A. Briggs*, 55, *Lincolns Inn Fields.*

The Nesting-places of the Sedge-Warbler.—In corroboration of Mr. Mead-Briggs' statement in your August issue (page 156), I may say that on June 5th, 1888, I found, near Winchester, a sedge-warbler's nest with four eggs among a bunch of *Arundo phragmites*, supported by four or five stems, which pierced the sides, with two more undergirding it slantwise. The eggs were carefully identified. It would be interesting to know to what extent the nests Mr. Mead-Briggs found were supported.—*John H. Teesdale, St. Margaret's, West Dulwich; September 16th*, 1895.

Unusual Sound from Lightning. — On August 22nd, 1895, between 4 and 5 a.m., during the severe thunderstorm, I heard the lightning quite close to Clarendon Street, Cambridge. It sounded like the "sh" of a scythe through thick grass. Others heard it besides myself, and asked me what it was. The last time I heard it was in April, 1882, during a tricycle ride in the New Forest near Lyndhurst, when the lightning struck the telegraph wire about twenty feet from us. On August 22nd, the smell of ozone was very powerful at the time mentioned above.—*R. Ashington Bullen, Shoreham Vicarage, Sevenoaks.*

Nest of Kingfisher.—In June, 1894, whilst staying at Charlton, near Salisbury, I found two nests of the Kingfisher (*Alcedo ispida*) in old sand-pits close to a stream. In both cases the tunnel was close upon two feet long, broadening out at the end to a sort of chamber about six inches wide, in which the nest—formed entirely of minute fish-bones—was placed. In one nest there were eggs, and in the other young birds nearly fledged. Is this bird getting rarer in England? It would be interesting if others of your readers would contribute notes on its distribution, etc.—*E. B. Lloyd*, 11, *Portland Road, Finsbury Park, N.; September*, 1895.

Local Land Shells in Kent.—I have just visited, after an absence of two years, the colony of *Helix terrestris* (or *elegans*), the Italian shell which mysteriously appeared near Dover some years ago. I am glad to find it abundant and breeding, and, perhaps, slowly spreading, though still restricted to a small area, or practically to one chalk bank. *Helix virgata*, var. *leucozona*, is abundant and fine in one field at Patrixbourne, together with the vars. *alba*, *radiata* and other forms; also near Canterbury, in one place, *H. hortensis*, 00300, fairly plentiful, both yellow and red. At Minster I found *segmentina* and *Limnea stagnalis*, var. *variegata*.—*Rev. J. W. Horsley, St. Peter's Rectory, Walworth, S.E.; August*, 1895.

Anatomy of Blow-fly.—We have received some exceptionally beautiful microscopical objects from Mr. Ernest Hinton, of 12, Vorley Road, Upper Holloway, London. These include a proboscis of blow-fly (*Calliphora vomitoria*), side view, showing different parts in their natural shape, colour and position. Another object illustrates the lobes of the proboscis of same species, showing the pseudotrachæ, Anthony's suckers, etc. These preparations are mounted with much success without pressure, and if shown with paraboloid illumination a beautiful effect is produced. We have not previously had opportunity of so satisfactorily examining the structural details otherwise than from fresh specimens.—*John T. Carrington.*

Late Clouded - Yellow Butterfly. —On November 9th, 1895, I took, near the Sussex coast, west of Brighton, a perfectly fresh male specimen of *Colias edusa*. It was flying strongly in warm sunshine. The previous week had been cold with frosty nights, and two very wet warm days immediately preceded the 9th November. Unfortunately, I had no box with me, so the specimen was damaged during conveyance home; but I sent it alive to my friend Mr. C. A. Briggs, of Leatherhead, as, probably, one of the latest known captures of *Colias edusa* in Britain; but I have since heard of one on the 13th, in the same locality.—*John T. Carrington*, 1, *Northumberland Avenue, London; November*, 1895.

Notes on Land Molluscs.—*Succinea putris.* At Wroxham, on August 2nd I secured about three dozen deep, clear, amber-coloured specimens. They had ascended the water-grasses and *Scrophularia aquatica* to oviposit. They had nearly all laid from fifteen to twenty globular transparent eggs each, when unboxed at Cromer the same evening On August 17th the Succineæ were still upon the water-grasses in the ditches, and on the banks of the Bure. *Helix nemoralis.*—At Shoreham, Kent, this species is now ascending beech-trees (as in September, 1894) for oviposition. *H. caperata* and *H. lapicida* are also ascending the beech-trees. I cannot find *nemoralis* in Kingsdown Lane, except during this time of egg-laying. On September 7th, 1895, I secured a fine specimen of *nemoralis* with five horns, two large and three small. I sent it to Mr. J. W. Taylor, F.L.S., of Leeds. *Cleaning Shells.*—A correspondent asked a few months back for information on this subject. There is a paper on the "Process of Cleaning Shells" in the "Penny Magazine," July 20th, 1839, pp. 274-5.—*R. Ashington Bullen, Shoreham Vicarage, Sevenoaks.*

# IN MEMORIAM

Henry Seebohm, the eminent ornithologist died in London on November 26th, aged not yet sixty. Although extremely enthusiastic about his especial study, he brought into it a cool and deliberate valuation of facts, which characterised his conduct of the immense commercial undertakings which he assisted in managing. He was not only a closet or museum naturalist, but one who sought out in the wildest spots on earth the difficult problems in ornithology which interested him. For these purposes he travelled much while investigating the breeding places of birds, even up to the Arctic Circle in the palæarctic region. For this purpose he spent many months in both European and Asiatic Siberia, on which he has written deeply interesting books, that should be read by all, for they rank among the best works on travel. Other journeys were made to Holland, Norway, the Danube, Greece, Pomerania and Heligoland. In fact, having large financial resources, Mr. Seebohm could afford much which is denied to ordinary men. It can hardly be wondered, under these circumstances that he should have developed a certain independence in his ornithological views. He was one of the Secretaries of the Royal Geographical Society, and took active steps to secure success for the late International Congress of Geographers which was held in London. Mr. Seebohm was much attached to the Natural History Department of the British Museum, South Kensington, rendering it many important services; one of the last being the presentation of his entire and most valuable collection of birds'-eggs. He will be much missed by the naturalists of Sheffield, where are situated the steel works of Seebohm and Dickstahl, of which he was the head. Among the more important works of the late Henry Seebohm are "Catalogue of the Passeriformes or Perching Birds in the collection of the British Museum (Warblers and Thrushes)," 1874; "Classification of Birds, an attempt to Diagnose the Sub-classes of Existing Birds," 1890; "The Birds of the Japanese Empire," 1890; "The Geographical Distribution of the Family Charadriidæ; or, Plovers, Sandpipers, Snipes, and their Allies," 1888; "A History of British Birds, with coloured illustrations of their Eggs"—this was commenced in 1882 and finished some years later, forming one of the most important books on British birds — "Geographical Distribution of British Birds," 1893; "Siberia in Europe, a Visit to the Valley of the Petchora in North East Russia," 1880; and "Siberia in Asia, a Visit to the Valley of the Yenisei in West Siberia," 1882. This latter book is one of far more than passing interest, as it contains, beside a great deal of information about the then little-known country of Siberia and its original Samoyoed inhabitants, much new and valuable information on the breeding and migration of certain European birds. Mr. Seebohm was a Fellow of several of the chartered scientific societies, but he rarely used his right to the initials following his name. Influenza was the indirect cause of his death.

# TRANSACTIONS

City of London Entomological and Natural History Society.—At the Meeting held Tuesday, September 17th, 1895, the exhibitors included the Rev. C. R. N. Burrows, *Apamea ophiogramma* taken on sugar in his garden at Rainham; he remarked that this species deposits its ova in a row in a fold at the edge of the leaf of ribbon grass. Mr. Bayne, a small specimen of *Boarmia roboraria* from Epping Forest, and a brownish specimen from the New Forest, in which the usual peppering of small dots was wanting on that portion of each wing contiguous to the inner margin and anal angle; also an example of *Boarmia gemmaria* with a pale greyish median area to the fore-wings. Mr. Bacot, a series of *Bryophila perla* from the waterworks wall, Lea Brdge, which were very white and cleanly marked. Dr. Buckell, three series of *Eugonia quercinaria* bred this year. The parents of series 1 were of the normal narrow-lined form with few markings, and their progeny showed a very slight melanic tendency. The parents of series 2 were darker, the male showing strong melanic tendency in the outer third of fore-wings; many of the male progeny showed considerable darkening on both the inner and outer thirds of the fore-wings, the females having the lines strongly marked, and in some cases showing a considerable sprinkling of dark scales. Parents of series 3 were a very dark male and a very pale female; the progeny were all dark, some extremely so, and many of the females had the outer third of fore-wings very dark. Mr. Nicholson also exhibited a short bred series of this species. The parents were a male with outer third of fore-wings suffused with a smoky tint, and a female with inner and outer thirds considerably darkened. All the females bred showed a strong tendency to melanism in the outer third, except one; and all except two were dark on the inner third; the males all showed similar darkening, and one was entirely suffused with smoky brown, especially on inner and outer thirds. Mr. Bacot, referring to a recent visit to Sandown with Mr. Prout, said that a mixture of raspberry jam and methylated spirits had proved more productive than the ordinary treacle, rum and jargonelle essence. They had taken, amongst many others, *Leucania albipuncta*, *Aporophyla australis* (common), *Agrotis saucia* (abundant), and all the British examples of the genus *Triphaena* except *T. interjecta*. Mr. Tutt exhibited *Nemeophila plantaginis* from one locality near Andermatt, Switzerland, including var. *hospita* and others; some of the latter were almost entirely black, and others had the hind wings scarcely marked with black at all. He had seen occasional British specimens like all these forms.—Tuesday, October 1st, 1895. Exhibits: Mr. Oldham, *Leucania albipuncta* from Folkestone. Mr. Tutt, *Polyommatus ægon* from Westmoreland, the females being much suffused with blue, and the males of two shades, some being almost lilac-coloured and others bright blue. Also *Orthosia suspecta*, *Celaena haworthii*, *Hydrœcia lucens* and *paludis*, all from Warrington. He believed *paludis* and *lucens* to be distinct from *nictitans* as they were found in different localities and did not fly together. Mr. Clark, a New Forest specimen of *Cleora lichenaria* about as large as *Coremia ferrugata*. Mr. Tremayne, a *Mamestra brassicæ* from Deal, which had a pale grey ground colour and very distinct transverse lines, the ordinary dark mottling being almost entirely absent. Mr. Nicholson, a short series of males of *Ocneria dispar* bred this year; one was beautifully marked with pale buff, and others showed considerable variation in the same direction; their average wing expanse was $1\frac{7}{8}$ inch. Capt. Thompson, *Eubolia cervinaria*, bred from larvæ taken from Hornsea, Yorkshire. Mr. Bacot, variety of *Mania typica* with the fore-wings much suffused with black, and pale and dark varieties of *Lecronycta megacephala*, the former closely resembling *A. aceris*, and the latter having a subterminal row of pale spots.—Tuesday, October 15th, 1895. Exhibits: Mr. Nicholson, a specimen of *Mamestra brassicæ* of an almost uniform lead-colour, the discoidal spots and subterminal line being of a smoky yellow tint. Mr. Tremayne, *Acidalia contiguaria* and other species from N. Wales. Dr. Sequeira, amongst other insects, a very fine pale-banded form of *Cidaria siterata* from the New Forest. Mr. Oldham, male *Odonestis potatoria* with female colouration, bred from Cambridgeshire larvæ, and a living example of *Chelonia caia* taken on the 14th at Woodford. Mr. Gurney, the skin of a penguin which had been captured at Port Elizabeth, South Africa, and was supposed to have swum from Bird Island, a distance of about 30 miles. Mr. Bayne, *Hesperia comma* from near Aylesbury, showing variation in the amount of suffusion with paler scales. Rev. C. R. N. Burrows, *Xanthia gilvago* and *X. circellaris* from Suffolk, showing some beautiful variations. He enumerated a list of fourteen species which he had seen at sugar at Rainham that evening, before he left for the meeting; these included *Calamia lutosa*, *Plusia gamma*, *Noctua c-nigrum*, *Caradrina cubicularis* and *Orthosia lota*. Mr. Bate, a living *Acherontia atropos* which did not require much persuasion to induce it to squeak. In quality of tone the sound strongly resembled the call of the corncrake in miniature, but it was repeated incessantly, instead of twice at short intervals as in the case of the bird. Mr. T.W. Jackson, a very large bred variety of *Chelonia caja* in which the hind wings were entirely orange-coloured, except a small blackish blotch near the apex; the fore-wings were only slightly marked with brown, and the left pair of wings were less distinctly marked than the right pair. Dr. Buckell read a paper on *Cœnonympha typhon*, several of the members bringing their series of the insect to help to illustrate the paper.—*C. Nicholson, A. N. Battley, Hon. Secs.*

The South London Entomological and Natural History Society.—October 24th, 1895, T. W. Hall, Esq., F.E.S., President, in the chair. Colonel Partridge was elected a member. Mr. Frohawk exhibited two specimens of *Acherontia atropos*, one of which had been washed ashore in Glamorgan, and the other taken at the lighthouse of St. Agnes, Scilly. It was remarked that the species had occurred singly in many places in Britain this autumn. Mr. Oldham, series of *Mamestra brassicæ* from Wisbeach and Woodford, those from the latter place being darker; two *Cosmia paleacea* from Lancashire; *Xylina semibrunnea* and several other species, from Folkestone. Mr. Williams, the feet of a cat possessing seven claws on the fore-paws and six on the hind. Mr. Carrington remarked that he knew of a race of such cats which had existed more than ten years, and he had heard of one specimen having ten claws on each foot. Mr. West (of Greenwich) several molluscs of the genus *Helix*, from the Eastern Archipelago. Mr. McArthur, *H. arbustorum* and *H. hortensis*, from the Orkneys. The former were thin-shelled and dark, while the latter were small and dark. A series of *Noctua festiva*, var. *conflua*, and specimens of *Agrotis vestigialis*, *A. cursoria*, and *A. tritici*, all from the Orkneys this year. Mr. Hy. J. Turner, series of *Agrotis obelisca* and *Aporophyla australis*, from Freshwater, and stated that the former had been very common there this year. Mr. R. Adkin, two series of *Himera pennaria*, from the New Forest and Abbot's Wood, respectively, and contributed notes. Mr. W. B. Thornhill communicated a series of observations upon a brood of *Arctia caja*, analysing the smaller variations shown. Mr. West, a bug, *Zicrona cærulea*, taken by Mr. Billups on the fungus table at the exhibition at St. Martin's Hall. Mr. Carrington reported having seen a fresh specimen of *Colias edusa* on the South Coast on October 20th, and Mr. Frohawk stated that several were seen on Hayling Island on the same day. Mr. Edwards read a paper communicated by Mr. Step, entitled "Notes on Sea Anemones." Mr. Turner laid on the table a full report of the annual exhibition, held October 17th, 1895.—*Hy. J. Turner, Hon. Report Sec.*

North Staffordshire Naturalists' Field Club.—This club's first evening meeting of the winter season was held on November 23rd, 1895, in the New Gallery, Campbell Place, Stoke. The chair was occupied by the President, Mr. W. Wells Bladen, who gave a most interesting demonstration on "Osseous remains found in the recent excavations for drainage-works at Stone," which, as classified on the table, attracted much attention. He said he was bringing to their notice some objects of a greater or less antiquity which had been found during the present year in excavations for a deep drainage at Stone. He could not claim that they were beautiful to the eye, but to the archæologist, geologist and zoologist they could not fail to be of great interest from the story they had to tell. Amongst the various things he proceeded to point out were remains of *Bos primigenius (urus)*, *Bos longifrons*, horse, red-deer, sheep and goat, a flint flake, an iron spear, some worked stones and tiles, and some pieces of earthenware of a later date. Most of them had been collected by himself. For assistance in bringing this subject before the club, he had to thank his friends, Mr. Lynam and Mr. De Rance, also Professor Boyd Dawkins, F.R.S., who had, with the greatest kindness, identified everything he had sent to him. No. 1 (length 16 inches, circ. at base 8 inches), a left horn core of *Bos urus* was found between two large boulders. The ground about it had often been disturbed; it smelt very strongly of sewer-gas. He submitted it to Professor Boyd Dawkins, who wrote, from Owens College, Manchester, as follows: "The horn core, which I return, is the left horn core of an ox of the urus type. I should infer from its small size and the absence of the usual double curvature, that it belonged to a domestic variety. If it does, the date will be fixed as not earlier than the conquest of Britain by the English. It has been cut with an edge of metal. Of course it may be an abnormal form of urus. If so, it is new to me." No. 2 (length $11\frac{3}{4}$ inches, circ. $6\frac{1}{8}$ inches), a right horn core (*Bos urus*), was found near the Scotch brook. It was eight feet below the surface, the bottom twelve inches being clay. Professor Boyd Dawkins wrote on this: "The second horn core also belongs to a domestic variety of *Bos urus* (*primigenius*), and probably to a cow." No. 3, a left horn core (*Bos urus*), (length $18\frac{5}{8}$ inches, circ. $7\frac{1}{2}$ inches), and No. 4, a left horn core (length 10 inches, circ. $5\frac{3}{8}$ inches), were found together in Stafford Street. No. 5, a right horn core (length 10 inches, circ. $7\frac{1}{2}$ inches), was found near Oak Inn. The latter three cores were found at the same depth, eight feet from the surface, in gravel. Referring to these, Professor Dawkins wrote: "All the larger horn cores appear to me to belong to domestic oxen of the strain of *Bos urus*, the aboriginal wild ox of Europe and Asia, from which all of our larger breeds are descended. No. 4 may be crossed with the strain of *Bos longifrons*. The presence of the urus strain proves that the date of the deposit is not older than the English invasion."

Norfolk and Norwich Naturalists' Society.—A meeting was held on October 28th, 1895, at the Castle Museum, the President (Mr. H. D. Geldart) in the chair. Mr. Southwell read some notes on a few of the more remarkable birds in the Castle Museum collection. On the present occasion, he confined himself to the two families containing the Megapodes, or "mound-builders," and the wingless apteryx, of New Zealand. Mr. Patterson read "Some Old Notes, from June 1st to October 26th." An oyster-catcher was seen on Breydon, on June 3rd, this being unusual, as this bird seems to prefer the beach. Mr. Patterson's most interesting record is that of a streaked gurnard, which came into the Rev. C. J. Lucas' possession on July 29th. It was $9\frac{1}{2}$ inches long. This is the first occurrence in Norfolk.

Natural History Society of Glasgow.—At the forty-fourth annual general meeting—Professor Thomas King, President, in the chair—Mr. R. D. Wilkie, on behalf of the hon. secretary, read the report of the Council on the work and progress of the Society during the previous year. It was stated that the names of one honorary, two corresponding, one life, and twenty-nine ordinary, members had been added to the roll (the total membership being 269), and that twelve associates had also been admitted. The statement of accounts showed an estimated net balance of £40 at credit of the Society. Mr. James Mitchell, hon. librarian gave in a favourable report of the library during the year; a large number of books, many of them gifts, dealing with all branches of biological science, had been added. Mr. J. Paterson exhibited an example of the great or solitary snipe (*Gallinago major*, Gmelin) shot on September 27th last. The fact was recalled that it is thirty-one years since this species was last exhibited to the Society, although in 1885 a pair were shot at Clydebank in May, an unusual season for the great snipe to occur in this country, as its appearances are almost confined to the period of the autumn migration. Mr. A. Somerville, B. Sc., F.L.S., on behalf of Mr. F. Lockhart Robertson, showed a young oak-tree eleven inches in height, and with a root forty-one inches long, grown in twenty months, from an acorn suspended over water, sustained by the store of nourishment in the cotyledons, and by the chemical elements in the atmosphere and water, dealt with by the chlorophyll in the leaves.

# NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s.* 6*d.* for twelve months (including postage), are now due.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid.* Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

## CORRESPONDENCE.

E. A. Webb (Chislehurst).—You will find reference to luminous centipedes in May (p. 82) and June (p. 110) numbers of Science-Gossip for this year.

D. Hooper (London).—(1) The bending over of plants is attributed by some physiologists to an increased growth on the side of the stem most exposed to light, thus pushing over the top of the stem into a drooping position. This varies in habit according to species. (2) The term *lores* is used in ornithology for describing the side of the head, between the eye and the upper mandible, which space is sometimes naked and generally has either bristles or characteristic feathers. Derived from the Latin *lorum*, a thong or strap.

## EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Wanted, No. 1 of "Naturalists' Journal"; good value given in exchange. State wants.—Charles Mosley, Woodside Road, Huddersfield.

Duplicates.—Helicella fusca, Mont., and others; desiderata, vars. of Limnaeæ.—E. W. W. Bowell, Huntsham, Bampton, N. Devon.

Ferro-type reproduction of plates of Greville's "New and Rare Diatoms," Series Nos. 1 to 20, in exchange for microscopic slides or natural history literature.—J. B. Bessell, 8, Elmgrove Road, Cotham, Bristol.

Pap. demoleus, P. policenes, P. erinus, P. similis, P. antheus, Timetes corinna, A. sagana, A. niphe and others offered in exchange for butterflies from North of Scotland and West of Ireland.—Harry Moore, 12, Lower Road, Rotherhithe, S.E.

Cuckoos' eggs with those of foster parent wanted.—W. Wells Bladen, Stone, Staffordshire.

Duplicates.—Pisi, bred Adonis, dark uniform Dilutaria; desiderata, Plecta, light ground-coloured Dilutaria.—Hy. J. Turner, 13, Drakefell Road, St. Catherine's Park, Hatcham, S.E.

Science-Gossip for the years 1880 and 1881, complete, and November and December of 1879. What offers?—(Rev.) Fred. Sumner, 283, Oxford Road, Reading.

Wanted, foreign stamps. Offered, several hundred species of British Coleoptera, about 10,000 specimens, all correctly named and in fine condition.—A. Ford, 48, Rugby Road, Preston, Brighton.

Wanted, entomological store-boxes, corked or not corked. Offered, 500 natural history books, magazines, British marine, land and freshwater shells, Alpine butterflies and zoophytes.—W. Harcourt-Bath, 195, Ladywood Road, Birmingham.

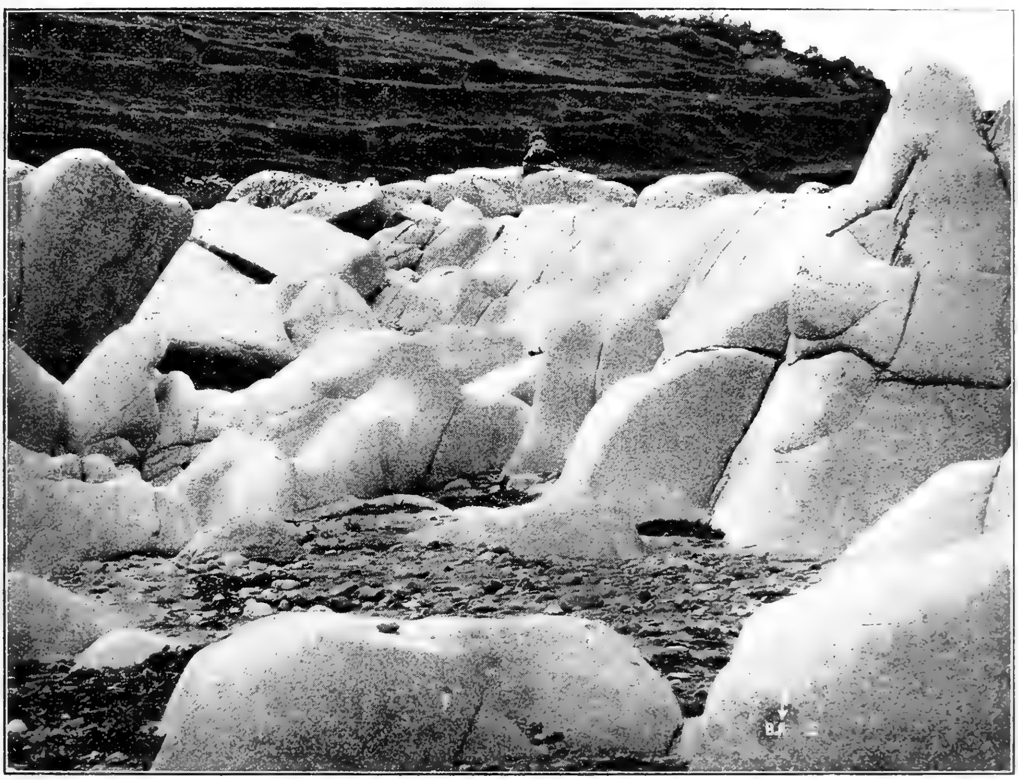
Science-Gossip for the years 1881-82-83-84-85, unbound, clean, complete; offers wanted in photo or scientific apparatus.—W. Scorah, optician, Fleetwood.

Demandé, en échange d'autres coquilles, terrestres des *Pupa* et *Vertigo* européens rares ou exotiques, ainsi que des Operculés terrestres d'Europe.—E. Margier, juge d'instruction, à Alais (Gard), France.

# THE EURITE OF GLASDRUMMAN PORT.

BY PROF. GRENVILLE A. J. COLE, F.G.S., M.R.I.A.

MR. WELCH'S photograph, which is reproduced on this page by his kind permission, is one of three, illustrating a great composite dyke on the east coast of Co. Down. This is eminently an eruptive district. The uptilted Ordovician (Lower Silurian) strata were broken through by a series of fissures, into which basalts and allied rocks oozed in a molten state, forming the immense mass of eurite forced its way, so that we now have a dyke with four feet to seventeen feet of basaltic andesite at its two sides, and thirty-six feet of pale pinkish eurite in the middle. Numerous blocks of the andesite were torn off and became included in the eurite; they weather away more easily than the latter rock, and thus become sunk in the broad wave-worn surface of the eurite. The photograph



R. WELCH, *Photo.*] PORPHYRITIC EURITE OF GLASDRUMMAN PORT, CO. DOWN. [*Belfast.*
(Arrows point to fragments of Basaltic Andesite.)

number of dykes now to be seen upon the shore. Somewhat later, an enormous intrusion of granite occurred, forming the central mass of the Mourne Mountains, and cutting off the earlier dykes all round its margins. A few new dykes of fine-grained granite (eurite) also arose, cutting across the others, or intruding along them and forming "composite dykes," like that of Glasdrumman. Here there was originally a dyke of basaltic andesite—a dark, fine-grained, and partly glassy rock, containing labradorite felspar and brown angite. Into a fissure in the centre of this, a broad shows well the rounding of the eurite by wave-action, and by the sand and pebbles thrown against it at every high tide. Behind is the low cliff of pebbly "drift" that fringes the coast of Mourne. In front, some of the dark blocks of andesite are seen included in the eurite, and are indicated by arrows. The eurite is speckled over with porphyritic crystals of felspar, especially towards its margins. The phenomena of these margins themselves have been the subject of a recent paper ("Scientific Transactions of the Royal Dublin Society," vol. v., page 239), since the most delicate intermingling of the two rocks has gone on along them. The eurite has melted up the easily fusible andesite, and, in turn, the melted andesite has attacked its invader. Consequently crystals of quartz and flesh-red felspar, derived from the eurite, are found floated away some inches into the marginal andesite, and at first sight it would appear as if the andesite were the later rock. The microscope, applied to thin sections, shows how intimate a mixture of the two materials has occurred, A foot away, however, from the planes of junction, the andesite contains only its original and proper crystals.

*Royal College of Science for Ireland, Dublin; Dec., 1895.*

## ALPINE PLANTS,

By Sophia Armitt.

IMMEDIATELY below the lines of perpetual snow is the home of the Alpine flowers; we can hardly fix a limit to the height at which they grow, for the snow-line varies, lifting itself higher the nearer one approaches the equator. In the region below the snow, above the trees, of which the last are pines and elders, the Alpine herbs occupy the ground alone, spreading themselves out in mat-like and characteristic fashion. Not that there are no trees here, but only the initiated know how to find them; they have had to accommodate themselves to hard conditions, to such protection in winter by burying their stems in earth, or to creep in tortuous zigzags between crag and boulder. The little herbaceous willow, *Salix herbacea*, lives on some of the wind-swept tops of our English mountains; it has a little woody trunk underground, quite thick and hard, sending forth in summer short-lived herbaceous branches, set with small grey leaves and single tiny catkins. The netted willow, *S. reticulata*, is a tree too, creeping over the surface of rocks and stones, with large round net-veined leaves, and is a handsomer plant than the former. Of truly woody plants, in the European Alps, there are few besides the dwarf willows, some rhododendrons, the beautiful mountain heath, *Erica carnea*, and one single *Azalea* of like habit with the willow, *A. procumbens.* These are scarcely characteristic Alpines; the willows are Arctic rather than Alpine; odd instances of survival in inclement regions of such natures as were plastic enough to bend before the storms of winter, and the rhododendrons of Europe have, I think, a lower range than the Alpine flowers. The true Alpine plants are low growing perennial herbs with woody roots; annuals are rare in this zone, only a few small species growing on damp sand, as *Gentiana tenella*; in habit they are dense, growing close together in belts or masses; they have a relatively small amount of foliage to their large and brilliantly-coloured flowers. No lowland flowers produce such vivid colouring or grow in such colonies and conspicuous patches; it is the cumulative habit, the colour of each flower, thus helping the others to look attractive—that is, perhaps, most characteristic. They lie very low in compact rosette-like masses; they are scarcely higher than the ground they decorate so profusely. This close habit and profusion of bloom, the very desideratum of the gardener's art, is found on Alpine slopes, the product of wild nature alone; it is the product of long winters, short summers, hard conditions. The coldest climates produce the loveliest flowers. Many of these hardy herbs yield resinous and bitter substances; these flowers secrete plentiful honey, often stored in deep and open bells. All the mountain chains of the world have their Alpine floras, and if they are somewhat of the same character, they are also each one special in possessing species not to be found elsewhere. Some are richer than others, but all have some peculiarity. On the mountains of Oceania the genus *Veronica* dominates; on the Andes abound species of *Pentstemon*, of dwarf umbellifers, of fuchsias, of gentians and saxifrages, quite different from those familiar to us. The North-American mountains have their phloxes and œnotheras. The Himalayas are rich in curious composites and rhododendrons. The Alps of central Europe, which alone are known to me, yield many species of ranunculus, crucifers, saxifrages, campanulas, phyteumas, gentians, and primulas. There are some few far-reaching species that extend from the Arctic Circle to the Alps of the south temperate zone, They cross the tropics from north to south by the only bridge there is, the chain of Andes. They are but lowly little plants, *Epilobium alpinum*, *Erigeron alpinus*, *Empetrum nigrum*, *Phlœum alpinium*, *Lycopodium selago*, etc. We find the characteristic Alpines of Switzerland and the Tyrol on slopes from 6,000 to 9,000 feet high; some few have been found higher, *Ranunculus glacialis*, *Saxifraga azoides*, *Achillea atrata* have been found as high as 12,000 feet; but one may revel in Alpine flowers from about 7,000 feet to the glacier edges and the snow level, culling a rich harvest in a short summer. One happy year that I spent in those valleys I got five hundred species, and four to six specimens of each. So rich did I find the Engadin that the necessary time for pressing the plants was almost more than I had patience for. Lower down, the valleys themselves seem richer in floral beauty than the fields of the plains; one gathers there great globe flowers, narcissus, columbine, arnica, graceful lilies, tall gentians, and many others. The mosses climb even higher than any flowering plants, and the lichens seem to know no limit beyond which they cannot pass, living on the rocks of the highest peaks.

To understand the cause of the characteristic habits and form of Alpine plants, we must enter somewhat into the conditions in which they grow. In the high Alps there are scarcely four months of the year when growth is possible, and even then often in a temperature only ranging from 0 degree to 2 degrees Cent. This temperature is attained at noon on 90 to 120 days; in the morning it is reached only on twenty-three days, and towards evening on no more than fifteen. Is it to be wondered at that these little plants have diverged in habits from those of the woods and plains to suit these hard conditions? The cells of their leaves are smaller, the contents more concentrated, their partitions thicker than in the lowland forms, so that in freezing and thawing the tissues do not tear. The nightly frosts explain the low-growing habit: plants are supposed to grow more rapidly by night than by day. Here there can be no question of growth by night on account of the frost, and as they can only grow by day, the shortness of their internodes is explained. For this same reason Alpine plants change much on being transplanted to the plains. They must needs flower quickly to win time to ripen their seeds, if indeed they can do so. Many instances are known of species higher up flowering earlier than those lower down: *Gnaphalium dioicum* and *Dianthus superbus* flower a month earlier at their highest than at their lowest limits. Strong sunlight, damp mists and frequent rains make up the summer climate at high levels, and they force on the early flowering at the expense of the accumulations stored up by the previous year's growth. Intensity of light and heat are not detrimental as long as the ground remains constantly saturated; but as a protection from the power of the sun's rays, the leaves are thick with a very solid epidermis. They are also prevented from drying by a pubescence of star-shaped hairs; this is quite special among the crucifers, whose epidermis is generally so delicate. Greyish-looking thick felt covers other plants for the same purpose, especially composites. The peculiarities become more marked in places exposed to the sun and on steep slopes, than in shady ravines,—edelweiss, artemisias, and *Senecio* are examples. If we examine a *Soldanella* or *Anemone vernalis* at the approach of winter we shall find in the centre of the rosette of leaves, well hidden away in the heart of the plant, the buds which will flower in the spring. When the snow comes they are fully formed, and they have not to suffer such changes of temperature as do the plants of lower zones, for they remain covered with snow during the whole time that snow lasts. Some of the early flowering species do not even wait for the complete disappearance of the snow to develop further; they emerge as soon as the frozen covering becomes soft enough for them to pierce it. In many species the leaves resist almost entirely the winter cold, and continue under the snow to amass in their tissues the substances which nourish the flowers in the spring. Kerner observes that the leaves of *Soldanella* remain healthy and vigorous until the birth of new stems, and that then only they wither and fall. The stiff, persistent leaves of small species of gentians, saxifrages and azaleas play the same part. Then, in the spring, when the surface of the ground is soaked with melting snows, the younger parts start into growth at the expense of the plastic material of the older parts which have ceased to grow, the older parts serving as reservoirs of nutriment for the younger. I know of no prettier sight than the purple bells of *Soldanella alpina* standing in the centre of the little hole which the stem has made for itself in the snow. The heat that it gives out in transpiration is enough to melt these little holes in the already half-melted snow above it, and through which the flower-stalk then emerges, bearing one, two, or three fringed bells, developing still out of the nutriment stored up in the last year's leathery leaves. The flowers are over in a few days, almost before the snow is gone. The auricula is another very early plant that seems quite like a product of the snow.

That Alpine plants are often not able to ripen their seeds seems to prove that they are placed upon the limits of conditions necessary for existence; but want of seed is often balanced by the number of branches and buds. Their tendency to form cushions and mats is also a compensation for the rarity of ripe fruit. Some of them, too, enjoy a very long life. Mr. Correvon, of Geneva, has gathered specimens of *Saxifraga oppositifolia*, which he judged to be at least one hundred years old. This plant, therefore, might maintain itself well by only occasionally ripening seed. It cannot be doubted that the brilliant colours of the corollas of the higher Alps have a close relation to the small number of insects there to effect fertilisation by their contact. Below, where flying insect wings abound, there is not the same necessity for the corollas to strike the eye. Hence it arises that, in the Alpine flora, the corolla is not reduced in proportion to the rest of the plant, for if it were so, fertilisation would be too much compromised. It has been suggested that the flowers have produced their special brilliance and form for the purpose of attracting butterflies. The bees, the great flower fertilisers of the lower regions, cannot get up so high; with their heavy bodies, their smaller wing power will not lift them into this zone of rarer air, which the butterflies, with lighter bodies and larger wings, can easily traverse. So the flowers must perforce bid for the services of the higher-flying butterflies. Butterflies do not search diligently, methodically, from one flower to the next, as do the neuter bees with their different aims. They fly high above the flowers, and only alight here and there, and now and then, as they want a sip of nectar. So the flowers spread themselves out in large flat mats, easily striking the eye from a distance, and take the form of deep and open bells like the gentians, with plenty of honey easily reached by the long butterfly proboscis.

As to the number of species constituting the Alpine flora of Central Europe, Baker says there cannot be less than a thousand species, but Dr. Christ counts them only as seven hundred. A large proportion are high-climbing species of cool, temperate genera; those of *Oxytropis* and *Astragalus* have hundreds of species on the Steppes of Asia, and the half-dozen Alpine ones seem to mark the limit of their western migration. Edelweiss is a true plant of the prairies. On the Steppes of Siberia it grows by millions among *Achillea*, *Centauria* and *Artemisia*. When it descends from the high Alps to its most fertile stations it puts on the slenderer habit which it has in its Asiatic home. Some are Mediterranean forms, a few are American. About a third of the whole are Arctic as well as Alpine plants; that is to say they are found in the Arctic zone, as well as in the Alps. The Arctic plants as distinguished from the Alpines, are considered to be the older. The theory is that after the retreat of the glaciers of the last ice age, the endemic Alpine flora was formed, and the Arctic one was able to spread itself anew in the higher Alps. Thus the endemic flora is an age younger than the northern one. If the endemic flora had existed in the time of the glacial epoch, how can its absence be explained from the countries of the north. What proves that the true Alpines were formed after the climate moderated is that their types are southern and Mediterranean, which are transformed into true Alpines like *Erica carnea*. They are species which were able to immigrate and modify themselves when the climate permitted them to maintain themselves in the Alpine zone. About 182 species may be said to have thus originated in our Alps, and they are distinguished from the Arctic plants in more than one way. They inhabit dry stations and rocks, as the white potentillas, saxifrages of the group of *Aizoon*, gentians, campanulas, *Phyteuma*, *Achillea*, and *Sempervivum*. Among the genus *Epilobium* only one, *fleischeri*, is truly Alpine. The seven species of *Phyteuma*, the six stemless *Androsace*, the four *Sesleria* are exclusively Alpine. The Alpine chain, with a climate warmer and drier than the Arctic zone, has given birth to species which have chosen the stations that do not suit the Arctic species, which, having sought humid spots, have abandoned the dry places to the endemic species. In the struggle between the two, the Alpine flora has the preponderance when encouraged by the softness of the southern climate; but when the damp and cold of the altitude make themselves more strongly felt, they give place to the plants of the north which can the better resist. Thus our Alpine plants are a mixed race of endemic species, Arctic species, and high-climbing species of the neighbouring temperate regions. This theory of origin is, I believe, not unchallenged; I give it because I know no better. Mr. Ball the President of the Alpine Club, has another; but it is buried, to me, in an unknown volume of the "Transactions of the Royal Geographical Society."

*Ambleside; November*, 1895.

## THE NEW LEPIDOPTEROLOGY.

WE have been favoured with an advance copy of "The Label List of British Lepidoptera," compiled after "A Handbook of British Lepidoptera," by Edward Meyrick, B.A., F.Z.S., F.E.S.; published by Watkins and Doncaster, of 36, Strand, London. It was a wise thing for Mr. Meyrick to arrange for the issue of this list in conjunction with his handbook which we noticed at length last month (page 229). The list will be useful for gaining at a glance a summary of Mr. Meyrick's new arrangement, but if the list were synonymic, its value would have been the greater. On opening its pages, which number thirty-four, at first sight, especially to those who have not yet seen his handbook, the new nomenclature and arrangement make a nice puzzle for solution. The first page we notice at random is number four, and on it we find the genus *Harmodia*, one species being *luteago*, Hb. As there are no synonyms in this list and we are writing in an express railway train where our copy of Hubner's work is not available, *Harmodia luteago* does not convey much to one's mind. Our only guide is that it is arranged between what was called *Dianthicia caesia* and *D. carpophaga*, and then we remember that some people think the Irish *D. barretti* of Doubleday is the same species as Hubner's *luteago*. Following in the same column as this occurs, is *Melanchra chrysozona*, Bkh., associated in the same genus with *cespitis*, *serena*, *brassicæ* and *myrtilli*, so we have to give up this puzzle until we can return to our library. Altogether Mr. Meyrick has given plenty of occupation, for those who adopt his system, and for those who do not, in keeping up to date in the new Lepidopterology. J. T. C.

# DEVELOPMENT OF THE ALDERFLY.

By W. H. Nunney.

HAVING in the summer of 1888 collected a large number of the eggs of the common so-called "stone-fly" (*Sialis lutaria*), I placed the reeds upon which they were in water, in order, if possible, to watch the transformations. The result exceeded my highest expectations, for in about a week from the date of capture I possessed hundreds of the young larvæ of different ages. The later-earlier stages, if I may so term them, of these larvæ have been fairly well described by the older working naturalists, but the characters given for the creatures immediately upon exclusion from the egg were vague and unsatisfactory.

The eggs, as is well known, are laid side by side in somewhat regular patches on reeds, palings, etc., and are of the form shown in the accompanying figure 2. The micropylal capsule is very prominent in these eggs, and is perhaps their most noticeable feature. They are of a dull brown colour until ripe for the emergence of the early larvæ, when the larval pigment shows through the egg-shell, causing it to appear reddish in colour. After hatching, the egg-shell becomes semi-transparent. Being dense during incubation, it is almost impossible to gain any idea of the embryological phases. Certain of them, however, are clearer than others, and I was fortunately enabled to examine microscopically a specimen (the one figured) in which the outlines of the almost-ready-to-be-excluded larva were faintly visible. Beyond this I was unable to make observations on the larva *in ovo*.

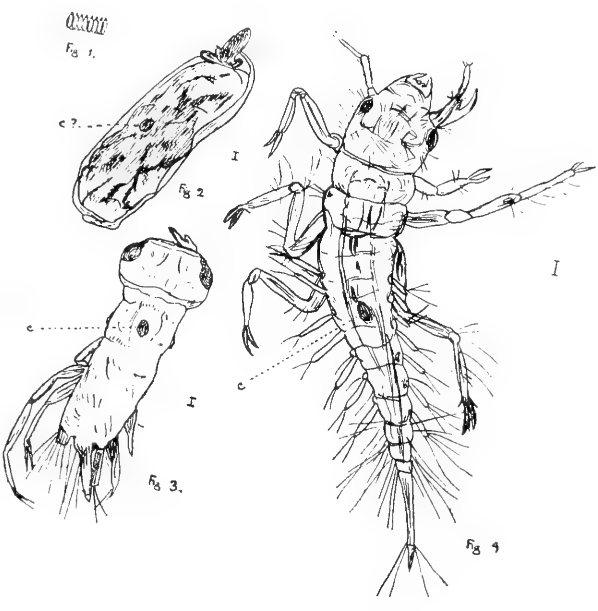


Fig. 1, group of eggs of *Sialis*. Fig. 2, egg magnified, showing embryo. Fig. 3, larva immediately on exclusion from egg, magnified. Fig. 4, larva in second stage. *c* and *c?* pulsating corpuscle. The lines *I* indicate natural size.

In the examination of the excluded larva I had better fortune. Turning over some of the eggs from which I knew the larvæ not to have emerged, my attention was attracted to several minute reddish spots apparently taking the places of the capsules. On closer observation I found the capsule in each case pushed aside and the minute larva struggling to free itself from the now useless egg-shell. This being accomplished, in about ten minutes a spasmodic movement took place in the hindmost segment, probably as a means of extension thereof to prepare the creature for its slightly later form. At this stage the larva (making some allowance for distortion caused by pressure in mounting the object in balsam on a micro slide) is, as shown in fig. 2, altogether lumpy and inelegant. In the living creature under the microscope a systolic and diastolic action of a large red corpuscle situated in the thoracic region was at this stage very distinct, but I failed to observe a circulation of fluid either therefrom or in the hardly visible vascular system. The body seemed almost unsegmented, and was apparently destitute of the branchiæ so easily seen in all the later larval stages. The body is also sparsely haired. The tail is seen as a tubular projection situated between two humps on the immediately preceding body segment. The legs are doubtfully situate in the thoracic region. One of the most noticeable features at this stage is the mandible, which is of the bidentate form shown in the figure, the outer tooth, however, being stouter and shorter than the inner. Possibly this appearance is due to compression by the cover-glass. Antennal rudiments are visible just above the compound eyes, which are as large as in the creature some stages further onward.

In the next stage, when a change of skin has been undergone, the creature seems altogether different, the lumpishness has given place to a slender and tapering contour, and the entire body is fairly well garnished with fine hairs and has acquired the swimming branchiæ to the number of seven or eight pairs, which are apparently so necessary to the larval well-being and which add so much to its gracefulness. Other and more curious structural changes have taken place, the mandibles are much larger and have now the outer tooth longer than the inner, the antennæ are well developed, the body has become clearly segmented and the thorax differentiated therefrom; the tail is a striking character, and last, but not least, the blood corpuscle is no longer situated in the thoracic region but has taken up a position midway between the two extremities. A circulation is faintly visible. The larva in this stage is well shown by fig. 3.

The succeeding larval stages are but repetitions of the second *plus* the process of skin shedding and consequent increase of size. Indeed, the only actual difference between the second and third stages is the position of the pulsating corpuscle, which has in this later stage retired still more towards the tail extremity.

The emergence of the perfect fly in April and May, after the acquirement by the larva of wing-sheaths as a sign of pupal existence, brings to a close this "strange, eventful history" and the whole cycle undergoes repetition.

*Bloomsbury; November, 1895.*

## A GARDEN IN SIAM.

By Mrs. K. Grindrod.

*(Continued from page 206.)*

IN a small enclosed portion of this garden in Siam, surrounded on all sides by creeks, and the creeks by hedges of sweet-scented heliotrope, the Malay gardeners, in leisurely fashion, try to rear such of the most attractive tropical flowering plants as the disadvantages of the spot will allow. Unfortunately, the trees have all disappeared long since from the little enclosure, for it was once a paddy field—witness the stalks of rice which still rear their graceful plumes in the shallow creeks. For lack of shade the clayey soil becomes in the hot season as iron for hardness, and cracks into great fissures all over its surface. Unfortunately, too, the gardeners waste much of their small store of energy and of ground-space in the vain attempt to grow roses. The result is rotten-heartedness for the roses, and disappointment for the spectator. But there are compensations. The hedge of heliotrope is itself a perpetual delight, with its delicate odours, its starry blossoms of white and gold, or orange and brown, or ruby and gold—never the dowdy purple of the hot-house heliotrope at home. The glossy, dark-green drupelets of the multiple fruits are scarcely less beautiful than the flowers themselves. Where the heliotrope comes to an end a mass of purple verbena clothes one side of the little bridge spanning the creek, and to the other rail of the bridge clings the passion-flower, beloved of mystic and botanist alike. Scattered at random over the enclosure are many varieties of the red-starred *Ixora* and still more numerous forms of the gorgeous *Hibiscus* tribe. Cool arcades of the "Hibiscus of the Ragged Petals" invite from glaring sunlight into refreshing shade, and the long-drooping staminal tube of the wonderful flower brushes one's cheek as one passes along the cool yet flaming avenue. Beyond, the rose-plumbago tries to outshine its delicate pale-blue cousin from the Cape; and *Nerium oleander*, with rose-pink flowers and glistening ruby buds, and leaves of exquisitely beautiful venation, displays its charms close to those of a double gardenia. But is there anything in nature or in art which can outvie the gardenia in its native tropics? Never elsewhere are the thick creamy whorls of petals so perfect in waxen beauty, nor the leaves so deep in tone, so glossy in surface; and never, certainly, is the delicate aroma of the flower so penetrating, even to ecstasy, as in a tropical garden during the brief twilight. Other sweet-scented flowers are here in profusion, with perfumes often too strong for any but Oriental tastes. Here is the pretty white "mali" of the Siamese, a simple oleaceous flower which they twine into garlands and top-knot wreaths; here are *Magnolias*, yellow and white; *Anonas*, with green trimerous flowers, which fill the night-air with heavy fragrance. White flowers are many and beautiful; besides the gardenia, "mali" and magnolia, there are tuberoses, jasmine, stephanotis, many forms of white-flowered *Apocynaceæ* and the magnificent flowers of *Crinum asiaticum*. Curiously interesting, too, are the *Jatrophas*, especially *Jatropha multifida*, the coral-plant, whose flower-buds in cluster instantly suggest a branch of red coral. The amateur can name but a few of the other glories of this little enclosure, and must leave it with the regretful feeling that the growth of the great city may have swept it away entirely, before justice can be done to its charms. The brilliant scarlet bracts of *Poinsettia*, the pink-fringed petals and winged carpels of *Hiptage*, the great golden funnels of *Allamanda*, the pale purple cups of *Thunbergia*—all these and more are here. Of begonias a volume might be written. There are begonias with hairy leaves and smooth leaves, leaves broad and narrow, flowers large and small, pink, white, yellow, and all minglings of these. But the globe-tourist can see them all in the Botanic Gardens, or even the Raffles Garden, at Singapore, and the untravelled can feast his eyes in the Conservatory at Kew, on as fair an array of begonias as the tropics themselves can afford. Orchids are rare in Siamese gardens, despite the wealth of them in the forests. The orchid cult has not penetrated to Siam. Instead thereof, is the craze for "crotons" (*Codiæum*), and for varieties of *Melia* and other plants with beautiful foliage. Indeed, it would seem to be foliage rather than blossom that appeals to the Siamese taste, if the verandahs and gardens of private houses of Bangkok Siamese are a fair index.

A garden in Siam all too soon reverts to jungle, and this once royal demesne has in great part passed into the unrestricted control of nature. Paths once trodden smooth by many feet are now almost entirely obliterated by trailing gourds, whose beautiful but ephemeral white flowers mingle with those of a purple *Ipomœa* and of papilionaceous creepers innumerable. Festoons of these delights of exuberance hang from tree to tree and clothe each bamboo hut with a never-fading garment of green and purple and gold. Here and there one finds the relics of a former cultivation—stunted olives and guavas, mean little pineapples, globe amaranths, red and white; the Indian prickly-pear, and a columnar cactus. This last stands sentinel-wise at the entrance to a native cabin, whose little unkempt garden-patch boasts a half-wild *Ixora*, a glowing *Hibiscus* and a tangled mass of rosy *Bougainvillea*. Of common wayside flowers there are many which are scarcely less pleasing than the more gorgeous relics of the gardener's craft. *Ricinus communis*, the castor-oil plant, is everywhere, and the eye never fails to rest with pleasure on its beautifully-formed young leaves of glistening ruby and its burr-like fruits crowned with their tufts of stigmas; *Canna indica*, "Indian shot," is also here in abundance, especially in marshy spots, sometimes with pale primrose flower, sometimes with flower of the bright hue of the scarlet gladiolus—"Buddha's blood" the red variety is popularly called—and the seeds of the plant have also their sacred associations in North India, where rosaries are made of them. *Vinca rosea* shines in simple beauty among the beds of blue *Commelyna* in the more open glades, which mark old clearings for houses or temples. Capparids, with their strange stipitate flowers and fruits and their pungent odour, are as common as the yet more fascinating *Calotropis gigantea*, whose hoary leaves and pale lilac flowers at once attract attention, and whose wonderfully-arranged corona is a thing of beauty never to be seen without admiration.

And here, in the heart of the jungle, mid creaking bamboos and giant tamarinds and palms, stands the weirdest of trees with the most perfect of flower-forms, the "temple tree," *Plumeria acutifolia*—near ally to the frangipani (*P. rubra*) and also of West-Indian origin. The grey, gaunt, ash-coloured branches of the temple-tree project at the oddest angles, bearing very few leaves, but with rich clusters of the most graceful and most delicately scented flowers. The creamy white of each petal of the funnel-shaped corolla deepens into the richest golden yellow at the base, and the effect is truly exquisite. This tree, and not the *Amherstia nobilis*, beautiful though the latter is, has been the sacred temple-tree of burial and cremation grounds in the Far East, probably since its first introduction from the Far West. But one turns with still greater reverence for a last look at its great neighbour, the giant bo-tree, remembering its yet more sacred and ancient associations with the East. Under its shade one pauses to reconstruct the great temple and monastery in whose court it once stood, and the wild havoc of the jungle is transformed for a moment into fair, orderly, cultured growth, and the yet dimly-suggested avenue of sappan-trees seems to be peopled with gentle spirits of departed brethren of the yellow robe.

The spell broken, we and they leave the garden sighingly, and the bo-leaves shiver in murmuring sympathy of regret for the days that are gone, and passing out into the "lane of lotus-pools," where terminalia-leaves of autumn flame in the setting sun, it seems but fitting that the last of the spirits which we have conjured back from the unknown should vanish amid the mist-like branches of the lofty *Casuarina* at the gate.

*London; September*, 1895.

Jersey Biological Station.—The operations at the Research Laboratory of the Jersey Biological Station were gratifying to the director, Mr. James Hornell, during 1895. The workers came not only from many parts of Britain, but also from distant places on the Continent of Europe. One marked feature of the influence of such an institution has been the far greater interest latterly manifested by the fishermen and others locally in the life which surrounds them, and the establishment of oyster-parks off the coast of Jersey. There the molluscs are "educated" scientifically by Mr. Sinel, careful notes being taken of their growth and other features in their life-history.

# THE CAUSE OF EARTHQUAKES.

By J. J. Stewart, B.A., B.Sc.

THE large number of earthquakes which have been occurring lately in various parts of the world must have struck everyone. From that great district of earth-shakings, Japan and the islands to the south towards Australia, to our own earthquake region, the country round Comrie, in Perthshire, a succession of shocks and earth tremblings appears to be going on with but short intervals of rest. This apparent increase of earth movements is probably not so much a true increase of frequency of earthquake shocks as an increase in the records of those which occur. The world is now so much bound together by the electric telegraph and the elaborate arrangements for the spread of news, that a few hours after an earthquake has travelled over a remote region we may read a more or less full account of it in the newspapers at home. By means of the sensitive instruments which have been devised of recent years for the purpose of indicating and recording earth tremors when they occur, it is clearly shown that the surface of what we call the firm and solid earth is rarely quiescent. Tremblings and slight shakings which are too slight to be noticed by the dwellers on the surface, are yet noted and recorded by the seismographic instruments, and such movements pass over the earth in various places and in diverse directions with remarkable frequency. Such instruments also serve to show the far-reaching extent of those surface disturbances. The instruments at Kew Observatory indicate slight tremors of the ground at the same period that great and striking earthquakes are traversing remote parts of Europe and Asia. The waves of earth motion extend to our country but with greatly diminished intensity and would not be noticed here at all, were it not for the careful observations with these delicate pieces of apparatus.

It may be of interest to consider shortly what are the causes which tend to produce these earth-shocks and movements. As to the nature of earthquakes, it seems certain that they consist of a wave motion of the substance of the earth similar in kind to the waves in the air by which sound is transmitted, or to the waves of alternate extension and compression by which a movement is propagated along an iron rod which is used to work a distant signal. The shock or pull given in the signal-box to the end of the rod travels along it with great rapidity, and in a time which seems to an observer so short as to be instantaneous, the pull of the signalman becomes a pull in the lever at the signal itself. This rapidity of transmission is due to the fact that waves of longitudinal extension travel very quickly in a metal like iron on account of its high elasticity.

The rapidity with which earthquake vibrations travel through the ground has been measured, and the velocity in different sorts of material such as granite and sand has been investigated by experiment. Mr. Mallet found that the shock produced by exploding gunpowder travelled at the rate of 951 feet per second in wet sand, and in solid granite at the rate of 1,640 feet per second, or not far short of twice as fast. From observations of the times at which the same earthquake shock has passed various places the speed of travelling in different cases has been found to vary from about 600 feet per second to about 3,000 feet per second.

Amongst the earlier observations in this century were those upon the form and nature of the fractures and rents produced in buildings, and from these the direction of the movements which take place in earthquakes was estimated; and not only so, but from observing the direction of the gaps and fissures in buildings over a considerable area after it has been traversed by an earthquake the centre of the disturbance can be approximately found, that is the region below the surface whence the vibratory motion has proceeded outwards in all directions. Such observations are now replaced by the more accurate ones obtainable by means of recently devised seismographic apparatus.

Earthquakes seem, certainly, to originate at some definite spot or region of the earth's crust, generally at no great depth below the surface. In various cases of great earthquakes the centre of origin has been found to be at a depth of from four to thirty miles. What is the nature of the disturbance which causes the sudden jar or shock giving rise to an earthquake is still a question involved in much obscurity. Various explanations and suggestions have been offered, such as the sudden explosion of steam from water under great compression. When the water is suddenly relieved from the pressure under which it existed it flashes into vapour with a sudden expansion, rupturing the surrounding rocks and causing a compression or blow which is transmitted outwards to the rocks around. The giving way of vast subterranean passages, due to long-continued pressure of the surrounding rocks, the explosion of gases, due to volcanic action and such like causes have been suggested. Probably each of these factors may be at work at different times to produce earth tremors of greater or less intensity; but while the collapse of a cavity below the earth's surface may, quite probably, be sufficient to produce a local earthquake; the larger and more terrible disturbances, such as that of the Lisbon earthquake, which affected a region as large as Europe, must be regarded as due to a more powerful and far-reaching agency. Volcanoes and earthquakes seem, certainly, to be related to each other, though volcanoes do not cause earthquakes, yet the forces which produce one manifestation may, when acting under different conditions, give rise to the other. Local earthquakes are frequently observed to precede volcanic eruptions.

While the exact cause of earthquakes must be considered a matter for future research and investigation, there seems to be little doubt that their origin is connected with the causes which give rise to earth foldings and the production of mountain chains. Long continued pressure, due to enormous masses of superincumbent rock, produces, at last, rupture at the point or area of least resistance. Thus a sudden jar is produced, probably with rents and fissures, and this squeeze, suddenly relieved, causes a sharp compression, followed by a relaxation, and this being transmitted successively to neighbouring portions of rock causes a wave movement of earth compression to travel along the upper portion of the earth's crust. The gradual cooling of the earth and the consequent contraction of its material, has been brought forward as an explanation of the stresses in the crust, which may lead to rupture followed by earthquake shocks.

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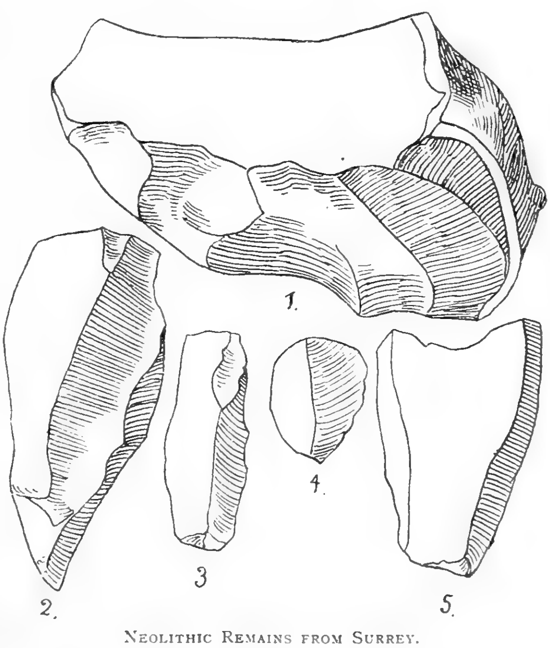
## A NEOLITH'S HAUNT.

By Alexander J. Hogg.

In Dr. Darwin's treatise on earthworms, the author draws attention to the fact that in meadows and untilled places, where earthworms abound, the surface of the soil is being continually raised by their excretions; so that in the course of a few years, any object left upon the surface becomes enveloped by the ever-growing humus, and finally disappears from view as though swallowed up by the earth. Darwin also mentions that in woods the worms are not plentiful, as there, the products of the decaying leaves are injurious or unpalatable to them; and the soil therefore, in such situations, increases at a much slower rate than on grass-land.

Of the many confirmations of these facts which are observable in our walks, I know of none more striking than to meet, in some wind-swept spot amid the trees, with the flint weapons or tools of the neolithic hunter, lost or cast away in passing along the track through the woodland haunt, perhaps thousands of years ago, and lying unregarded for untold generations. Such objects are frequently found in the remnants of the great pre-historic forests that once surrounded Croydon, now represented by small patches of woodland covering the tops, or extending along the flanks of the hills; and preserving, unvexed by the plough, the surface on which our far-away ancestors dwelt.

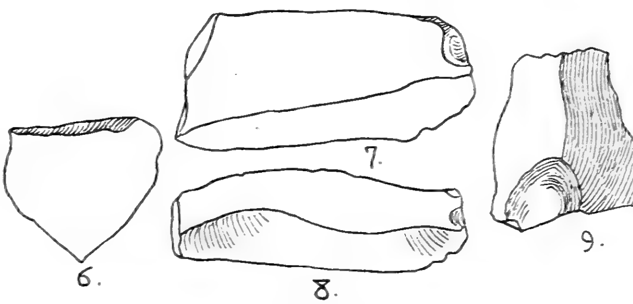



Neolithic Remains from Surrey.

It was in the spring of 1894, when the primroses were almost fully-blown, and the young spikes of the wild hyacinths began to stand up among their glossy leaves, that, on the outskirts of one of these woods, I came, unawares, upon the spot where a neolithic worker had been engaged in making his implements. My attention was attracted by the number of flint chips lying scattered over the ground within a very limited radius. Under and around a small oak stub lay hundreds of chips and flakes, with a few perfect implements, and many irregularly-shaped fragments of the crust, or outside coating of chalk-flints, and some few of the cores from which these had been struck. The whole occupied, perhaps, five or six feet in each direction from where the maker had sat, and it appeared as though he had been interrupted in his work and might return at any moment. The rubbish lay rather about the edges of the spot—the cores towards the middle—as if here had been the seat of some solitary man, working for his own hand. Here and there among the débris, a primrose opened its modest flowers; and the whole made so pretty a picture that it seemed a kind of sacrilege to disturb it. But science allows no scruples of sentiment; and I proceeded to gather up some of the cores, with a few handfuls of such of the chips and flakes as appeared the most likely to have been detached from them, in the hope that it might be possible to replace some of their number. However, of the hundred or so taken home for examination, one only could be assigned to its proper core; and I proceeded no further with the profitless task.

The figure (No. 1) in the accompanying illustration shows one of the cores found; but the object has been tilted forward by the photographer, so that the face from which the flakes have been struck is not sufficiently exhibited. It is about four inches in length, and from two to two-and-a-half inches in thickness; a portion of an irregular block of flint from the chalk, with some of the crust remaining on the thicker end. Here and there have made their appearance the brilliantly shining spots, which are the first signs of the action of atmospheric influences on the surface of the flint, and are themselves indestructible. The figure is intended to show the depressions from which five flakes have been detached, by blows from the top, apparently with a small punch of flint, such as are occasionally found in the fields near by, with points battered or broken from use.

The implements selected for representation are of late neolithic types, and the figures are about one half the actual size of the objects. The spear (No. 2) is three-and-a-quarter inches in length; the long arrow (No. 3), two inches, and the short arrow (No. 4), having lost its tip, a little over an inch. No. 3 is extremely thin and light; No. 5 is of the same form as the rarely-found crescent-shaped arrows, and may perhaps have been intended for a javelin. There is an iron arrow of similar shape, but larger, in the Guildhall Museum. No. 6 may be the prototype of the modern phleme, used by veterinary surgeons for bleeding cattle, by placing it on the vein to be depleted, and striking it with a mallet. In the present example, the butt is thick, and the sharp point is produced by a little secondary work at the back. The size is one-and-a-quarter inches in length and breadth. The next implement (No. 7) is a perfect specimen of a small flint knife, in length two-and-three-quarter inches, and in breadth one-and-a-quarter. The back is thick, and the bevelling of the opposite side produces a keen and effective edge. Other forms of the knife were used in the latest neolithic period; including the semicircular "skinning-knife," which survived from the earliest times. No. 8, a beautiful example of a double saw for fine work, is of the same length as the knife, and seven eighths of an inch in greatest width. The sharp edge of the knife is left untouched; but both edges of the saw are finely notched throughout their entire length, apparently by another sharp flint. These two implements were probably struck from the same core. The next and last, (No 9), is a little hatchet or chisel, one-and-a-half inches in length and in breadth of blade, but is imperfect, about half the edge having been broken off. Of the many forms of hatchet this is one of the least common, as well as one of the oldest; implements of identical design being found of deep ochreous tint and of much larger size.



Neolithic Remains from Surrey.

The spot where the ancient workman followed his craft is not far from the site of an early neolithic factory of considerable extent. The making of implements seems to have been carried on here for a long course of time, perhaps even as late as the Roman period, for fragments of coarse Roman pottery and roofing-tiles have been found in the neighbourhood; while at some spots the ground is covered with chips and imperfectly-formed implements. Very few are found showing secondary work of any importance; and the probability is that this was one of the many stations along the outcrop of the upper chalk where, during the stone age, weapons were made for districts where flint was not obtainable.

*Birchanger Road, South Norwood; July, 1895.*

# LEPIDOPTERA IN SUFFOLK.

By Claude A. Pyett.

THE records of past years afford conclusive evidence that the county of Suffolk is eminently suited for enabling one to pursue the study of Entomology, and I have endeavoured to compress into this Paper some observations upon the principal captures of Lepidoptera which I observed during 1895, one of the most productive seasons in my experience. The almost Arctic weather of the opening months of the year induced one to wonder whether such abnormal meteorological conditions would have a diminishing effect in the number of insects; but from what I have already observed, it will be understood that there were no grounds for this apprehension.

In January, search after the pupæ of *Trachea piniperda*, at their favourite haunt in the woods five miles to the south of Ipswich, resulted in only an empty pupa-case being turned up, and like success attended my efforts to secure the imago of *Nyssia hispidaria*, but this species is evidently of intermittent occurrence, for, as far as I know, only one, a female, was taken. Tree trunks were, however, thickly populated with *Diurnea fagella*, many of which exhibited melanic influence. During March a forcible demonstration in favour of the theory that moths possess auricular powers was afforded in the case of *Hybernia leucophœaria*. This species also abounded on oak trunks, but though I exercised great caution in approaching them, I only effected the capture of about a dozen specimens, as they almost invariably took to flight when within a few yards of them, and it seemed to me that the cracking of a decayed twig was sufficient to warn them of my approach. The sallows, on April 17th, produced nothing of any rarity beyond *Tœniocampa rubricosa*.

During May *Brephos parthenias*, *Euclidia mi*, and *Melanippe hastata* occurred somewhat sparingly on the wing, whilst one fine *Eurymene dolobraria* was disturbed by the beating-stick. This was the month for micros, and, among many others, I netted swarms of *Adela viridella*, also *A. degeerella*, *Nemophora schwarziella*, *Harpella geoffrella*, *Roxana arcuella*, *Micropteryx sparmannella*, *Gracilaria swederella*, etc. At rest on palings, I secured *Tephrosia punctulata*, *Bapta temerata*, *Dasycera sulphurella*, and *Elachista cerussella*; *Xylocampa areola*, and *Amphidasys strataria* (female) were taken off trunks. One advance specimen of *Dipterygia scabriuscula* visited sugar on May 22nd, accompanied by *Hadena thalassina* and several *Gonoptera libatrix*. The town electric light and lamps, to the alluring powers of which the success of the season must be largely attributed (for I recorded no fewer than 200 species) attracted *Sphinx ligustri* and others of the hawk-moths, including several *Smerinthus ocellatus*, *Dicranura bifida* (3), *D. vinula*, *Notodonta dictœa*, *N. ziczac*, *Hadena adusta* (2) and *Amphidasys betularia*, var. *doubledayaria*; whilst at lamps I took *Tœniocampa gracilis* (2), *Cucullia umbratica*, *Eupithecia nanata*, etc. At dusk, in the town suburbs, I netted several *Ligdia adustata* and *Conchylis smeathmanniana* (new to the Suffolk list of Lepidoptera).

Throughout June *Eupithecia subciliata* were freely disturbed from maple, its food-plant; and from wild clematis *Phibalapteryx tersata* and *T. vitalbata* (both plentiful). Others taken at dusk were *Chœrocampa elpenor* and *Leucania conigera* (attracted by flowers of water bedstraw), *Mamestra anceps*, *Eupithecia castigata*, *Melanippe rivata*, *Xanthosetia zœgana*, etc. From May day-collecting proved very discouraging, it being no uncommon incident to return home with nothing of any worth, and I attributed this to the almost leafless condition of the woods about that time, but mostly noticeable during June, when hazel-bushes could be seen absolutely bereft of foliage owing to the ravages of the larvæ of the autumnal insects, amongst them being representatives of the genus *Hybernia*, *Cheimatobia*, *Cosmia* (*trapezina*), etc. However, on June 9th, I was rewarded by taking *Chesias obliquaria* and *Macaria notata*.

I found the country hedgerows nearer town to be more productive during July, beating several *Coremia quadrifasciaria*, mostly worn specimens, unfortunately; *Cidaria fulvata*, from dog-rose; *Elachista nigrella* (female) flying in afternoon; several *Argyresthia gœdartella*, under a wall-ledge; a few *Apamea unanimis* at sugar, with one *Depressaria liturella*; and at dusk *Hyponomeuta plumbellus* and *Platyptilia bertrami* (only once previously recorded for the county). The light list was considerably augmented during June and July, and I mention a few of the captures: *Orgyia pudibunda*, two males of *Lasiocampa quercifolia*, *Platypteryx falcula*, *Acronycta aceris*, *Leucania phragmitidis*, *Dianthœcia carpophaga*, *Eupithecia fraxinata* (2), *E. succenturiata* (3), *Acidalia trigeminata*, *Acentropus niveus* (female), and *Tinea tapetzella*. Amongst the numerous micro-lepidoptera was *Tinea pallescentella*—one of the many additions to the Suffolk list during the year; whilst I confirmed the supposition that *Spilonota roborana* occurs, this insect having been unrecorded hitherto.

August was somewhat of a blank month, the greater part of it being spent at Yoxford, "the Garden of Suffolk," on a holiday, which I had intended should be free from entomological pursuits. I brought home, however, specimens of *Cidaria prunata*. Having returned to Ipswich, I sugared at the woods on the 29th, and found *Noctua dahlii* abundant, with a few early examples of *Cymatophora diluta*, *Catocala nupta*, one *Triphœna fimbria*, with *Pyralis glaucinalis* and *P. costalis*, neither of which I had taken by this means before. The only noteworthy captures at light during this month were *Heliophobus popularis*—which yearly increases in numbers, *Luperina cespitis*, *Eugonia tiliaria*—remarkably scarce this season, *Aspilates ochrearia*, and *Anaitis plagiata*; the September light records being *Eugonia fuscantaria*, *Polia flavicincta*, which also shares the partiality of *Bryophila perla* for walls, *Noctua glareosa*, and *Nonagria lutosa* (3). The effect of the extraordinary heat of the closing days of this month was exhibited on October 13th, when I took off a lamp, late in the morning, a splendid example of *Thera firmata*. The season practically concluded with the capture of *Xylina ornithopus (rhizolitha)* from palings, on which I also saw *Macroglossa stellatarum*, several *Eubolia cervinaria*, and one *Pœcilocampa populi*.

28, *Waterloo Road, Ipswich; December*, 1895.

## IN THE MALAY PENINSULA.

By Lieutenant Stanley S. Flower.

(*Communicated by* Sir William H. Flower, K.C.B., F.R.S.)

At Eastertide last, I was one of a party of six friends, in an excursion which gave some opportunity for natural history observations. On Friday we weighed anchor and steamed into the North Channel, from Georgetown (Penang), about nine o'clock in the morning, but the clumsy-looking little steamer, the "Flying Dragon," soon stopped, the captain informing us that "the engine was tight." After a time the machinery was got right again and we pursued our way. We had a lovely passage, a favourable wind enabled us to spread a respectable show of canvas which steadied the ship and materially assisted the poor old engine. We, unfortunately, saw no birds or sea creatures, but most lovely views of tropical scenery. First the now to me familiar hills of Penang on the port side, and the palm-covered beach of the Province Wellesley on the starboard. Soon the island of Betels began to get hazy in the distance and fell behind us as we followed the coast-line of the mainland. The groves of palm-trees and strips of shining sand gave place to dull, green mangrove swamps running right into the sea, with, behind them, its summit hid in clouds, the noble mountain called Kedah Peak. We passed close by several little rocky isles, clad from high-water mark to summit with luxurious, beautiful, tangled woods; on some, at the base of the rocks, were level, sandy beaches with graceful palm-trees shading thatched native cottages and a few long boats lying on the shore. The large, mountainous Lancava Islands gradually got more distinct in front of us, but before we reached them we turned sharp to the right and followed a rudely marked passage towards the mouth of the river Kedah, which was indicated by a break in the line of mangroves and a little white lighthouse. At about three o'clock we were in the mouth of the river, and I saw for the first time a real Malay town, many of the houses standing about in the water on poles. On the left-hand side (as we went in) was dry land, and so we took a turn on shore and looked at the ruins of the old Dutch fort, said to be three hundred years old. This town is called Kwala-Kedah. The little steamer had some cargo to discharge, and when that was finished we re-embarked, I being the last to get on. There was no gangway, so we climbed from the wooden pier on to the steamer; but after I had left the pier, as the steamer was starting, the railing I was about to climb over gave way—the wood was rotten,—and the next moment I was in the water. As the river is noted for crocodiles and there was a strong tide running, my position was not an enviable one, and no one remembered to throw me a life-buoy. However, I swam better than I thought I could, and was soon clambering on to the pier, having saved my topee (hat) *en passant*. The steamer picked me up and there was no harm done saving that my clothes and boots were wet through, and as we went up stream I changed to dry things. It took rather over an hour going up the river, which winds tremendously. The banks on either side are covered with dense tropical forest, one could hardly see dry land. Under the foliage was mostly slimy-looking mud, and quantities of little creeks left the main river and went winding away among the trees. On the mud everywhere were hundreds of little fish crawling and jumping about, and thousands upon thousands of little crabs of many different kinds, the most noticeable being the cocoanut crabs, which have one immense bright-red claw each. We passed many native canoes sailing on the river—rigging most primitive, simply three or four great palm-leaves, eight or ten feet long, stuck up in the boat. We saw one crocodile that afternoon.

Every day on the river we saw quantities of birds,—a few crows, some starlings and mynahs where the ground was open by villages, innumerable swallows, several sorts of little birds, including one like a chaffinch with a very sweet song. There were many great dark-grey and white fish-hawks, very many of the handsome Brahminy kites, a few small brown hawks, and many most beautiful kingfishers of at least three different species. The little black-and-white "straits robin" and a species of sandpiper were omnipresent. There were also a few lovely green pigeons, an occasional great stork, several big flocks of white egrets, a curious white-faced water-hen, and many little sunbirds, like living jewels flitting about. Every day we saw some monkeys of two species, one, a brown beast, is *Macacus cynomolgus;* they walked about the mud in parties of two to six, and were not at all shy, letting one approach in a boat to within a dozen yards. The other monkeys were some species of *Semnopithecus*, and lived in the higher trees in troops of about half-a-dozen. These were most agile and restless, and difficult to get a good view of, so we shot some; they had very handsome fur, dark-grey on the upper and paler on the lower parts, with black hands and feet, round the brown eyes were most distinct white rings and the nose was also white, their average size seemed, head and body twenty-one to twenty-three inches, and the tail twenty-six to twenty-seven inches.

We rounded one of the numerous corners and came on some big buildings, and a wrecked steamer in the channel, and at the next turn the river divided, in the angle was a large town, Kota Star, the capital of Kedah, and we saw the Sultan's yacht lying alongside a quay; at another quay our steamer stopped, and we landed. It was rather curious for the first time being in an independent Oriental country, in a town without a single resident European and where the Sultan has unlimited power. The young Sultan, we found, was away at Calcutta, and his uncle, the Tunkoo or vizier, was regent; he sent us a message after we reported our arrival, that he could not receive us till Monday morning, but meanwhile a court official, an intelligent young Malay, was put to look after us, and the Sultan's guest-house placed at our disposal. We got two dilapidated old garries, with big skeleton-like horses, and drove through the city; there are many Klings in it, but the bulk of the population were the ubiquitous pushing Chinese, though evidently the ruling race were the Malays—lazy, fine-looking, muscular, swaggering fellows, dressed in sarongs, a sort of long kilt, each with a kris stuck in his belt; these are very handsome weapons, family heirlooms, and they say it is very difficult for a foreigner to acquire a genuine one. I was surprised to see Malay policemen dressed almost exactly like those in Penang, and Sikh soldiers equipped and armed with Martini-Henrys like our Indian sepoys. We drove right through the town and then along a good high road to the guest-house, a fine two-storied bungalow, simply furnished in the European fashion. We had tea, and then went for a walk in the fields round the house till dark. At 7.30 we were served with dinner by the Sultan's butler, a good, simple meal of chicken in various forms.

On Saturday I was up with the sun to make a sketch of some Malay houses and saw a pair of crow pheasants (*Centropus rufipennis*), the first since I left India. We had arranged to spend the day in visiting some caves in the Elephant Mountains, but could not start early owing to the tide. At eight o'clock we breakfasted, and about nine set out along the road in the opposite direction to Kota Star Town in the two old garries. When we had gone about two miles we were stopped by a message from the Tunkoo, saying that he wished to see us then instead of Monday, so to his house, which was hard by, we repaired. Here we were shown into a large upper room, surrounded with verandahs and ornamented with pictures of the Queen, Prince and Princess of Wales, two German Emperors, King of Siam, etc. Here we had to wait a long time. At last the potentate condescended to appear,—an intelligent, nice-looking old Malay gentleman, with grey hair and moustache, and very keen brown eyes, but he was not becomingly dressed. His kit was all untidy and unpipeclayed; it consisted of a white sun-hat, loose white Chinese coat, gay tartan sarong, white stockings and canvas gymnasium shoes. A slovenly attendant carried his umbrella and a really fine kris, with ivory and gold hilt. He left his hat in the verandah, came in, shook hands all round, and then we all sat down in a circle and a most desultory conversation went on. The Tunkoo showed us photographs of the King and Queen of China and some rifles he was rather proud of, including a Lee-Metford, which, being loaded, I thought safer out of the way, so put it on a table, as neither he nor the man he was exhibiting it to appeared to understand it, and were fingering the cut-off and trigger dangerously.

It was curious to see the abject bows which the Malay officials gave to the Tunkoo; they seemed pretty well afraid of him. The interview showed no signs of concluding, so at length we said, "bully piggy?" (can we go?) and he answered "bully" (you can); so we retired, and pursued our journey in the garries. We were soon stopped again by a Malay official, in a solar topee and karki suiting, *à l'anglaise*, who had been instructed to show us over the Sultan's summer palace, this was well worth seeing: a large Italian-like villa on a little hill surrounded by a fine garden, the rooms were furnished handsomely, but inartistically, white and gold French furniture, inlaid stone tables, mirrors and looking-glasses in large quantities. The pictures were mostly portraits of royalties, European and Oriental, the Queen and Prince of Wales being chief favourites, judging from the number of pictures of them; there were also a great many very good old English sporting prints, probably worth a lot of money in England now. After we had been conducted round the palace, we walked to a village on the river bank, where our things had been brought from the garries. Here, by the Tunkoo's orders, were two long native canoes ready for us; we five (as one of our party, an engineer, was looking after his proposed railway), with four Malays, got in the larger one, and our tiffin, servant and two Malays, in the smaller dug-out. We paddled down stream a few hundred yards, and then turned to the right and went up a tributary with the rising tide. This was a most interesting excursion; all along the banks, mile after mile, was the most luxuriant forest, only broken by the little villages of attap-roofed houses built on poles, with peasang trees (banana palms) growing round them; in many places the trees met overhead. The stream was quite narrow, and time after time we stuck on the bottom or on sunken snags, and had to wait for the tide to rise to enable us to get off again and proceed. The heat was most intense, but under the circumstances I did not mind it a bit, and generally the overhanging boughs shaded us. The birds were most lovely and abundant, especially the great red-beaked kingfishers; monkeys and squirrels also enlivened the trees. We saw three lizards on the stream that day, all *Varanus salvator*, a most handsome reptile when alive and wet, with his strong head, great brown dog-like eyes and sparkling black and yellow uniform. I shot one swimming past us on our way down stream, and fortunately recovered the body with a paddle; he was a grand fellow, such muscular neck, tail, and limbs, and seven feet nine inches in total length from nose to end of tail. [This fine specimen is now exhibited in the reptile gallery of the British Natural History Museum.—W. H. F.] At length, we could push, paddle, or persuade the canoe no further, so taking one Malay as guide we got out and walked.

(*To be continued.*)

## LIVERPOOL MARINE BIOLOGY COMMITTEE.

THE Ninth Annual Report of the Liverpool Marine Biology Committee and their Biological Station at Port Erin, in the Isle of Man, by Professor Herdman, D.Sc., F.R.S., is, as a whole, distinctly encouraging. Considering the energy and ability of the author, who is the director of this useful establishment, we should be led to expect good results from the station. Situated as it is on the ground rendered classic by Edward Forbes, and amidst a rich marine fauna and flora, the only wonder is that its work and opportunities are not better known and appreciated. This Biology Committee has now been at work for some ten years or more, and has been reared under the fostering care of some of the leaders of scientific thought in Liverpool, such as Mr. Isaac Thompson and Professor Herdman. These investigations are not by any means confined to picturesque Port Erin, but include extensive dredging expeditions in the Irish Channel, northward to the Scotch coast, and south along the coast of Wales. The lists of animals found in these hauls of the dredge or trawl are most instructive and carefully reported. Great care has been exercised to ascertain not only the species brought up to the surface, but also the number of individuals. For instance, on July 23rd, at the mouth of the Mersey, on very unfavourable ground, the trawl, after being down one hour, brought up seventeen thousand specimens. This was by no means a record catch as Professor Herdman mentions other drafts in Liverpool Bay containing the enormous number of from 45,000 to 50,000 specimens, not including microscopic forms. There is quite a long list of additions to the Liverpool marine fauna, which is far exceeded by the interesting captures of species already recorded.

A goodly list is given of naturalists who have used the Port Erin Biological Laboratory; some of whom made lengthened stays. The curator, Mr. J. C. Summer, has devoted much attention to the equipment of the station, which is now well up to the necessary standard. Among the more important work executed has been a series of experiments, by Professors Boyce, and Herdman, upon oysters, in view of investigating their connection with diseases. Great effort has been made to establish, adjoining the laboratory, a sea-fish hatchery. The committee have offered to place the advantages of the aquarium and laboratory at the disposal of any responsible body who will start such an interesting adventure. The site is exceptionally well situated for such a hatchery, and it is to be hoped someone will come forward to help. As yet, the general public have not appeared in overcrowding numbers to view the most interesting family in the tanks, and the numbers given are only small when we remember the immense crowds who visit the island every summer.

# GROWTH OF PLANTS IN THE PRESS.

By G. H. Bryan, Sc.D., F.R.S.

SOME years ago I placed a sprig of *Sedum telephium* in a botanical press to dry for my herbarium. Knowing the plant to be very moist and succulent, I removed it to fresh sheets of drying paper in a few days, but after that, my press was unopened for about ten days. At the end of this time all the leaves of my *Sedum* were dry and stiff, but I was surprised to find white shoots sprouting from their axils, and on these grew tiny leaflets, also white. As my press was full of other plants at the time, I thought it desirable to remove the specimen, and placed it in a jug of water, where the sprouts continued to grow, in a few days beginning to turn green as the result of being no longer kept in the dark.

I made a careful sketch of this botanical curiosity at the time, and was reminded of the incident by finding my drawing, a few days ago, among a bundle of papers. I can vouch for the accuracy of the figure as a representation of facts; as to its artistic merits, I do not claim any.

Sedum telephium.
The abnormal leaves were grown during drying in the press.

A plant of *Cotyledon umbilicus*, which I attempted to dry about the same time, threw out a tiny little white leaf about half an inch long while in the press, and as over a fortnight's pressing did not appear to kill it, I planted it in a rockery, where it grew and flourished for a year or two, although some mice nibbled it down several times. The best way to kill these Crassulaceæ appears to be to bake them in hot sand, after giving them a little preliminary flatten down in the press. Plunging into boiling water at once kills them, but it reduces their leaves to such a soft, flabby pulp as to render them useless for the herbarium.

*Thornlea, Cambridge; November 27th, 1895.*

## THE INTERNATIONAL BIBLIOGRAPHICAL BUREAU.

BY an unanimous vote of the third International Congress of Zoology, held at Leyden, there has been established in Zurich - Oberstrass, Switzerland, an International Bibliographical Bureau. This office is under the control of an international commission nominated by the congress. It is composed of the following members, representing the countries appended to their names:—Professor J. W. Spengel, Germany; Professor J. Sidney Hickson, Britain; Professor W. B. Scott, United States of America; Professor Raphael Blanchard, France; Dr. P. P. C. Hoeck, Holland; Professor W. Schimkewitsch, Russia; and Professor A. Lang, Switzerland. The Bureau is under the direction of Dr. Herbert Haviland Field, the full address being Universitäts-Str. 8, Zurich-Oberstrass, Switzerland, and commences work on January 1st. It appears that this institution when proposed, met with some opposition in this country, but the British Association, through its Zoological Section, at the meeting held at Ipswich, appointed a committee to consider the matter; but this is as far as public acknowledgment seems to have gone. We have received an appeal from Dr. Field to urge private individuals in Britain to support the Bureau until a national committee is formed to serve the interests of the new institution.

The preliminary cost of organization of the Bureau, we are told, has been assumed by Dr. Field, and the funds necessary to pay the current expenses have been contributed by various "government boards," by learned societies, and some private zoologists. The results to be published by the Bureau will be issued by subscription, or by sale, and we are informed that this is not in any sense a commercial enterprise. The publication of the Office will consist of an index and Prompt Card Catalogue to all zoological literature, whether in the form of books, serials or scattered papers. This is to be broken up into sections, which parts of the whole index will be sold at smaller prices. For instance, the whole Invertebrata is marked as £2 8s. per annum, but Mollusca, Lepidoptera, Coleoptera, Pisces separately, are to be twelve shillings, while less worked groups, such as Myriapoda or Neuroptera, will cost only four shillings each yearly. Annual subscribers are to have a reduction on these prices. The book edition may be ordered through a bookseller of the publisher, Wilh. Engelmann, of Leipzig, but the Card Catalogue can only be obtained from the Bureau. The size of the cards is to be that of the Library Bureau Standard (125 × 75 mm = 5 × 3 inches).

In regard to the card catalogue, the Bureau offers to seek through the thousand or more journals containing zoological notes, to pick out such articles as relate to a particular group or question, and to inform its subscribers at once whenever any new observation appears. This will relieve them of much tedious work, and the information is likely to be completer than unaided effort could make it. If this is well done, we make sure many workers will appreciate the value of the catalogue as an aid to the progress of zoological science, and that its disinterested nature will commend it for support. An active propaganda is needed in order that librarians may know of the new enterprise and of its importance to working zoologists.

The Bureau, of course, needs works to record, and, if possible, reprints annotated by the authors themselves. Every publishing body will naturally be ready to send their publications for the sake of having them brought promptly to the knowledge of those interested; but for societies and others to do this the matter must be properly brought to their notice. It is so easy for those living in a given locality to do this, and so difficult for Dr. Field to act at a distance.

FREDERIC KITTON.—We have received a Memoir of the late Frederic Kitton, with portrait and bibliography, by his son, Mr. F. G. Kitton, of Pré Mill House, St. Albans. To microscopists this little work will be of especial interest, not only on account of its subject, who was considered an authority on diatoms, but also for several pages of remarks upon diatoms. The bibliography contains eleven pages of references to the printed works and papers by his father, no less than 138 of which appeared in SCIENCE-GOSSIP, ranging from the first volume in 1865 onward. Although not all these papers refer to diatoms, the list indirectly forms a fairly good index to the literature on the subject. The price is one shilling and sixpence.

HYDRA FUSCA IN CAPTIVITY.—I remember, some years ago, an instance in London of the hardiness of *Hydra fusca* in captivity. There was, at the Royal Aquarium, a long tank, about eighty feet in length by fifteen feet wide and six feet deep, filled with fresh water from the street mains. Suddenly the glass fronts, which occupied four-fifths of one side of this tank, became sprinkled over inside with specimens, some being exceptionally large, of *Hydra fusca*, which multiplied in an extraordinary manner until it became necessary to clean the glasses so as to avoid a misty appearance, caused by them obstructing the view, so close together were they. They extended in the same manner over the bottom and rock-work of rest of this tank. Just as described by Major-General Verrand, on page 276 in this number, they all suddenly disappeared in autumn. —*John T. Carrington.*

# BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Modern Microscopy: A Handbook for Beginners.* By M. I. CROSS and MARTIN J. COLE. 192 pp. medium 8vo, illustrated with 40 figures. (London: Baillière, Tindall and Cox, 1895.) Price 3s. 6d.

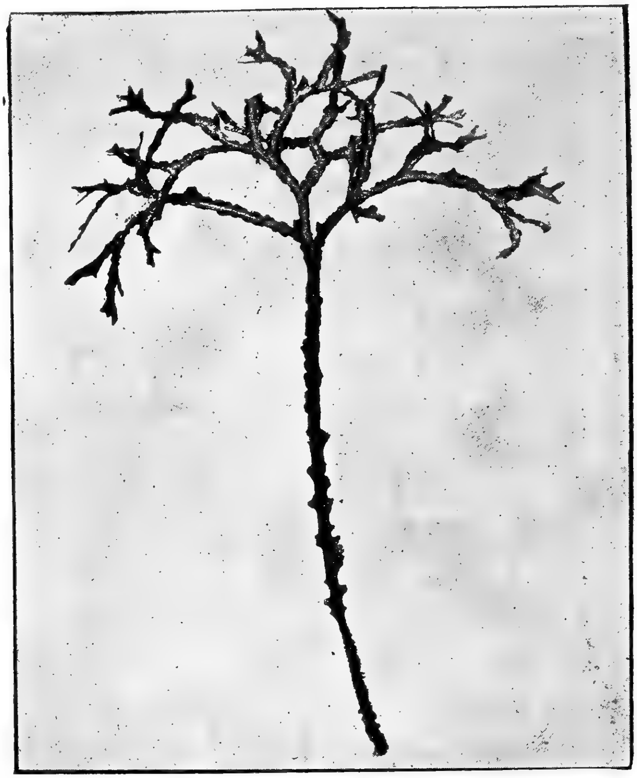
This is a second edition of a standard book for beginners. It has been considerably enlarged and in part re-written. As before, the first portion treats of the microscope and the methods of using it; and the second, of the preparation and mounting of microscopic objects. It is only too well-known that the person who attempts to use his microscope without a thorough understanding of the methods of doing so, not only will never obtain the best results that the instrument is capable of yielding, but is very likely to misinterpret and form false ideas regarding that which he does see. Yet there are enthusiastic workers who are inclined to look scornfully on the more careful worker who will not commence observing until he has accurately centred and focussed his condenser and arranged his illumination so that it may yield the truest image. If a microscope is worth using at all, it is worth using well, and there is undoubtedly a growing demand for a book which sets forth concisely and intelligibly the most approved methods of employing the instrument and its accessories. This, the first part of this book succeeds in doing, and the advice and information given are clear and distinct. Considerable space is devoted to the comparative values of apochromatic and achromatic objectives, the advantages and relation of aperture to power, and there are some very interesting pages on Monochromatic Light. This latter is too little appreciated by the ordinary worker, but if he reads this chapter, and is tempted to try the effects for himself, it will give an added charm, and be a step forward in much of his work. The second part of the book is devoted to the methods of preparing and mounting microscopic objects, and the author, Mr. Cole, is well-known as a professional preparer of first-class slides. Not only are the processes of hardening, section-cutting, staining and mounting fully described, but the formulæ for the making of the stains and mounting media are given. Chapters are devoted to every description of work—physiological, botanical, entomological, geological, opaque mounts,—and we note with especial pleasure the inclusion of a chapter on the Mounting of Rotatoria, by Mr. C. F. Rousselet. The cabinet of the Quekett Microscopical Club testifies to the success that has attended this gentleman's efforts in his particular department. The publication of the processes that he adopts will be of great advantage to many microscopists. The book is altogether one that can be recommended to the working microscopist. Although it is specially intended for beginners, many who have advanced beyond that stage will find in it hints that may be followed with profit. This class of work is just that which encourages the beginner, guides the amateur, and reminds the proficient worker; thus doing much to advance the popularity of the microscope, and relieving its votaries from unnecessary anxiety.

*The Cambridge Natural History.* Edited by S. F. HAMER, M.A. and A. E. SHIPLEY, M A., vol. v. "Peripatus," by Adam Sedgewick, M.A., F.R.S., Fellow and Lecturer of Trinity College, Cambridge; "Myriapods," by F. G. Sinclair, M.A., Trinity College, Cambridge; "Insects," Part i., by David Sharp, M.A. (Cantab.), M.B., F.R.S. 596 pp. large 8vo., illustrated by 371 figures and map. (London and New York: Macmillan and Co. 1895.) Price 17s. net.

We have already had occasion to notice the "Cambridge Natural History" Series of Messrs. Macmillan (*ante* page 66) and prophesied a library of books unrivalled in the knowledge to which they are to be devoted. This, the second volume issued, although volume v. of the series, more than maintains the reputation. As indicated by the title, there are three divisions of invertebrata included, or, more correctly, two and a half. Professor Sedgewick's contribution is a monograph of twenty-six pages on those curious animals forming the genus *Peripatus*, which have been variously assigned by divers authors to the slugs and to the centipedes, until Mr. H. N. Moseley, in 1874, discovered the tracheæ. There are less than a score defined species of this genus which alone constitutes the class Prototracheata. Then follows fifty-four pages by Mr. F. G. Sinclair, M.A. (formerly F. G. Heathcote), on the Myriapoda, which class is divided into the orders Chilognatha (= Diplopoda), Chilopoda, Schizotarsia, Symphyla and Pauropoda. These comparatively little worked and not generally understood animals include the slow-moving millipedes and the active centipedes. We imagine now they will become more interesting from the delightful manner and pleasant language in which Mr. Sinclair tells us about them. One need only read his account (page 32) of the myriapod hunt in a neglected garden of Larnoca, to appreciate this, and to be bitten, not by one of them, but by a burning desire to have such a hunt. In this chapter the author tells us what is known of their habits, classification, structure, embryology and palæontology. The biological public are to be congratulated upon the choice of Dr. David Sharp as the exponent, in the Cambridge Natural History, of the great class Insecta. It would not be easy to find a writer than whom the mantle of fitness would better adorn. His special knowledge of one of the largest of the orders, Coleoptera, added to his general familiarity with all the orders, makes him one of the best to deal with so wide a subject. In this volume the sections treated are characteristic features and definition of Insecta, embryology and classification. This portion of the work is admirable, and greatly helped by the copious illustrations. It has all the fascination of "Kirby and Spence," with the erudition of modern research. This volume of the Cambridge Natural History indicates how popular will become the series, for any ordinarily educated person can fully grasp the history and scheme of entomology from its pages. The orders dealt with in part 1, include, Aptera, Orthoptera, Neuroptera and Hymenoptera. Other orders will be continued in volume vi. of this series. Every library, school and college in the country should possess this work, which is of the highest educational value.

*Fern-Growing.* By E. J. LOWE, F.R.S., F.L.S. 206 pp. royal 8vo, with 62 illustrations and portraits. (London: John C. Nimmo, 1895.) Price 12s. 6d.

This work will come as a revelation to many botanists who confine their studies to field work, to the exclusion of horticulture. As the sub-title informs us, it is the result of "fifty years' experience in crossing and cultivation," and contains "a list of the most important varieties, and a history of the discovery of multiple parentage." The author, Edward Joseph Lowe, is a Justice of the Peace and Deputy-Lieutenant for the counties of Nottinghamshire and Monmouth. In 1825 he was born in the former county, where he resided until 1880, when he removed to Monmouthshire. His large works on "Our Native Ferns," "British and Exotic Ferns," as well as many others, are well-known. For half a century of years Mr. Lowe has devoted assiduous attention to rearing ferns, with most remarkable and unexpected results. So remarkable were they, that for a long period the leading botanists declined to accept them when advanced by Mr. Lowe. This is better understood when it is stated that a paper on "Crossing of Ferns" was read in 1867, with particulars of experiments, which were discredited until about 1883. Still more remarkable is the fact that now the fern-grower may select the spores from four or more different varieties and produce a plant bearing characters of all these parents. This art of variety producing has become so perfect that particular varieties of the most monstrous forms can be produced at will. As is also stated by the author, these extraordinary results have been yet further advanced by dividing the prothallus. It is possible to grow any one of these divisions for seven years in the prothalloid condition, and afterwards, at the will of the experimenter, to cause it to put forth fronds. Mr. Lowe has been dividing and *sub-dividing* the prothallus several times in order to remove *all* the original prothallus from certain portions, so as to ascertain the development of an entirely new prothallus. This has occupied six or seven years, but the result has been marvellous. New generative organs have been formed and plants obtained. Microscopical examination has disclosed new truths, and these, we understand, will be described, with a history of further investigations, by the author. As an example to what extent this variation may be artificially carried, we reproduce from this work, by permission of the publishers, two extreme forms of the common hart's-tongue fern, *Scolopendrium vulgare*, viz: vars. *paulovna* and *feodorovna*, of Lowe. Thus "a number of experiments at first confined to investigation of the crossing of ferns, has gradually resulted in the establishment of an ordered series of facts materially affecting our conceptions of Pteridology." This great work has taken forty years of study and trials, with more than nine hundred experimental sowings of spores. All this and much more lore of fern-growing is set forth in this beautifully-produced book, which is embellished by a fine portrait of the author, engraved on copper by E. Stodart. It is not only the man of means and leisure who can attain such results, but any person who has the patience and experience may continue the investigations. Doubtless there are many other facts to learn in connection with Mr. Lowe's discoveries, so that others may have rewards for their pains awaiting, besides an immensity of pleasure out of fern-growing.



SCOLOPENDRIUM VULGARE. ARTIFICIAL VAR. PAULOVNA. Half natural size.
(From "*Fern Growing*" by E. T. LOWE, F.R.S.)

*Handbook of Grasses: Treating of their Structure, Classification, Geographical Distribution, and Uses: also Describing the British Species and their Habits.* By WILLIAM HUTCHINSON. 92 pp. 8 vo., illustrated, 40 figures and frontispiece. (London: Swan, Sonnenschein and Co.; New York: Macmillan and Co., 1895.) Price 2s. 6d.

When one comes to think about grasses, the first thing that strikes us is how very little these, the most abundant of our plants, are generally understood. Even many botanists are shy of them and "leave them to the last." Perhaps this shyness may be largely the result of forgetfulness of the fact that grasses are after all only a small group, and by no means difficult. This little work should do much to popularise the study of grasses. It is plainly written, and, with the aid of the figures, forms an excellent first aid to the identification of material which is literally always at our feet. Having thus gained our first knowledge, we can go to more scientific works for what this one lacks; but few masters will be found more pleasantly chatty while giving us lessons than Mr. Hutchinson.

*The International Naturalists' Directory*, 1896. 42 pp. 8vo. (London: Swann and Co. and Elliot Stock.) Price 6d.

This little book will be invaluable to our readers as a handy address book for rapid reference. It is No. 2 only, and therefore, as yet, more or less incomplete, from several points of view. The first page we open contains the list of "Preparers of Microscopical Materials and Objects." It includes one who is no longer in business, and omits several of the leading workers. We also miss many valued correspondents from the Directory, whom we are thankful to believe are alive and well. With regard to its being international, we think that word had better be omitted from the title. The system of defining the branches of study affected by the persons whose names are given is more or less arbitrary, and apparently inventive; for instance, one of our leading entomologists appears only as an ornithologist, which he professeth not. This differentiation would be better left out of future editions, unless made more correct. The directory of Scientific Societies, which fills another important work of several hundred pages, is here summed up in about two pages. We consider the list of Natural Science publications far from complete. Still there is plenty of information for sixpence, if we do not need the rest.

*Guide to the British Mycetozoa exhibited in the Department of Botany, British Museum (Natural History.)* By ARTHUR LISTER, F.L.S. 42 pp., 8vo, illustrated by 44 figures. (London: Printed by order of the Trustees, and sold at the Museum. Price 3*d*.

In Volume I. of the New Series of SCIENCE-GOSSIP, at page 32, we noticed an admirable guide-book to the British fungi, though nominally to "Sowerby's Models of British Fungi." This work forms a companion guide to these allied organisms, which hover on the borderland between the animal and vegetable kingdoms. Although only termed a guide-book, sold at less than ordinary guide-book price, this is really a valuable illustrated introduction to a little-worked group by an authority upon its scientific investigation. In Britain we have about 120 known species of Mycetozoa. They are to be found on old and decaying stumps, or on fallen branches, in moist woods and shaded gardens, and among damp, dead leaves. No bigger than a grain of mustard-seed, many are magnificent in brilliance of colour and delicacy of form. The Museum collection is practically the Author's collection, for he presented to the Trustees 832 mounted slides of British species, which are now happily available for references for students at large. Added to these are coloured drawings made by the author's daughter, Miss Gulielma Lister, with a diligence and accuracy which is celebrated. In this guide every British species known at the time of publication is included in four orders and thirty-six genera. The little drawings in the margins of the pages are excellent, and by their aid the study is much simplified. Such a work as this is of the highest educational value on account of its accessibility, and will certainly lead to many additional systematic workers in this branch of cryptogamic botany. These Guides can only be obtained from the Museum, and written communications for them should be addressed to the Director, British Museum (Natural History), Cromwell Road, London, S.W.

SCOLOPENDRIUM VULGARE. ARTIFICIAL VAR. FEODOROVNA. Half natural size.
(From "*Fern Growing*," by E. T. LOWE, F.R.S.)

# NOTES & QUERIES

Moss Exchange Club.—It is proposed to form an exchange club for mosses and hepaticæ, somewhat on the lines of the existing exchange clubs for flowering plants. Any persons willing to join such a club are invited to send in their names to Rev. C. H. Waddell, Saintfield, Co. Down.

Notes of a Home Naturalist.— Mrs. Climenson, at the end of the first column on page 242 (*ante*), describes an animal under date 27th September, with which she is not familiar. I think the description clearly indicates *Hydra fusca*. The features agree well with the Polype.—*W. H. Nunney, Bloomsbury, London, W.C.*

Memory of Bees.—On August 16th we took a quantity of honey in frames from the tops of the hives (super honey). The hives are in an orchard at the bottom of the garden. When cleared of bees the frames of comb are usually carried through the garden to a disused cottage at a distance of seventy yards from the nearest hive. On arriving here we found a number of bees, which had *preceded* us, flying round the cottage awaiting the arrival of the combs, which, however, still remained in the clearers in the orchard. No honey had been taken since June 21st last, and no bees had been noticed near the cottage in the interval.—*W. A. Gain, Tuxford, Newark; August*, 1895.

White Variety of Common Centaury.—When botanizing on the Somersetshire coast between Clevedon and Portishead, in the latter end of August, 1895, I found several plants of *Erythræa centaurium* bearing perfectly white flowers. I have consulted several of the standard British Floras, but can find no mention made of this variety. I should be glad of any information on this subject. The plants bearing the white flowers were growing under perfectly natural and favourable circumstances, in fact several plants with corollas of the normal colour were growing near them, so that there seemed no probability of the white colour being the result of weak growth of the plant.—*Alan P. Gardiner, 32, Upper Belgrave Road, Clifton, Bristol; January 2nd*, 1896.

Winter Exhibitions.—A paragraph on page 167 of this volume explained a scheme for circulating sets of lantern-slides amongst Natural History Societies. This plan has since been worked out successfully. A set of fifty slides was got together illustrating the geology of South-Eastern England, and is now circulating among the contributing societies. The work for next winter is to photograph in greater detail the Upper and Lower Greensand and Gault-beds in the South-East of England. The possibility of carrying the idea still further, of bringing about co-operation in other subjects, is to be considered at a Congress of Natural History Societies to be held at Tunbridge Wells on April 25th, under the presidency of the Rev. T. R. R. Stubbing. Invitations can be obtained, with other particulars, on application to *George Abbott, 57, Pantiles, Tunbridge Wells.*

Edible Fungi in Winter.—On Christmas-day, 1895, my brother and I, in company with Mr. John T. Carrington, gathered a number of specimens of *Agaricus personatus* on the chalk downs near Leatherhead, in Surrey. They were of good flavour when cooked. This species has been very scarce in 1895, as it also was in 1893, after the summer drought of that year.—*T. H. Briggs, Surrey House, Leatherhead.*

Abnormal Plantago Major.—Regarding the abnormal forms of *Plantago major* which have been recently spoken of in Science-Gossip (*ante* pp. 178 and 248). You will, perhaps, allow me to mention that with the two forms grown in gardens as curiosities, one is more leafy than the other. They reproduce themselves by seed, and by far the greater number of the seedlings present the abnormal formation of the parents. I have one of these forms in my garden, and hope to have the pleasure of sending you a specimen next season. Another interesting variety of the same plant is one with purple leaves, almost as deep in colour as some of the dark-leaved beets, but not so glossy on the surface. This also comes, to a considerable extent, true from seed, although there is a great tendency to revert to the green leaf of the type, a proportion of the seedlings being inferior in depth of colouring.—*S. Arnott, Rosedene, Carsethorn, by Dumfries, N.B.*

Water-boatmen.—I have read on pages 232 and 233 of Science-Gossip, a very interesting and charming article, entitled "Notes of a Home Naturalist." Your correspondent enquires as to three curious water-boatmen, and from the very perfect description given, there need be no hesitation in at once informing her as to their identity. I have little doubt but that the insects described, belong to the family Hydrodromica, the generic and specific names being *Velia currens*, Fab. They are very common in streams in an immature form, but to find them fully developed is extremely rare. For a full description, I would refer your correspondent to page 571 "British Hemiptera," one of the Ray Society's works, by J. W. Douglas and J. Scott, published 1865, or to a later work still, "Synopsis of British Hemiptera-Heteroptera," by Edward Saunders, F.L.S. (from the "Transactions" of the Entomological Society of London, 1875 and 1876), page 641.—*T. R. Billups, Swiss Villa, Coplestone Road, Peckham. S.E.*

Habits of Bats.—Can anyone inform me if bats migrate? Some time ago—last May, in fact—while out fishing on the lower Stour at Canterbury, I observed towards dusk an unusual number of large bats, probably the long-eared bats (*Plecotus auritus*), flying about overhead. I should judge there must have been over two hundred individuals, and owing to the entire absence of suitable trees and other places of shelter during the day, all along the Stour valley, I am inclined to think it may have been a migratory movement. I am especially led to this belief as I failed to see any sign of the number on the following night, or since. —*H. Mead-Briggs, 37, Nunnery Fields, Canterbury; December*, 1895. [In No. 17 of "The Annals of Scottish Natural History," page 58, published after Mr. Briggs' question was in print, Mr. Symington Grieve, of Edinburgh, asks the question "whether Daubenton's bat (*Vespertilio daubentoni*) migrates. He states that in the crevices of some rocks on Loch Dochart, in Perthshire, there were many in July, in the breeding season, but at the end of September they had all disappeared.—*Ed.* S.-G.]


| | 1896. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| | | A.M. | P.M. | | |
| *Sun* ... | Jan. 1 | 8.8 | 3.59 | 18.46 | 23° 2′ S. |
| | ,, 11 | 8.5 | 4.11 | 19.30 | 21° 50′ |
| | ,, 21 | 7.56 | 4.27 | 20.13 | 19° 57′ |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| *Moon* ... | ,, 1 | 4.32 | 1.13 | | |
| | | A.M. | A.M. | | |
| | ,, 8 | 2.41 | 7.10 | | |
| | | *Souths.* P.M. | *Sets.* P M. | | |
| | ,, 15 | 0.41 | 4 44 | | |
| | | P.M. | A.M. | | |
| | ,, 22 | 5.31 | 1.9 | | |
| | | P.M. | P.M. | | |
| *Mercury*... | ,, 2 | 0.38 | 4 28 | 19.25 | 24° 11′ S. |
| | ,, 12 | 1.8 | 5.20 | 20.34 | 20° 40′ |
| | ,, 22 | 1.26 | 6 10 | 21.32 | 15° 7′ |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Venus* | ,, 2 | 4.24 | 8.58 | 15 44 | 17° 6′ S. |
| | ,, 12 | 4.48 | 9.7 | 16.32 | 19° 33′ |
| | ,, 22 | 5.10 | 9.18 | 17.22 | 21° 14′ |
| *Mars* ... | ,, 2 | 6.11 | 10.8 | 16.55 | 20° 50′ S. |
| | ,, 12 | 6.8 | 10.0 | 17.27 | 23° 33′ |
| | ,, 22 | 6.2 | 9.52 | 17.58 | 23° 53′ |
| | | P.M. | A.M. | | |
| *Jupiter* ... | ,, 1 | 6.5 | 1.53 | 8.38 | 19° 7′ N. |
| | ,, 21 | 4.31 | 0.24 | 8 28 | 19° 47′ |
| | | A.M. | A.M. | | |
| *Saturn* ... | ,, 1 | 3.26 | 8.13 | 14 59 | 14° 39′ S. |
| | ,, 21 | 2 15 | 7.0 | 15.5 | 15° 0′ |
| *Uranus* ... | ,, 1 | 4.11 | 8.37 | 15.23 | 18° 17′ S. |
| | ,, 31 | 2.18 | 6.43 | 15.27 | 18° 33′ |
| | | P.M. | P.M. | | |
| *Neptune*... | ,, 1 | 2.13 | 10.15 | 5.0 | 21° 15′ N. |
| | ,, 31 | 0.14 | 8.15 | 4.57 | 21° 12′ |

MOON'S PHASES.

| | | | | | |
|---|---|---|---|---|---|
| *Last Qr.*... | Jan. 7 | 3.25 p.m. | *New* ... | Jan. 14 | 10.19 p.m. |
| 1st *Qr.* ... | ,, 23 | 2.42 a.m. | *Full* ... | ,, 30 | 8.55 a.m. |

MERCURY is at its greatest elongation east on the 23rd. Venus is still very prominent in the morning, but her declination is too far south to be convenient. Jupiter is still very well situated, his north declination making his position very satisfactory; he is in opposition on the 24th.

WE understand that Mr. R. Kanthack, of 18, Berners Street, London, has just been appointed sole agent for the United Kingdom and Colonies, for Messrs. C. A. Steinheil Söhne, of Munich, the makers of telescopes and all kinds of instruments for astronomical and physical research. Mr. Kanthack will be pleased to forward, without charge, their catalogue in English, to anyone who may desire to have a copy. Mr. Kanthack is also agent for Leitz's microscopes.

DR. JOHN RUSSELL HIND, F.R.S., the eminent astronomer, died on December 23rd, 1895, at Twickenham. He was born on May 12th, 1822, at Nottingham, the son of a lace manufacturer there, and at an early period began to study astronomy. When he was but sixteen years of age he contributed a number of astronomical notes to the "Nottingham Journal" and elsewhere. His first occupation was as an assistant to a civil engineer, and in 1840 he went to London on professional duties. Through the influence of Professor Wheatstone, he later obtained a post in the Royal Observatory at Greenwich, under Mr. Airy, the then Astronomer Royal, as an assistant in the magnetical and meteorological department, where he remained until June, 1844. In 1843, for a period of three months, he served on the Commission appointed by the Government to determine the exact longitude of Valentia Island off the Kerry coast. On his return he joined the staff of Mr. G. Bishop's private observatory in Regent's Park, and there he made observations which rendered his name celebrated among astronomers. He calculated the orbits of more than seventy planets and comets, reported sixteen new movable stars and three nebulæ, and discovered ten new minor planets, viz.: Iris and Flora in 1847, Victoria in 1850, Irene in 1851, Melpomene, Fortuna, Calliope, and Thalia in 1852, Euterpe in 1853, and Urania in 1854. In 1844 he became a Fellow of the Astronomical Society, and in 1846 his first work appeared, "The Solar System." About the same time he was appointed Foreign Secretary of the Royal Astronomical Society, elected a corresponding member of the Société Philomatique of Paris, and received from the King of Denmark a gold medal for his discovery of a planet, in February, 1847. In May, 1850, he became a corresponding member of the National Institute of France, in 1851, obtained from the Academy of Sciences, Paris, the Lalande Medal and was elected a corresponding member, and the following year was awarded the Astronomical Society's gold medal and a pension of £200 a year from the British Government. He also, in 1852, received for the third time the Lalande Medal from the Academy of Sciences, Paris, and a prize of about 300 francs for his discoveries of new planets. In 1853 he undertook the editing of the "Nautical Almanack," and was for many years the Superintendent of the "Nautical Almanack" office. In 1880, Dr. Hind was President of the Royal Astronomical Society. He was the author of many works, including his "Solar System," "Recent Comets and the Elements of their Orbits," an "Astronomical Vocabulary," "The Comets," "Illustrated London Astronomy," "Elements of Algebra," "Expected Return of the Great Comet of 1264 and 1556," and a Descriptive Treatise on Comets.

MESSRS. KEGAN PAUL, TRENCH AND TRÜBNER have recently published a book, by Mr. William Ford Stanley, F.R.A.S., entitled "Notes on the Nebular Theory, in relation to Stellar, Solar, Planetary, Cometary, and Geological Phenomena." In a rather apologetic preface the author mentions that although the essays which constitute the chapters in this work have already appeared in serial literature, they are now amplified and brought up to the range of his more mature results of investigation. These essays, even if the specialist reader does not quite agree wlth Mr. Stanley's conclusions, will be found to quite repay perusal. That they are speculative is inevitable, but there are many very thoughtful passages which are worth weighing and their theories investigating. The work shows every indication of independence of thought on the part of the author, though he constantly quotes other thinkers, but always gives his authority and place where he had obtained his quotation. To the general reader the subject is one which grows upon his imagination until he passes from the stages of wonder to that of highest interest. The illustrations are well executed and admirably printed; especially is this so in plate 3. The price of this work is 9s.

## SCIENCE GOSSIP

OUR contemporary, "The Photographic News," appears in enlarged form, and at the reduced price of one penny, with the commencement of the new volume on January 3rd.

WE have on a former occasion referred to the Garden Scholarships of the Missouri Botanical Garden, at St. Louis. We have now received the seventh annual announcement concerning the pupils, dated November, 1895.

MR. W. VICK, photographic artist, of London Road, Ipswich, has published an admirable portrait of the late Mr. J. E. Taylor, so long editor of "Hardwick's Science-Gossip." It is a photo-etching and therefore permanent. The price for single copies is one shilling and sixpence.

"COLONIA" is the title of a periodical issued by the Colonial College, Hollesley Bay, Suffolk. No. 6, which has just come to hand, contains a portrait of the late editor of "Hardwick's Science-Gossip," by Mr. W. Vick, of Ipswich, with memoir. Mr. Taylor was Professor of Natural History at the college.

A NUMBER of the former students of Professor Bonney's Geological Classes, at the University of Cambridge and at University College, London, having felt a desire to recognise the value of his labours among them, and of his services to Geological Science, have united in presenting him with his portrait as a memento of their personal esteem and gratitude.

IN the last quarterly part of "The Annals of Scottish Natural History" are several articles of interest, especially one on "The tufted-duck in Scotland," by Mr. J. A. Harvey-Brown, F.R.S.E., and a critical notice by Mr. G. C. Druce, F.L.S., of Oxford, of the ninth edition of the London Catalogue of British Plants, also an account of coleoptera collected during a residence on the summit of Ben Nevis.

DURING the past autumn at least two specimens of the northern race of bullfinch (*Pyrrhula major*, C. L. Brehm) have been obtained in East Yorkshire. These brilliantly-coloured birds are much larger than our ordinary bullfinches (*P. europœa*), and are native of Northern Asia and through to Sandinavia, not being generally found south of Poland and Prussia. This is an addition to the list of casual bird-visitors to Britain.

FLOTSAM found at sea often takes curious forms. On calling upon Mr. L. T. Griffin, of 3, North Quadrant, the Brighton taxidermist, recently, he informed us that a fisherman had brought into his shop five fine albatross skins, minus heads, legs and wings, which were picked up in the English Channel, packed in a wooden box. They are in good condition, and Mr. Griffin would like to find the owner to whom they were consigned. There was not anything on the box to lead to his identity.

THE late astute Premier of Cape Colony finds time from his political labours to take interest in natural history, at least, from the point of view of acclimatisation. Mr. Rhodes is introducing into South Africa several species of English singing birds.

THE memory of the well-known Arctic explorer, Dr. John Rae, F.R.S., who died a little time since, is perpetuated by a monument just erected in St. Magnus Cathedral, Kirkwall. Dr. Rae's various expeditions are enumerated on the pedestal.

WE have received a prospectus of "The Ornithologist," which is to be a sixpenny monthly journal devoted to birds, edited by Mr. H. K. Swann. This magazine is announced to appear in March next, subject, apparently, to first obtaining five hundred subscribers.

MESSRS. FRIEDLÄNDER AND SOHN, of 11, Carlstrasse, Berlin, invite subscriptions of ten shillings, including postage, for the "International Zoologists' Directory," edited by the German Zoological Society. It contains 748 pages and upwards of 12,000 names. The work is now ready for delivery.

A REPRINT of the Presidential Address, by Mr. James Fletcher, F.L.S., read in May last before the Royal Society of Canada, has been issued. The address is an interesting summary of what is known of practical entomology. This reprint may be obtained for a few pence in England from Mr. Bernard Quaritch, Piccadilly, London.

A NEW history of the order "Arthropoda" is announced, in two volumes, the first of which is just published by M. L. Mulo, of 12, Rue Hautefeuille, Paris. The author is M. E. Simon. This volume contains 1,084 pages 8vo, and 1,098 woodcuts, and the first two of the four parts, viz.: (1) External Anatomy of Spiders, (2) Classification and History of Families, (3) Biology, (4) Geographical Distribution. The price is £1 1s. 9d., delivered by post; or the parts separately at 5s. 6d.

THE wonders of photography never cease. Now the camera is to investigate our insides before we have ceased to use them, and give gruesome pictures of our living skeletons, and, maybe, in time, the consciences of those who have got any. Messrs. Newton and Company, the opticians, of Fleet Street, London, are now supplying lantern-slides from such photographic negatives, including the skeleton of a man's hand taken through the flesh, also a razor photographed while inside its case, coins inside a purse, and such like examples of the new portraiture. The first of these plates we have seen, and believe it indicates a new and great epoch in the economic uses of photography.

AT Toynbee Hall, Whitechapel, there are now various classes in physiology, geology, and botany, two extension courses—one on "Elementary Chemistry," by Mr. John Wade, with supplementary practical classes; another on "Biology," by Mr. P. Chalmers Mitchell, with demonstrations by Miss Hall. Of a more practical nature are the lectures by Mr. A. Wynter Blyth, the medical officer for Marylebone, (Saturday mornings) on "Hygiene;" on the "Physiology of Everyday Life" (Sunday mornings), by Mr. David Walsh, and those on "Nursing," by Dr. Eddowes and Dr. W. Black Jones. Dr. H. R. Mill and Mr. W. G. de Burgh give courses which will probably cram their lecture rooms in Limehouse and Poplar, the former on "Political Geography," the latter upon "The Growth of the British Colonies."

## SCIENCE ABROAD

THE MUSEUM (Albion, N.Y., September and October, 1895). These numbers contain very popularly written articles on various subjects connected with Natural Science, and also a number of illustrations which are hardly up to the standard of American magazines. These numbers are, however, in advance of the first issued.

BULLETIN DE LA SOCIÉTÉ ZOOLOGIQUE DE FRANCE (Paris, October and December, 1895). The late Zoological Congress at Leyden receives full attention. The report is divided into three parts: (1) The general meetings and conferences; (2) the sectional meetings; (3) the receptions, fetes and excursions. M. Fernand Meunier contributes an article, entitled, "Note sur les Carabidæ des Schistes de Schernfield." There are two illustrations of two fossil Carabidæ from the collection in the Museum at Haarlem. The writer also describes a new species, entitled, *Procalosoma giardi*. There is a "Notice sur les *Spongiaires recueillis* en 1894 et 1895," by Emile Topseut, being an account of the sponges collected during the voyage of the "Princess Alice," in 1894.

A BIOGRAPHICAL NOTICE OF W. S. W. RUSCHENBERGER, M.D., by Edward J. Nolan, M.D., contains an interesting account of the foundation and early progress of the Philadelphia Academy of Natural Sciences. Its first recorded meeting was held on January 25th, 1812, at the house of John Speakman, under the title of "Friends of Science and of Rational Disposal of Leisure Moments." Dr. Ruschenberger was a surgeon in the United States Navy, and although in constant correspondence with the Academy, it was not until 1840, when he was stationed at the naval rendezvous in Philadelphia, that he took any active part in its work. He was elected one of the Vice-Presidents of the Academy, in January, 1869, to fill the position made vacant by the death of John Cassin; and at the annual meeting of the same year he was elected President, a post he filled until 1881.

PROCEEDINGS OF THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA (Philadelphia, 1895) contains a "Description of a New Genus and Species of Cottoid Fishes from Puget Sound," by Edwin Chaplin Starks. The new species of fish, *Jordania zonope*, is not uncommon in Puget Sound; it is allied, but not closely, to *Triglops* and *Chitonotus*. The largest of the three types in the museum of the Leland Stanford Junior University is four inches in length. Unfortunately the life colours of this species disappear in alcohol. There is in life much red on the lateral plates and elsewhere on the body and fins, the prevailing colour being black. Mr. Warren M. Foote contributes a short note on "A New Alkali Mineral" discovered by Mr. C. H. Northup, at Borax Lake, California. The crystallization, which is of a somewhat rare nature, is fully described. The colour varies from milky pale yellow, and greenish grey to brown; the lustre is vitreous; hardness, 3·5 to 4. Chemical examination shows it to be essentially a chlorocarbonate of sodium. It is proposed that the name "Northupite" should be given to this new species, since it has been brought to light by Mr. Northup's indefatigable zeal in collecting.

FEUILLES DES JEUNES NATURALISTES (Paris, December, 1895). M. H. Dolfus, the editor, continues his Report of The International Congress of Zoology at Leyden. He gives short particulars of the speeches of Mr. J. Murray, M. Milne-Edwards, Prince Roland Buonaparte and others. A series of articles by M. Bavay, on "Conservation et preparation des Mollusques," contain an account of the manner in which both shells and the soft parts of molluscs should be treated for preservation. M. Bavay gives preference to uncoloured alcohol at a temperature of 70° C., and mentions that M. Joubin recommends a solution of bichromate of potash for keeping cephalopoda. For univalve land and sea shells the *modus faciendi* is the same. They should be put in warm water and heated to boiling. Then the bodies should be taken out with a pin. If by accident some of the body should be left behind, a piece of steel rolled into a spiral should be inserted into the shell, and warm water finally injected. Dr. Louis Planchon gives some "Observations sur la Resistance Vitale de l'Argas reflexus Latr." These notes date some years back, but M. Planchon considers them worthy of publication that they may confirm what is already known on the subject of the vitality of certain mites, and of *Argas* in particular.

BULLETIN DE LA SOCIÉTÉ ROYALE LINÉENNE DE BRUXELLES (Brussels, November and December, 1895). The editor contributes an article entitled "Le Moineau et l'Agriculture." He refers in it to an article by M. Pelicat which appeared in the "Revue Scientifique" of May last, in defence of the sparrow. It is pointed out in this editorial that the sparrow, being a great destroyer of insects, is really a friend and not an enemy. M. Pelicat says the writer calculates that a couple of sparrows can in a dozen years destroy five hundred cockchafers. M. Pelicat calculates that a sparrow consumes four litres of corn a year. On the other hand, considering the number of cockchafers and other destructive insects devoured by these indefatigable birds, the gain is certainly in many millions to the agriculture of France. Belgium and French sparrows are evidently better educated than those of Britain. "Plantation des Arbres Fruitiers," by M. E. Pamart, is a short account of the best time and manner in which to plant fruit-trees. He says they should be planted before the winter, but if that is not possible, at the end of February or the beginning of March. The December number contains a sketch by M. Paul de Closeau, entitled "Causerie." It is a poetical description of autumn, the uses of fallen leaves as fuel, as manure, and as covering for the roots of the spring plants, and also their possible use as beds for poor people. An article on "Les Couches" gives some useful information with regard to making forcing beds. The writer recommends their being made of dead leaves and stale manure, as he considers these substances develop a better and more sustained heat than fresh manure. When the heat of the bed begins to grow weak, one can renew it by taking away the manure from the edge and putting fresh round. This can easily be done regularly by making the border a little higher than the box.

## MICROSCOPY

Polynema natans in August.—I see in the June issue of Science-Gossip (*ante* p. 89) that Mr. Fred Enock found some *Polynema natans* in a pond near Totteridge in May last. It may interest many microscopists to record that whilst dipping in a pond near Shenley, Herts, I found one perfect specimen of this remarkable little aquatic fly late in August, 1895, quite by chance. This seems to point to the species being at least double brooded. —*Walter Crosbie, The Chestnuts, Lyonsdown, New Barnet.*

Questions on Microscopy.—I think your readers would help to make Science-Gossip more practically useful if they would ask questions concerning *technique*, etc., through your columns, and give also the results of any experiments they have made with objects for the microscope. Though some of these may seem trivial to the learned ones, yet I am sure your object is to help the many hundreds of young people who are now taking up the microscope, Their difficulties will be those of many others. I add an instance or two of what I mean.—*Adam Clarke Smith, Eastmoor, Bournemouth East.*

[We welcome this communication, and cordially invite others. We have pleasure in announcing that Mr. Martin J. Cole, the well-known professional microscopist, has kindly undertaken to answer questions on *technique*, and generally assist, through our columns, any students of microscopy.—*Ed.* Science-Gossip.]

*Marine Glue.*—What is the solvent of this cement? I have been told that wood naphtha is, but I cannot succeed. Methylated spirit will—but will not naphtha do?—A, C. S.

*Mildew in Slides.*—I have tried soaking in methylated spirit for a few minutes, then brushing the object very softly with a camels'-hair brush. The object must then be thoroughly dried before putting up again. Mildew is a terrible enemy.—A. C. S.

*Marine Glue.*—Methylated spirit is the best solvent for marine glue, but why use the latter for microscopical work? Miller's caoutchouc cement answers all purposes much better. It can be obtained from most opticians; its solvent is also methylated spirit.—M. J. C.

*Mildew in Slides.*—The remedy you have applied is all you can do. The cause of the mildew is either that the specimen was not quite dry before mounting, or that the cell was not properly sealed up. Dry mounts should always have two or three coats of some good shellac cement, such as Miller's caoutchouc.—M. J. C.

What Becomes of Hydras.—The Rev. G. C. Bateman, in his interesting book on the Aquarium, page 301, says that "they apparently disappear in the autumn." At page 254 of Kerner and Oliver's "Physiology of Plants," it is stated that *Hydra* is "an instance of symbiosis," the alga in partnership with it being furnished with chlorophyl. About six weeks ago I had a very fine *Hydra viridis*, which, under a good food supply, was budding freely. I had to go away from home for a fortnight, and left it in a glass plentifully supplied with entomostraca, expecting to find it on my return a rival to the giant one figured in the last edition of "Carpenter on the Microscope." It had, however, vanished out of sight, and the entomostraca were flourishing. Had they eaten it? A few days since I had another *Hydra viridis* in a cell slide in a very active state, till one day I gave it a drop of water that had some *mycelia* in it, when that *Hydra*, too, disappeared, and left nothing behind it, unless it may have been a trace of the symbiotic green algæ which had flourished on it. I could find no vestige of this *Hydra* under the microscope. Can any of your correspondents explain this? Does *Hydra fusca* turn into *Hydra viridis* by means of green alga spores settling on it? The former is found here in clear water on willow-roots, which are of its colour; the latter is on *Lemna* in ponds. Is the symbiotic theory correct?—*Wm. N. Varrand, Maj.-Gen. R.E., Westhorpe, Southwell; December* 10*th*, 1895.

High Magnification.—There is a prevailing idea in the minds of many amateur microscopists, notwithstanding the repeated efforts that have been made to eradicate it, that enormous magnification is the essential for the examination of minute structure. There was a time when $\frac{1}{20}$-inch, $\frac{1}{25}$-inch, and even objectives of still higher power, were considered desirable additions to the equipment of the microscopist. Before the relation of aperture to power was understood, it was possible for such objectives to have been thought advantageous, but examined from the standpoint of modern optics, they have no *raison d'etre*. It is therefore a matter for surprise to find in the "Proceedings" of the American Microscopical Society the following paragraph:—"Dr. Ephraim Cutter, of New York City, then gave a vivid description of a $\frac{1}{75}$-inch objective, whose performance he considered a triumph for America, and a great credit to Mr. Tolles, by whom it was made." The claims of this $\frac{1}{75}$-inch have been further energetically pushed in an American journal devoted to microscopy. Its marvellous performances, from the owner's point of view, the difficulties encountered in the manufacture, the enormous cost (roughly, £80), and the people who have looked through it with wondering eyes, have all been minutely described. It may be, and probably is, a curiosity, and a marvel of the optician's skill, but a modern oil immersion $\frac{1}{12}$-inch lens, costing £5, correctly used, would reveal far more fine detail than this much-lauded $\frac{1}{75}$-inch.

There are many microscopists yet to be met with, who, if they were offered a choice between a dry $\frac{1}{25}$-inch or higher power, and an oil-immersion $\frac{1}{12}$-inch of large aperture, both by equally good makers, would unhesitatingly select the former, because of its imagined effectiveness in consequence of the greater magnifying power that it would yield. This ignorance is not confined to "unattached" microscopists, that is, such as are not members of clubs or who live away from centres of microscopical work, for it was but three or four months ago that a gentleman was exhibiting a diatom, with a dry lens of high power, in the meeting room of a Microscopical Society at Hanover Square, and was claiming for it an equality with, if not a superiority to, oil-immersion lenses.

Before proceeding further, it must be clearly stated and understood that it is the aperture of an objective—other conditions being, of course, equal—that enables us to perceive the fine structure in an object under examination, and every degree of aperture represents the ability of a lens to divide so many lines to the inch. It, therefore, only becomes necessary to be aware of the greatest aperture that has been obtained, and the limit of vision possessed by a keen eye, to know what is the maximum magnifying power necessary to show all that the microscope can reveal. The greatest numerical aperture hitherto obtained has been 1·63, in the $\frac{1}{10}$-inch mono. brom. of naphthalin immersion objective, made by Zeiss, which requires special cover glasses and other exceptional conditions for satisfactory working. In practice, however, 1·4 numerical aperture is the limit of aperture employed.

The ability of the eye to separate detail has been dealt with by Mr. E. M. Nelson, in an admirable paper read by him before the Royal Microscopical Society ("Royal Microscopical Society's Journal," February, 1893). In it he pointed out that a keen eye could perceive all the detail that a numerical aperture of 0·26 could resolve, if the magnification were 100 diameters. That is, given an eye-piece power of ten diameters, 0·26 numerical aperture could be given to every ten diameters of initial magnification afforded by the objective; the combined power of the eye-piece and the objective producing the needed 100 diameters. (The initial magnification of an objective can be very approximately determined by dividing its focal length into ten. Thus a $\frac{1}{7}$-inch would have an initial power of seventy diameters.) A further enlargement of the image could be obtained, if desired, by using eyepieces of higher power. Bearing in mind these two points, the highest aperture obtained and the limit of vision, it will be seen that a $\frac{1}{7}$-inch of 1·63 numerical aperture would more than suffice, if used with an eyepiece power of ten, to show all the fine detail that the microscope can reveal.

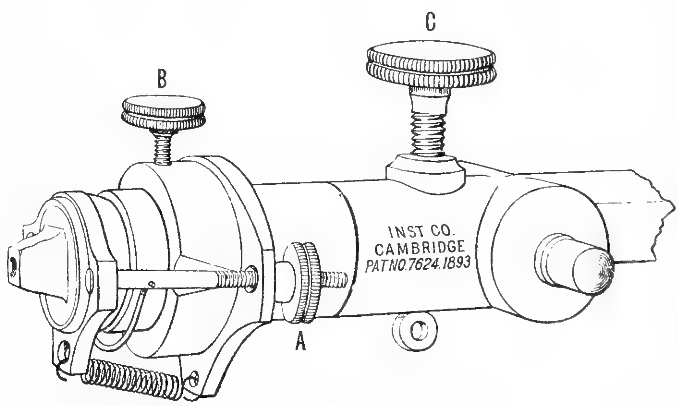
The $\frac{1}{75}$-inch before referred to, so far as the writer has been able to ascertain, was a dry objective. The maximum numerical aperture obtainable with a dry lens is 1·0; this lens, therefore, could not have exceeded this. From the premises before stated, it will be apparent that a $\frac{1}{4}$-inch objective of similar aperture, used with an eyepiece, magnifying ten diameters, would show all the delicate structure that this $\frac{1}{75}$-inch would be capable of doing, and there is no doubt, whatever, that a modern apochromatic objective, such as that made by Zeiss, with its improved corrections for colour and spherical aberration, would reveal even more than the $\frac{1}{75}$-inch lens. How absurd, therefore, is it to use dry lenses of high power.

In mentioning the limit of power to aperture that is permissible, it must not be taken for granted that it can be arbitrarily carried out. There are very few lenses that have the full relation of aperture to power. A saving in cost of manufacture is generally effected by having the power fairly high for the aperture employed, and the $\frac{1}{12}$-inch has become the popular high-power objective of large aperture. This is not an unreasonable power, but it is obvious that no advantage can be gained by having a $\frac{1}{20}$-inch, unless, indeed, a proportionate increase of aperture be given to it, which, so far, has proved to be impracticable.

Professor Abbe has been said to have given it as his opinion that the $\frac{1}{8}$-inch immersion lens of 1·4 numerical aperture will be the lens of the future, and the opinion of microscopists is becoming increasingly favourable to this idea.

Only those who have had experience in working with the old high-power lenses and the modern comparatively low powers of large aperture can be aware of the advantages that the latter possess. Not only are the latter far easier to use, and yield a much brighter and more perfect image, but they have a convenient working distance, which was a quality almost unknown in the former.

To summarize: attention should be paid by microscopists in the selection of their objectives, to see that they have at least a fair ratio of aperture to power, and when it is thoroughly understood that high magnification, unaccompanied by proportionate aperture, is valueless, useless high-power lenses will cease to be.—*M. J. Cross* (*author Part I. "Modern Microscopy"*), 27, *Chancery Lane, London, W.C.*



ADJUSTABLE OBJECT-HOLDER.

ADJUNCT TO MICROTOME.—In connection with the new rocking microtome, described on page 228 (*ante*), the Cambridge Scientific Instrument Company have brought out a new form of adjustable object-holder, sometimes called an "Orientating Apparatus"; this allows the object to be moved so that the sections are cut in the required plane. The engraving shows this addition as applied to the old rocking microtome, but a larger form is made suitable for the new instrument. It will be seen that it consists of a ball-and-socket-joint which is capable of being adjusted in all directions by screws. The ball of the ball-and-socket-joint is really a cup holding the paraffin in which the object is embedded, and when both the screws (*a*) are tightened this cup is pressed tightly into the socket, and the whole is perfectly rigid, a point of considerable importance. The screw (*b*) moves the object about a horizontal axis and the screws (*a*) move it about a vertical axis. When the screw (*c*) is loosened the whole apparatus can be at once removed.

## ZOOLOGY

Stone Curlews in Kent.—During November last, I obtained a nice pair of stone curlews (*Œdicnemus scólopax*) from this neighbourhood. A third one also found its way into the hands of the local taxidermist, obtained from Whitstable. This bird, of course, is not a rarity, but from all accounts it appears to be uncommon in Kent. The time of year, too, is worthy of note.—*H. Mead-Briggs, 37, Nunnery Fields, Canterbury; December, 1895.*

Golden Eagle in Kent.—Mention of a golden eagle having been shot at Minster, in Thanet, Kent, appeared in the London papers during December. This, like most of the so-called golden eagles that from time to time have been obtained in Kent, has turned out, upon inspection, to be an immature white-tailed or sea eagle.—*H. Mead-Briggs, 37, Nunnery Fields, Canterbury; December, 1895.*

Spotted Crake in Argyllshire.—At the meeting of the Natural History Society of Glasgow, held December 23rd, 1895, Mr. John Patterson exhibited a specimen of *Porzana maruetta*, of Leach, which had been shot on the river Add, Argyllshire. It does not appear that this species had been observed north-west of the Clyde up to the publication of Mr. Saunder's Manual of British Birds, though Mr. Harvie-Brown included it in his "Vertebrate Fauna of Argyll," at a subsequent date. The bird is, however, rare in that region.

Birds in the Firth of Forth.—Large numbers of the greater black-backed gulls have been observed here within this last three weeks. I procured a specimen in fine plumage which measured from tip to tip of each wing five feet two inches. Snow-buntings are very scarce here compared with last year. Thrushes are just beginning to come down to the shore, but fieldfares and redwings have not yet made their appearance. Scaup ducks and scooters are plentiful, as also are the various gulls. Golden plovers are very scarce here at present, but we hope soon to get some sport at this fine bird. I shall be glad to know if any of your readers have observed unusual numbers of black-backed gulls in their vicinity.—*W. A. Nicholson, 39, Tower Street, Portobello, Scotland; December 18th, 1895.*

Winter Habits of Helices.—Can anyone tell me anything about the habits of some of the larger species of the genus *Helix* in winter time? I more especially want to find *H. nemoralis, H. hortensis* and *H. arbustorum* with the winter eppiphram. I have no difficulty in finding specimens of *H. aspersa* while hibernating, but have only occasionally succeeded with *H. nemoralis*, and never with *H. hortensis*. *Nemoralis* has a beautiful white eppiphram when found on the sandhills in winter time. It consists of a strong cake of white calcareous substance, something in appearance like that deposited by *H. pomatia*, though not so strong in proportion, and much more brittle; in fact, it is difficult to remove when cleaning.—*Charles Williams, Sheffield; December, 1895.*

## TRANSACTIONS

Royal Meteorological Society.—The opening meeting of the session was held in the new building of the Institution of Civil Engineers, on November 20th, Mr. R. Inwards, F.R.A.S., President, in the chair, when a paper by Mr. J. Eliot, F.R.S., was read, "On the origin of the cold-weather storms of the year 1893, in India, and the character of the air movement on the Indian seas and the equatorial belt, more especially during the south-west monsoon period." This was really a discussion of the data contained in the "Indian Monsoon Area Charts," the publication of which was sanctioned by the Indian Government for the two years, 1893-4. Cyclonic storms are of frequent occurrence during both the north-east and south-west monsoons, but they differ in many important respects. The storms of the south-west monsoon originate almost invariably over a sea surface, and travel in very variable directions, and occasionally develop into intense and furious hurricanes. The cyclonic storms of the north-east monsoon almost invariably originate over the plateaux of Persia or Baluchistan, or in North-Western India, and travel in an easterly direction at a velocity ranging between fifteen and twenty miles per hour. These plateau-formed storms of the cold weather are the chief instruments of the distribution of the moderate rainfall essential for the great cold weather wheat and other crops of Northern India, and are the chief sources of the snowfall of the Western Himalayas. After giving an account of the more important cold-weather storms in January and February, 1893, and the results of the tabulation of the wind observations for the equatorial belt, the author describes the "burst of the monsoon." Mr. Eliot says that the evidence of the year 1893 is strongly in favour of the supposition that the south-west monsoon currents in the Indian seas are the direct continuation north of the equator of the horizontal movement of the south-east trade winds; and that the larger variations in the strength of the south-east trades near the equator during the monsoon period, are reproduced in the monsoon currents in the Indian seas from June to September. Mr. W. H. Dines showed a very interesting and and instructive experiment illustrating the formation of the tornado cloud. The characteristic funnel cloud was readily seen, extending from the tray of hot water to the mouth of the pipe at the top of the box, and when the draught was strong and the conditions favourable, a decided protuberance was observed on the surface of the water just under the end of the cloud. Mr. Dines is of opinion that the cloud is formed by true dynamic cooling, as the air saturated by the vapour from the hot water comes under the influence of the decreased pressure at the centre. A paper by Mr. C. Davison, F.G.S., was also read, "On the Diurnal Variation of Wind Velocity at Tokio, Japan."

The South London Entomological and Natural History Society.—Thursday, November 14th. Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Briggs exhibited a living specimen of the Madeira cockroach, *Panchlora maderæ*, taken in Covent Garden Market. Mr. Edwards, specimens of the rare morphos, *M. cacica* and *M. neoptolemus*, from Peru. Mr. R. Adkin, a series of *Emmelesia tæniata*, from co. Kerry, lighter in colour than the English form, and a specimen of *Arctia caja*, from Louth, with very intense black-brown markings. Mr. H. W. Williams, a bred series of *Oporabia dilutaria*, including two very dark uniform specimens and one with a light marginal area. Mr. McArthur, living larvæ and a recently emerged imago of *Triphæna comes*, var. *curtisii*, from Orkney, and said that all the captured ones were of that form. Mr. Turner, a specimen of *Phorodesma smaragdaria*, unique in being bred on September 26th, and several varieties of *Vanessa urticæ*, one of which had the central spots reduced to minute dots. Mr. Mansbridge, a series of *Scoparia basistrigalis*, taken at sugar in Epping Forest. Mr. Sturt, a living larva of *Sphinx convolvuli*, from Cornwall, with drawings of others he had had. It was noted that one specimen was of the rare striped form of the larvæ. A discussion took place as to the necessity of forcing the pupæ of the larger hawk-moth. Mr. South, a short bred series *Acronycta menyanthidis*, from Macclesfield, and stated that the larvæ much preferred sallow as food, although a few fed on birch. Mr. Carrington, a large number of specimens of *Helix memoralis*, varieties from various localities, including mons. *sinistrorsum*, from co. Donegal, var *albolabiata*, from Arran Isles, var. *major* from the South Downs of Sussex and a number of curious sub-fossil forms from Dog's Bay, co. Galway. A considerable discussion took place with reference to the latter. Mr. Winkley, a Simian hand, prepared to show the bones and tendons with their various attachments and ramifications. Mr. Ashdown, a number of Lepidoptera, including a strange var. of *Melanippe sociata*, having a light looped band from the costa, including the discoidal spot. Mr. Step communicated a list of British stalk-eyed crustacea, including the new species, with references to all species described in Bell's "British Crustacea."—NOVEMBER 28th. Mr. T. W. Hall, F.E.S., President, in the chair. Mr. R. Adkin exhibited a specimen of *Mesogona Acetosellæ*, a species new to Britain. Mr. Adkin also exhibited a series of *Coremia munitata*, from Hoy, with series of the same species from Shetland and Paisley, and of *C. designata*, for comparison, and read notes on the variations exhibited. Messrs. Barrett, Tutt and Carrington remarked on the habit of the species of flying during the day-time in elevated, exposed and Alpine regions. Mr. H. Moore showed a long series of *Ocneria dispar*, bred from a Bordeaux female. They were all small, owing, it was thought, to the larvæ being fed on hawthorn. Mr. Carrington, four specimens of *Epinephele janira*, with bleached splashings on the wings, from Leigh, Essex, taken in the same field in 1890-91; also he showed typical and lemon-coloured forms of *Hesperia lineola*, from Shoeburyness. Mr. Clark, a number of large and well-executed micro-photographs. Mr. Hy. J. Turner, a specimen of the moorland form of *Noctua festiva*, from Carlisle. *Crambus pinellus*, from Box Hill, a very rosy specimen of *Anticlea rubidata*, bred from Chichester, and a pair of *Coccyx cosmophorana*, from Carlisle. A long discussion took place on the life history of the latter species. Mr. McArthur had bred a number from the knobs produced by *Retinia resinella* a year after *resinella* had emerged, and said that he found the larvæ feeding on the grass of that species. *Coccyx cosmophorana* occurred at Rannock, where *R. resinella* had not been recorded, but from several localities where *R. Resinella* was known to occur. Mr. Ashdown, a bred specimen *Acronycta alni*, from Richmond, and a specimen of *Eumenes coarctata*. Mr. Briggs, an Orthopteron, *Periplaneta australasiæ*, taken at Kew, and introduced to Britain. Mr. Perks, a specimen of the velvety-stemmed Agaricus, *Agaricus volutipes*.—*Hy. J. Turner (Hon. Report Sec.)*

NATURAL HISTORY SOCIETY OF GLASGOW.—The third meeting of the winter session, was held in the Society's Rooms, 207, Bath Street, on November 26th. Professor Thomas King, President, in the chair. Mr. F. J. Hanbury, F.L.S., editor of the "London Catalogue of British Plants," and Professor Edward E. Prince, B.A., F.L.S., Director of Fisheries, Dominion of Canada, were elected corresponding members. Professor G. Bell Todd, M.B., C.M., submitted and described a second series of dried plants, collected in the province of Victoria by Baron Fred. von Mueller, K.C.M.G., M.D., F.R.S., Government botanist, Melbourne. Many of these plants were of special interest, some from peculiarities in themselves, others from their affinity with species occurring in Europe. Miss M. Henderson exhibited photographs taken *in situ*, of the scaly spleenwort, *Ceterach officinarum*, growing spontaneously in the Roseneath peninsula, a new county record for Dumbartonshire. Mr. A. Somerville, B.Sc., F.L.S., showed dried specimens of *Ceterach* from the east and west of Ireland, and gave particulars as to its distribution in Britain, and of its more or less sporadic occurrence in eleven Scotch counties. Living specimens of the *Ceterach* specially sent by a friend from Hyères, in the south of France, for the meeting, were distributed amongst those present. Mr. Peter Ewing, F.L.S., read a paper entitled "Remarks on the 'Ninth Edition of the London Catalogue' (of British Plants), with Illustrative Specimens," in which he compared this list with the eighth edition, issued in 1886, and criticised the increase in its length, due so largely to the splitting up of species, and to the recognising of new varieties described in papers scattered throughout botanical journals, but not as yet included in any of our floras. Mr. Ewing further criticised the assumption by the catalogue of the functions of a flora—as, for instance, in the physiological department of hybridization, so remarkable a feature in the willows, willow-herbs and other genera.

GREENOCK NATURAL HISTORY SOCIETY.—The usual monthly meeting of this society was held in the Museum, Kelly Street, on November 27th. Mr. Andrew Kerr, President, occupied the chair. Mr. G. W. Niven read a paper on "Ancient Nautical Instruments." Some curiosities of nomenclature were first alluded to. Photographs were thrown on the screen of many beautifully engraved gold, silver and bronze astrolabes, taken from ancient MSS. and old prints. The nautical instruments successively used, such as the plummet quadrant, astronomical ring, nocturnal, cross staff, fore staff, back staff, mariners' bow and numerous forms of the Davis quadrant, were also described and illustrated. Mr. Niven concluded with a brief sketch on the subject of longitude, giving some quaint extracts from old navigators regarding their troubles, with what was, until the invention of the chronometer, the most difficult nautical problem to solve.

Norfolk and Norwich Naturalists' Society.—A meeting was held on November 25th, at the Castle Museum, the President, Mr. Geldart, in the chair. The members of the Science Gossip Club were specially invited to attend. Mr. Patterson reported from Yarmouth, that on October 29th, a specimen of Ray's bream was brought to the wharf; also, on November 22nd a streaked gurnard. His observations on some of the migratory birds in November were mentioned. Mr. Southwell gave a second paper on "Some of the more remarkable birds in the Castle Museum. Commencing with the family of the crows, so well-known to us by the rook and the jackdaw, he selected the Indian grey-necked crow *(Corvus splendens)*, giving some account of its worderful intelligence and amusing habits; from this he passed to the jays, quoting Mark Twain's inimitable account of the North American blue jay in his "Tramp Abroad," but for the scientific account of its habits and the life-history, he said he must refer to the pages of Alexander Wilson's "American Ornithology." The beautiful and sprightly magpies and tree-pies, as represented by *Calocitta formosa*, were next reviewed, followed by a very remarkable New Zealand bird of uncertain affinity, known as the "huia." In this bird the form of the bill differs greatly in the opposite sexes, that of the male being powerful and pointed, whereas in the female this organ is slender, crescent-shaped, and pliable. Their food consists of the grubs of insects inhabiting the wood of decaying trees, in pursuit of which the male attacks the soft wood with his chisel-shaped bill, but should he be unable to reach the grub, the female comes to his assistance with her long, slender probe, and successfully extracts the delicate morsel, this wonderful division of labour being one of the most remarkable features known in the economy of bird life. Near allies of the crows are the birds of paradise, several species of which are exhibited, and the habits and plumage referred to at length. Passing to the rifle birds, remarkable for the resplendent lustre of their plumage, the less attractive and still more interesting bower birds, descriptions were given of the truly wonderful structures erected by the various species, from which they derive their name, and which it was stated had nothing to do with their nesting, but were erected simply as play places for the male for the attraction of the opposite sex. Passing the beautiful starlings, king crows, or drongas, the lovely orioles, weaver birds, and the numerous family of finches, a pause was made at another wonderful New Zealand bird, the tui, or parson bird, so called from the two little white curled feathers on the throat, which somewhat resemble the "bands" formerly worn by the clergymen of the old school. This bird is restricted to a very limited area, and is now becoming scarce. Captain Cook found it numerous when he visited Dusky Bay in 1773, and expatiates not only on the beauty of its plumage and the sweetness of its note, but also on the deliciousness of its flesh. The Cayanne bell bird was next noticed, and Charles Waterton's description of the marvellous effects of its remarkable bell-like notes in the stillness of the South American forests quoted. The lyre birds received brief notice; as also the humming birds, which alone were worthy of separate treatment. The structure and habits of the hornbills were briefly alluded to. The lovely South American quezel, perhaps one of the most beautifully plumaged birds known, was next described, and its habits quoted from Mr. Osbert Salvin's account; this led to the toucans, handsome and grotesque birds with exaggerated and gaudily coloured bills, inhabitating the tropical forests of Central and Southern America, and from these to the plantain-eaters, cuckoos, and the extensive family of the pigeons, all of which had to be passed over with very brief notice, the great family of the parrots was reached, these latter alone affording material for a whole evening, but attention had to be restricted to two genera, *Nestor* and *Stringops*. In conclusion, Mr. Southwell said that in his two papers he had merely introduced the subject. There was sufficient in the various collections to form the material for a series of such addresses, and he trusted that others would follow.

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic and not specific names. Scientific names and names of places to be written in round hand

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of *6s. 6d.* for twelve months (including postage), are now due.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All communications, remittances of subscriptions, books or instruments for review, specimens for identification, etc., are to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Duplicates.—Ranunculus arvensis, Lepidium smithii, Trifolium arvense, Alchemilla vulgaris, Œnanthe fistulosa, Calluna erica. Desiderata: Myosurus, Helleborus, Trollius, Actæa, Ræmeria, Subularia.—F. Watts, 40, Goldhurst Terrace, London, N.W.

Wanted, 8th Ed. L. C., Nos. 612, 615, 623, 627, 629, 631, 652, 653, 657, 659, 671, 674, 676. Offered, Nos. 11, 27, 46, 137, 150, 161, 163, 191, 202, 219, 229, 286, 379, 536, 538, 552, 564, 741, 919, 1,029, 1,077, 1,143, 1,401, 1,548, 1,550 and others.—Jo Beanland, 7, Oastler Road, Saltaire.

Captain T. Brown's "Fossil Conchology of Great Britain and Ireland," giving description, illustration and localities of all species; royal 4to, 116 beautifully coloured plates, 3,521 figures. Wanted, ½-plate camera or student's microscope.—J. G. Dufty, Kenyon Road, Wigan.

"London Catalogue," 9th Ed., 123, 175, 233, 309, 324, 355, 539, 840, 1,053, 1,083, 1,137, 1,294, 1,440, etc., in exchange.—C. E. Britton, 189, Beresford Street, Camberwell, London.

Offered, L.C., 9th Ed., 1,059, 1,785, 1,630, 1,448, 1,838, 1,312, 1,089, 533, 536, 1,369, 385, 845, 1,493, 592, 651, 761, 1,037, 319, 1,788, 1,794, 130, 1,663, 1,681, 1,917; desiderata numerous; lists exchanged.—W. Falconer, 4, Roseville Avenue, Leeds.

Cuckoos' eggs with those of foster parent wanted.—W. Wells Bladen, Stone, Staffordshire.

Offered, "The Zoology of Captain Beechey's Voyage," 4to—Mammalia, 2 plates; birds, 12 plates; fishes, 9 plates; Crustacea, 5 plates; reptiles, 4 plates (text incomplete); Mollusca, marine, 9 plates (text incomplete)—in exchange for reprints on land shells, cash, or foreigh Helices.—G. K. G 5, Gresback Road, Upper Holloway, London.

British, Swiss and exotic Lepidoptera; desiderata, many ditto or British birds' eggs; lists exchanged.—Rev. J. M. Hich, Trimdon Vicarage, Trimdon Grange, R. S. O.

# ATROPHY OF TREE-BRANCHES.

By John T. Carrington.

THE drawing of a *Pinus sylvestris* in the centre of this page is given to represent a remarkable mass of twig growth on one of the lower branches. This Scotch fir-tree is growing on the estate of Mr. W. H. Smyth, at Elkington Hall, near Louth, Lincolnshire. In size the mass is about six feet long by about five feet wide, and five feet thick from top to bottom. It is extremely dense, the twigs being quite matted together. Unfortunately, the lower portion of it is dead, as shown by the bare branches in the drawing, the mass having some time ago been set on fire. Still, this abnormal growth is very remarkable. We are favoured with these particulars by Mr. H. Wallis Kew, who knows the tree well, and has lent us a sketch, from which Miss Hensman has kindly made the pretty drawing we have reproduced. At one time the owner of this tree contemplated its removal to a site near his house, but the idea was abandoned on account of the possibly fatal results to the tree and the great cost of the undertaking.

These abnormal bunch-like growths are by no means uncommon, and are familiar to most of us, especially on some birch-trees. They are caused by a condition of atrophy in the growth of the branch. Dr. Maxwell Masters refers only slightly to atrophy of tree-branches in his "Vegetable Tetrology," and there does not seem to have been much written about it by other authorities in more than a general way. It is a subject which will bear some discussion in these columns, and exceptional cases might well be recorded.

Abnormal Pinus Sylvestris.

Dr. Masters divides atrophy in vegetable growth into two sections, viz., abortion and degeneration. Abortion includes in this sense the arrest of development of organs, occurring at an early stage, the effect being to leave them much smaller and more rudimentary in condition than in the normal type, but materially unaltered. By degeneration is meant that the development is not entirely checked, but perverted; so that not only are the parts affected lessened, but the form is altered. Under this last section these tree-tufts are to be classed, and as I have already said, the commonly-seen tufts of small branches in birch-trees are excellent examples of degenerated development, or arrested growth.

From some cause, whether naturally, or in consequence of injury does not appear to be clearly known, the branch suddenly ceases to increase in length. Growth, however, continues at the end of the branch by forming a small bulbous knob, from which are developed a profusion of little twigs. These sprout out, apparently in any direction, frequently exactly opposite to that of the natural extension of the branch. The result is the formation of the birds'-nest-like masses so often seen among the branches of birch-trees. Several other species of trees are liable to these abnormities, such as hornbeam and thorn. In the fir forests of central Europe, tufts may occasionally be seen on conifers, which are said to be caused by attacks of a small fungus, which places the branch in one of the categories of atrophy.

It seems probable that the abnormal tufty growth of branches may be caused by injury when young, for there is on record a case of a grafted ash, that produced a large swelling below the graft, from which proceeded more than a thousand densely-packed and interlacing twigs. We have all seen how readily little twigs grow on elm-trees when the lower branches are cut off in agricultural districts, and again in the case of pollard-trees of any kind. The injury which causes these twig masses may not necessarily be the result of man's action, nor indeed of any animal. Frost might be a possible solution of the origin. It is doubtful whether sufficient importance is credited to the results of injury of young plant-growth by spring frosts, when considering the modifications and deviations from the type so frequently found among vegetation. We shall be glad to have this subject discussed in our pages.

# WHAT IS A LARVA?

By H. Guard Knaggs, M.D., F.L.S.

THE term "larva" appears to be indiscriminately applied by batrachiologists to a tadpole, and by entomologists to a caterpillar, a grub, a maggot, etc.; and it seems to me that this application of the same name to two widely different phases of existence is calculated to perplex the general student, by leading him to infer that tadpoles and caterpillars are in the corresponding stage of growth. In these notes it will be my endeavour to show that such an inference is fallacious.

All animals commence life in the ovum, which, with rare exceptions, comprises two distinct stages, the embryo and the fœtus, not to mention the original germ. The chief exception to this rule occurs in the anomalous family of the Amphibia, where the duration of the egg state is, in many cases, cut short, the condition in which the "larva" makes its exit varying considerably according to the species. Thus the eggs of the common frog (*Rana temporaria*) will, in a warm climate such as the south of Europe, yield forth their limbless tadpoles in four days; and when it is borne in mind that impregnation has not taken place until after deposition of the ova, it may be guessed that the resulting larvæ are in a very early embryonic condition. In other cases the larva makes its first appearance in a more advanced state. Dr. Fritz Müller mentions ("Nature," vol. xix., p. 462) that he found a little frog (*Hylodes* ?) bearing very large eggs, and only nine in number, upon its back, and that when the tadpoles came forth they were provided with two legs, hind ones; while several frogs, toads and newts hatch out with four limbs, some of these species being ovoviviparous, as *Salamandra atra*, which is remarkable for the young being born with gills ("Standard Natural History," Jno. Sterling Kingsley. Boston, 1885), others incubating their ova in pouches, or embedded in the skin, or merely glued upon the backs of the females, as in *Pipa* and *Nototrema*. These instances show that, even amongst the Amphibia, tadpoles are by no means the rule.

Darwin ("Descent of Man," vol. i., p. 207) mentions that it is well known that, at an early embryonic period, both sexes possess true male and female glands, and to this statement he appends the following footnote: "This is the conclusion of one of the highest authorities in comparative anatomy (namely, Professor Gegenbaur, 'Grundzüge der Vergleish Anat.,' 1870, s. 876). The result has been arrived at chiefly from the study of the Amphibia; but it appears from the researches of Waldeyer (as quoted in 'Humphrey's Journal of Anat. and Phys.,' 1869, p. 161), that the sexual organs of even the highest vertebrata are, in their early condition, hermaphrodite. Similar views have long been held by some authors, though, until recently, not well based."

The observations of Yung, too, who experimented largely with tadpoles, corroborates the fact that they pass through a hermaphrodite stage, and he found that, when in this condition, the future sex could be influenced by feeding them upon a highly nutritious diet, such as beef, fish and frog meat; the latter being especially productive of a very large percentage of females. Pflüger also admits the existence of a hermaphrodite stage.

Prof. Quatrefages' "Memoirs of Man and the Lower Animals," translated by Dr. Lawson, observes: "The development of frogs presents another curious phenomenon. It is that the young animal, after it has left the egg, and before it has become a larva, is still in a semi-embryonic condition. At this period the digestive tube and its appendages are exceedingly rudimentary. *The greater portion of the body is filled by a large mass of yolk or vitellus, enclosed by the skin which has been formed for some time, and it is at the expense of this alimentary matter that the development depends.*" (The italics are mine.)

A most eminent authority upon this subject writes me:—"I use the term 'larva' to denote an active embryo which has left the egg. I should say, therefore, that *Pipa*, like *Salamandra maculosa*, has no larval stage. Surely the young four-limbed *Pipa* corresponds to the young four-limbed frog. The changes which take place within the eggs of *Pipa* and *Salamandra* seem to me to answer to those which take place in the changing (developing) tadpole, and in that sense it may, I think, be said that their tadpole state is passed within the ovum; or, if you prefer it, that part of the embryonic development of *Rana* takes place after the embryo has left the egg, and become active and locomotive."

From the foregoing notes it would seem pretty clear that the larva of the frog, otherwise tadpole, is an embryo—a sort of locomotive egg, minus its envelope: sexless at first, but of decided sex before it reaches the equivalent of the fœtal stage.

Linnæus used the word "larva" to signify the stage which masked or hid the true character of the species; and of course, in this sense, it is equally applicable to the tadpole and the caterpillar; but from an entomological point of view, it conveys another and definite idea, viz.: that it is the stage which succeeds the egg and precedes the pupa. ("Century Dictionary," article "Larva.") It is, according to many writers, including the late Prof. Westwood ("Text Book," p. 168), analogous to the period of infancy (*i.e.* to "the young") of the higher animals; and certainly the young of many animals, especially the males of birds, differ far more from their adolescent stage than do the larvæ of many insects from their pupæ. For example, the chicken bears much less resemblance to the cockerel, than the larval cricket or cockroach to the pupa of the same. Then, according to the best authorities, the sex of the caterpillar, having been decided in early embryo, before the fœtal stage, and of course a comparatively considerable time before exclusion from the ovum, cannot possibly be altered by feeding or by any other agency. The larval period, too, is pre-eminently the age in which the greatest amount of assimilation and growth takes place, and large quantities of food have to be absorbed for the purpose of providing the necesasry material; not only this, but in such species as undergo a pupal metamorphosis considerable reserves have to be stored up in readiness for elaboration in the quiescent stage, for then cell formation is very busy perfecting the reproductive apparatus and completing the secondary sexual characters, including the organs of sound, etc., preparatory to the attainment of the adult state. These organs, for producing sound, whether vocal or mechanical, freshly acquired or altered, as the case may be, seem to be very characteristic of the male adolescent or pupal condition. The boy's voice begins to "crack" or "break" and ultimately deepens; the puppy's bark becomes "doggy"; the cockerel tries to crow; the thrush commences to sing; the death's-head moth "squeaks" while yet in the chrysalis; the grasshopper chirrups in a mild way; and it may be added that the frog makes an effort to croak; and these phonetic signs of approaching maturity are accompanied by the appearance of other secondary sexual characters, varying according to the species to which they pertain, of which I may specially mention the vocal sacs of *Rana esculenta*.

To sum up: the batrachian larva is, when first excluded, a sexless, limbless egg, provided with a yolk upon which its development depends; its digestive organs are very rudimentary indeed, and the duration of its larvahood stops short of the fœtal stage. The newly-excluded larva, from the standpoint of the entomologist, on the other hand, has a decided and unalterable sex; it possesses six or more permanent legs, according to the order to which it belongs, and, of course, contains no yolk; its digestive organs are more vigorous than in any other stage, and the duration of its larvahood commences from its exclusion from the egg, that is after the fœtal stage, and extends to the pupal, or adolescent state. In other words, the one terminates before the fœtal stage, the other commences after it.

In conclusion, my object in penning these notes is not to advocate any change of nomenclature for these respective phases of life, but, as originally stated, to warn the student against drawing any comparisons between the larvæ of frogs and those of insects. A tadpole is an anomalous creature, quite the exception to the rule of nature. It is not that, in itself, it is so extraordinary, for all vertebrata and invertebrata, from man downwards, pass through a corresponding stage. The marvellous thing about it is that an early embryo should be excluded from its envelope, and yet be viable, independent, free and locomotive, while, in all other animals, this stage of life takes place within the privacy of the membranes *in utero*, the eggshell, or other protective covering. There is not in the animated world, so far as I know, a case which presents a parallel. The nearest approach to it must be sought amongst the Marsupalia.

*Folkestone; January*, 1896.

TUNBRIDGE WELLS CONGRESS.—We understand that definite arrangements are being made for a Congress of societies devoted to natural science in the South-east of England, which will be held at Tunbridge Wells, on Saturday, April 25th next, under the Presidency of the Rev. T. R. R. Stebbing, M.A., F.L.S., who is this year the president of the local society, to discuss this and other subjects. The visitors are invited by that society to attend on the Saturday morning for a ramble to inspect the geological features of the town, and also to lunch with the members. Among others, the following are the subjects for discussion at the Congress, which meets at 3.30 o'clock: "Travelling Lantern-Slide Scheme," introduced by H. E. Turner, B.A., B.Sc., Hastings Natural History Society; "The British Association Photographic Committee's Work," W. W. Watts, M.A., Geological Survey, Jermyn Street, S.W.; "Redelivery of Lectures before other Societies," E. A. Pankhurst, Hon. Sec. Brighton Natural History Society; "Winter Programmes," G. Abbott, M.R.C.S., Tunbridge Wells Natural History Society; "Summer Excursions and Field Work," Professor G. S. Boulger, F.L.S., F.G.S., Geologists' Association; "The Protection of Footpaths, Commons, etc.," L. W. Chubb, Commons Preservation Society, Westminster; "Congress, 1897,—Date, Time, and Place of Meeting, Rules," Capt. Gordon McDakin, Dover Natural History Society; interchange of microscopical slides, books and magazines with affiliated societies and similar associations in other districts. Further information may be obtained from Dr. George Abbott, the Hon. Secretary, 57, The Pantiles, Tunbridge Wells.

# BOTANY NEAR LIVERPOOL.

By J. A. Wheldon.

THE extensive sand-dunes of the Lancashire coast are a well-known happy hunting-ground for the botanist, owing to the variety of interesting plants they produce. These sandhills are more especially attractive to the muscologist, from the fact of their yielding in abundance a number of species of our rarer mosses, one or two of which, strangely enough, are usually Alpine or at least

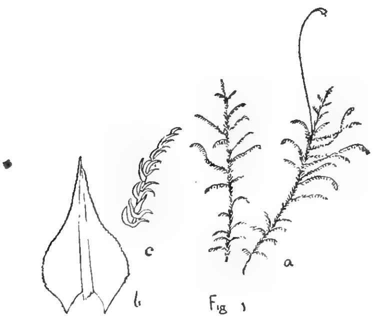



Fig. 1.—*a*, *Hypnum filicinum* ($\frac{2}{3}$ natural size); *b*, Leaf (much magnified); *c*, Apex of Branch (enlarged).

sub-Alpine in their range of distribution. Abundant food for the speculative mind is provided by the discovery of such plants as *Catoscopium nigritum*, *Amblyodon dealbatus*, *Meesia uliginosa*, and *Ditrichum flexicaule* in such a locality.

To the south of Southport one or two stations for rare plants are likely to be lost on account of the encroachments of the speculative builder. Where, two years ago, I collected abundance of *Meesia uliginosa* now stands a modern villa, and I have not yet found a fresh locality for the moss; and *Amblyodon* occurs in only a few places, where it ekes out a very precarious existence.

A further extension of the Birkdale "improvements" will destroy a splendid patch of collecting ground, on which occurs *Bartsia viscosa*, *Viola curtisii*, *Pyrola rotundifolia*, var., *maritima*, *Euphorbia paralias*, *Epipactis palustris*, *Parnassia palustris*, *Festuca uniglumis*, and other more uncommon phanerogams, and of mosses *Hypnum polygamum*, *H. lycopodioides*, *H. sendtneri*, var. *wilsoni*, *Bryum calophyllum*, *B. warneum*, etc.

On this particular spot, since 1891, I have observed, in one or two pools only, a peculiar form of *Hypnum filicinum*. So much does it differ in facies from the ordinary plant, that for a long time I did not recognise it, and specimens laid in my herbarium without a name. It is to the kindness of my friend, Mr. John Whitehead, that I am indebted for its determination as a form of this species. Should it prove worthy of varietal rank, and not have yet received a name, it would be a graceful compliment to one of our most enthusiastic bryologists if it could be named in his honour. His devotion to the study of British mosses deserves this recognition. It is distinguished as follows: Stem erect, somewhat tall and slender, altogether more gracile than that of typical *filicinum*, growing in densely cæspitose tufts, scarcely at all pinnate, many stems being almost or quite destitute of branches. When branched the pinnæ are not so crowded nor so patent as in the type. The tufts are tawny yellow, not even the young shoots being green. Leaves longer, narrower and more laxly arranged on the stem, not at all secund or falcate, erect patent even to the extremities of the branches. Nerve reaching apex, and occasionally ex-current; margins entire, or very minutely sub-serrulate. The entire absence of any tendency in the leaves to become falcate or secund, and the long slender stems give the plant a very untypical appearance. In the sketches I have endeavoured to reproduce these differences; but, I fear, not very successfully. I have not yet discovered fruiting specimens. It appears to me to diverge from the type more than

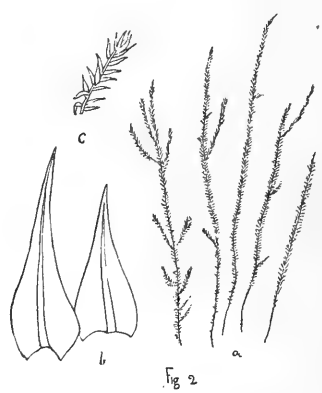



Fig 2.—*a*, *H. filicinum* variety ($\frac{2}{3}$ natural size); *b*, Leaf (much magnified); *c*, Apex of Branch (enlarged).

do a good many mosses which have varietal names bestowed upon them.

*Erythroea latifolia* appears to be quite extinct on the Lancashire coast now. *Bartsia viscosa* is very rare, and other decreasing species are seen in *Cakile maritima*, *Viola curtisii*, *Silene maritima*, *Anagallis tenella*, *Epipactis palustris*, the *Pyrola*, *Scirpus maritimus*, and *Hypnum lycopodioides*.

It is more pleasant to record the occurrence of new species than to refer to the disappearance of old ones. Near Birkdale, last summer, I found a patch of *Malcolmia maritima* growing luxuriantly, and *Setaria viridis*, *Chenopodium opulifolium* and *Silene dichotoma* have rather unexpectedly cropped up in one or two places—of course as aliens. Genuine additions to the native plants of the district are seen in *Rubus gratus*, Focke, *R. mercicus*, var. *bracteatus*, Bagnall (hitherto recorded from Warwickshire only), *R. infestus*, Weihe, *R. rosaceus*, var. *silvestris*, Murray, *Urtica dioica*, var. *augustifolia*, Blytt (on the Cheshire side of the Mersey), and *Cynoglossum officinale*, var. *subglabrum*, Syme.

*H. M. Prison, Liverpool; January*, 1896.

## COLLECTING ON WHEELS.

By Harry Moore.

IN a previous paper (Science-Gossip, vol. i., N.S., pp. 31-32 and 55-56) I described our entomological experiences while bicycling across France from Dieppe to Geneva. Our next journey was in the opposite direction, viz., from Dieppe to Bordeaux, and as we had quite as good a time from a collector's standpoint, both for specimens and species, a record of our captures, together with a few notes of our trip, may again prove of some interest. Picturesque scenery was not so much in evidence, and miles of monotonous stretches were occasionally encountered, but now that the fatigue has passed away we have but pleasant memories of the wind-swept Beauce, the lovely heights of Angoulême, and the sunny banks of the Loire and Gironde.

We arrived at Dieppe shortly after 3 a.m. on August 20th, 1895, and, as the moon was shining brightly and we knew our way, we started immediately for the Norman capital. In the early grey of the morning the bats snapping up the moths afforded a little diversion, but nothing save the quantities of fungi under the beech-trees was noticed before reaching Maromme, when we boxed our first moth (*Ocneria dispar*). After spending a few hours in Rouen we went on to Louviers, but the day being dull and cold we only saw two insects, a *Pieris rapæ*, at St. Adrien, and a small beetle (*Chrysomela*), while pushing up the hill out of Pont de l'Arche. Next day was hardly more successful; the weather was brighter, but at the expense of a cold wind. A short distance out of Louviers, just where the road skirts the Eure, we noticed a number of *O. dispar* at rest on the tree trunks. Climbing out of Evreux, *Epinephile tithonus* and *Satyrus ægeria* were sparingly met with, but all the way to Chartres we saw only one common blue *Polyommatus icarus*, and a few whites. As compensation, various incidents of travel made our ride very enjoyable, and the midday halt at Nonancourt will not be readily forgotten. After leaving Chartres things began to improve. Fortunately the weather was fine for our journey across the Beauce, that wind-swept plain where war has claimed its harvests as well as peace. One can well mistake for villages the large farms surrounded by the mud hovels of the peasants, when seen from a distance, and the *patois* is so pronounced that according to Miss Betham Edwards, Parisian French is not understood by the natives. No wonder then we once had to write our wants. The Beauce seems to be a good place for orthoptera; near Beaulieu we took a male *Decticus verrucivorus*, and another near Voves. Very conspicuous they look, sitting up between their legs, apparently ready for a flying leap; but they are cumbersome creatures, for when attempting to escape they jump two feet upwards, and only get one foot forwards. The great green grasshopper, *Phasgonura viridissima*, which we also took at Voves, is a little more agile, but still not difficult to take with the hand. We found the black field cricket, *Acheta campestris*, very abundant; they were, of course, all immature. This insect, which is so local or rare in England, seems to have a partiality for the road, and we could have taken almost any number on this and each succeeding day. It is a plucky little creature, never attempting to escape before it has faced the foe. With antennæ straight in front, it looks rather uncanny, and even my brother observed, "I don't like picking up those things." On the road its hop is very feeble, but it is another matter to catch one when amongst the grass. During the forenoon we saw a good many butterflies, all, however, flying wildly. *Vanessa cardui* was most numerous, then *Vanessa urticæ*, several *Lycæna icarus*, *L. corydon*, and one each of *Colias hyale* and *C. edusa*. Why is *Hyale* the rarer in England? It does not seem so much a creature of the sun as *edusa*, and when amongst the mountains, one finds it at an altitude far too high for its darker complexioned relative. Its flight is certainly not so strong, but quite sufficient for all average purposes, as the man with the net very often finds out. One would think our temperature would suit it. Near Fains-la-Folie we saw a most curious migration of earwigs (*Forficula auricularia*). Considerable numbers were marching in a continuous string across the road from some waste ground to a cottager's garden. It seemed strange that a nocturnal insect should be abroad in midday, travelling afoot, when it has ample means for flight, and making for a particular spot with apparently preconceived reasons. If they had been ants, no one would have been surprised; but surely here was evidence of equal intelligence. The Beauce also seems to be a fairly good place for coleoptera, but as it is rather annoying for one to dismount every few minutes, we only boxed one specimen, a large bright *Carabus*. We had been turning corners nearly all day, and were glad to get out on to the main road again. Fortunately we reached Orleans before the rain started. It turned out a wet evening. We were now on the banks of the Loire.

On the morrow, after spending an hour or two doing the sights of the city, we crossed the river and continued our journey along the southern bank. Insects now appeared in profusion. We commenced operations near Cléry, when we dismounted to box a full-fed larva of *Saturnia pyri* and a large longicorn beetle (*Saperda*). A good half-hour was spent in a hollow by the roadside near Lailly. *Argynnis paphia* and *V. cardui* first attracted our attention, then several *Melitea phœbe* and a *M. parthenie* fell to our nets, to be followed by a nice pair of *C. hyale;* a moment later, and we found through what a small hole *L. icarus* could escape. Hemiptera were also rather plentiful, and we were reminded of our two or three captures every time we uncorked the cyanide bottle for several days after. The wasp-like fly *Volucella zonaria* was also taken. Amongst the orthoptera we took a solitary *Œdipoda fasciatum* and a series of two species of *Decticus*, *D. griseus*, and its smaller relative *D. tessellatus*. *D. griseus*, which is very local and not common in England, is plentiful and widely distributed in France; one can find it almost whenever looked for, amongst the rough road-side grass. Between Nonan-sur-Loire and Blois, insects were even more numerous. *L. icarus* swarmed, settling by the dozen upon the wet patches in the road, and on fresh horse droppings. Upon one occasion we counted over thirty, males being in the very great majority. Amongst those we took was one var. *icarinus*. *Pieris daplidice* was not uncommon; it was amusing to watch its hostility to *P. rapæ* when they met at the same flower; until you know its flight, *daplidice* is not an over-easy insect to take. *Colias edusa*, *C. hyale*, *V. cardui*, *V. urticæ*, etc., were in greater or less abundance. Large dragonflies were also very plentiful.

Blois, with its chateau and streets of steps, we shall never forget; it is well worth visiting. A thunderstorm in the morning detained us awhile, and made travelling rather hard. Along the river banks a strong head wind was encountered, but several sheltered and sunny spots called for as many halts. Just before reaching Chaumont, we saw our first *Papilio podalirius*, then several *Gonepteryx rhamni*. *Lycæna semiargus* was represented by a few worn specimens, but *Epinephile tithonus* was in fine condition and very abundant, females especially. Near Amboise *L. corydon* was fairly common, and noticing this species also favoured horsedung, I stopped for a few minutes, and was rewarded by netting a fine blue female, perfectly normal on the underside, but almost as bright as a male on the upper side. *Colias edusa* seemed to increase in numbers, very few females were noticed, but several of the males were small and dark specimens. At Chaumont I took another *Œ. fasciatum*, but up to the present we had had nothing like the experience of last year. Amongst the grass in the bed of the Loire, we saw plenty of half-grown edible frogs (*Rana esculenta*), and along the banks the little lizard, *Zootoca muralis*, darted everywhere. At Amboise, we recrossed the river and proceeded to Tours, viâ Vouvray and Roche Corbon. There is much to see in the Valley of the Loire, its chateaux and cliff dwellings would interest if everything else failed. Tours seemed commonplace, and offered no hindrance to an early departure on the morrow. Although the weather was very fine we did little collecting on our way to Châtellerault. At Montbazon we might well have loitered, *C. edusa*, *V. cardui*, various *Satyridæ* and blues were plentiful. During the day several of the larger Satyridæ were met with, *Hipparchia hermione*, *H. briseis* and *H. semele*. One large white-banded specimen at Les Ormes I should have liked to have secured. During our halt at St. Maure, *P. podalirius* again kept beyond the net, *C. edusa* afforded its usual sport, and *Œ. fasciatum* was kicked out.

We had very mixed experiences from Châtellerault to Vivonne, brilliantly fine weather to Poitiers, then a succession of thunder showers, culminating in a regular deluge of rain, which lasted throughout the night. Shortly after leaving Chàtellerault we saw it was to be a record day for "blues." *L. icarus* and its variety *icarinus* were in extraordinary profusion, several dozens resting upon every patch of excrement; upon one occasion there must have been some two hundred, as when they rose they formed a cloud about a yard in extent; they were all males in very fine condition, larger and whiter than those we usually find at home. The females we took at rest on the grass by the roadside; there was not much variety amongst them, the marginal orange spots are perhaps larger, and have a more metallic appearance, and some of the black spots on the undersides have the usual tendency to confluence, but we saw no females with any extra amount of blue about them. We had a good halt at Le Clain—for after we had done with the "blues," there were *H. briseis* and *M. phœbe* to take before we turned our attention to the Orthoptera, which were even more abundant. The rosy-winged grasshopper, *Caloptenus italicus*, swarmed amongst the grass, in all its varieties of colouration; several other small species were about, but only one or two *Œ. fasciatum*. Our best captures we considered a series of *Ephippigera vitium*, the saddled-leaf cricket of the vine, a curious creature, called by the peasantry "le lindi." We found them climbing the grass stems and in greater number by the side of the road. Our available boxes were soon full, so we deferred taking any more till the morrow, but the opportunity did not again occur. A beetle, *Milabris variabilis*, was frequently seen on the wing, and just before reaching Poitiers we took another full-fed larva of *S. pyri*. The rest of the journey was a series of rushes to shelter, but we finished the day by taking at Vivonne a female *Lasiocampa trifolii* which was attracted by the lamp while at dinner. It deposited about two dozen ova.

Things improved next day: a shower before and after starting, then the most brilliant weather for the rest of our trip, and warm enough to be called torrid even by the southern folk themselves. No wonder then we found insects plentiful. *Papilio podalirius* and *P. machaon* were frequently seen, the former captured; its flight is graceful compared with its boisterous relative. At Chaunai and other places we took nice series of *M. phœbe*, *M. didyma* and the smaller *M. trivia;* in fact, any number of the first two might have been taken. The best things of the day fell to my brother's net, he taking, amongst others, *Callimorpha hera*, a variety of *V. urticæ*, in which the two central spots of the fore-wings are represented by a few black scales only, and a *Mantis religiosa;* possibly if we had known then as well as we do now the habits of Continental *hera*, we might have taken a few more; but as there were no whitethorn bushes about we deceived ourselves by thinking it a stray specimen. Our other captures included *C. edusa*, *H. briseis*, *H. semele*, *E. tithonus*, *C. pamphilus*, *V. cardui*, *L. icarus*, and a few moths. *Colias edusa* was so numerous that it frequently collided with us as we rode along; females we rarely saw, indeed we only netted one during the whole journey. Upon leaving Ruffec we boxed another larva of *S. pyri;* these seem to have a proclivity for crawling across the road, where numbers get crushed by passing vehicles.

We had a pleasant evening in Angoulême, and at night, from our elevated position, witnessed a grand display of lightning as it darted into the valley beneath. We had an early halt next morning, for shortly after leaving the city we came upon a small clearing that seemed too much alive with insects to pass. It is surprising how at times one finds in a very limited area such a number of species numerously represented. To see *C. edusa*, the three "blues"—*corydon*, *bellargus* and *icarus;* the five Satyridæ—*H. briseis*, *H. semele*, *H. arethusa*, *E. janira* and *E. tithonus*, the *Melitæa cinxia* and *M. didyma*, numerous *Pieris rapæ*, and an occasional *P. machaon*, two species of burnet moths and several others, all flying together, and to be taken without any running, merely careful stalking, is of itself a thing to be remembered. To complete the scene one must add the *Orthoptera* disturbed at every step, the rosy-winged *C. italicus*, the blue-winged *Œ. fasciatum*, the delicate green *Phaneroptera* (species?), and several others in greater or less abundance. As a rule we took no notice of common white butterflies, but to-day we could not help it, for while pushing up a stiff incline near Montmoreau we disturbed a number of *P. rapæ* regaling upon a few square inches of horse droppings. Waiting until they had re-settled, we counted forty specimens. We did not reach Coutras till dusk; *Lasiocampa quercus* was then noticed on the wing; a pale female which rested on the table in front of me while at dinner was promptly papered and pocketed, somewhat to the amusement of my nearest neighbours. Between Coutras and Bordeaux we had little sport; true, there were one or two places which seemed inviting, but vineyards are not happy entomological hunting grounds, high cultivation and weeds don't go well together. As we had taken nothing before reaching Beychac, we had a short turn amongst the wild grass in the only uncultivated spot we saw. It produced nothing worth mentioning save a very delicate green cricket, closely allied, if not identical, with *Phaneroptera falcata*. It was a warm ride into Bordeaux, and although it struck us as rather comical at first to see the horses wearing straw hats, we commended the humanity that suggested it. From Bordeaux we had a short excursion to Podensac, where we soon found a small clearing in a wood, with the usual abundance of insect life, and had the satisfaction of taking several new species. *Limenitis camilla*, sunning itself on an ash twig, was quickly netted; then the small-tailed blue *L. telicanus*, and another species of doubtful identity, somewhat the colour of *L. bellargus*, and the size of *L. astrarche*; a series each of *L. icarus*, *L. astrarche*, and the blue-spotted *P. phlœas*; several *S. ægeria*, *S. megæra*, *E. janira*, a large female *C. pamphilus*, and the ubiquitous *C. edusa*. Amongst the hymenoptera the violet carpenter bee, *Xylocopa violacea*, was most noticeable, soaring over the tree-tops when disturbed. From the herbage two new species of orthoptera were kicked out, *Conocephalus mandibularis*, a delicate green cricket with a very wide geographical distribution, and a large female *Ephippigera* (species?). *A. campestris* was nearly mature, and *Œ. fasciatum* was common. We had been collecting the latter species as a study in protective resemblance; our series now showed every gradation of colour from that of a sun-dried road to a dirty ditch. A successful chase on the railway station after *Catocala nupta* concluded our day's sport.

The Park and Botanical Gardens of Bordeaux are worth visiting. In the former (Parc Bordelais) *O. dispar* seemed to be common, and if one can judge by the immense damage done to the oak-trees, the stag beetle *(Lucanus cervus)* must be little short of a curse; from the size of the burrows we were prepared for the giants we saw in the Museum later on. In the Botanical Gardens insects were very numerous, *Macroglossa stellatarum* and a large clear-wing hawk moth were dashing about everywhere. The lepidoptera in the Museum show cases are so many ghosts, the colours in some species are entirely faded, and being for the most part unnamed and without locality, are of no use for reference. Needless to say we found more pleasure under the palms and magnolias outside. Our stay in Bordeaux was very pleasant. We returned home by boat, a trip which usually takes from sixty to sixty-five hours; in our case it occupied three days and a half, having to lay-to on account of fogs. The frequent soundings gave us an opportunity to secure micro material for the winter evenings every time the lead was raised, so that from a collector's standpoint, our trip was an all-round success. We had filled our boxes, added to our knowledge, had no mishaps, been in much pleasant company, and thoroughly enjoyed ourselves. Yes, there is much to recommend collecting on wheels.

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## BLACK DIAMONDS.

By James R. Gregory.

One of the largest pieces of diamond ever discovered was recently exhibited at the Academy of Sciences in Paris. It can hardly be described as a diamond, being amorphous, and having an indefinite form and no appearance of a crystal. It is the variety named "carbonado," and also known as black diamond. This specimen had the enormous weight of 3,073 carats, or about one and a quarter pounds avoirdupois, when weighed immediately on being found; but being in some parts slightly porous, lost about 60 carats when brought to Europe, owing to the evaporation of moisture. During twenty years' experience with this scarce mineral, I have found it has a dark, brownish-black colour, slightly polished on some of its angular surfaces. On being freshly broken, the colour is of an ashen grey or somewhat fawn colour. In texture it is generally uniform, in fact nearly compact, though sometimes it is very slightly cellular, similar in texture to a piece of spongy-like lava. Some specimens have bright glistening specks throughout, though this was not the case with the piece exhibited in Paris.

This strange mineral occurs in one small area in the Province of Bahia, in Brazil, and is found in irregular angular pieces weighing from half a carat to frequently 200 or 300 carats each. Very rarely small rounded pepples of the carbonado are found, with a more or less dull surface, which is all the more remarkable in so hard a substance, as these pebbles have been, undoubtedly, rounded by attrition; but how and by what material is a moot point, as no other substance is nearly so hard, or capable of rounding one of the hardest and toughest materials in nature. There cannot be a large quantity of the carbonado, or in sufficient quantity for detached pieces to grind each other, as but a comparatively small amount is obtained, possibly 50,000 carats would represent a total of the annual production. This singular substance is in considerable demand, and is to an extent largely employed, I might say almost the whole of it, for drilling hard rocks in prospecting for gold, and other underground boring work by means of the diamond drill. It is also used for drilling holes for blasting and other purposes; extensive workings and deep borings have been carried on with the aid of this singularly hard mineral.

In composition it is pure, or nearly pure, carbon, its impurity being probably a small percentage of oxide of iron; it burns in oxygen with little or no residue, and is converted into carbonic acid gas. Its density is slightly higher than the ordinary crystallized diamonds. As to its mode of origin, nothing seems to be known; no speculation on that subject, so far as I know, has ever appeared. It is exceedingly tough, and will stand an extraordinary amount of grinding pressure, and its lasting power is enormous, as after working in hard rocks for many hours, or even days, the edges and surfaces are hardly abraded.

It is somewhat remarkable that this form of diamond has not, up to the present time, been discovered at any other district in which diamonds have been found, and even in Brazil it occurs only in the Bahia provinces, where it was first found nearly a hundred years ago, when its value was quite trivial—only a few shillings an ounce—while at the present time it runs up to pounds sterling per carat, exceeding the ordinary average price of rough diamonds, except in certain selected stones.

*1, Kelso Place, Kensington; December, 1896.*

# IN THE MALAY PENINSULA.

By Lieutenant Stanley S. Flower.

(*Communicated by* Sir William H. Flower, K.C.B., F.R.S.)

(*Continued from page* 266.)

On landing, we found the jungle was only quite a strip along the water's edge, and outside that was an open maidan and good walking. The Elephant Mountain was in front of us, a curious hill, rising straight up from the level plain on every side, and no other mountains near it. From first impressions I thought it would be basalt, but found it was limestone, with a good deal of hematite in lumps in it. At the foot of the mountain we found a great array of men and boys ready for us, with torches of attap-leaves, about the size and appearance of a fascine. Then we went up by a rough, steep, rocky path In places a bamboo staging had been erected on the face of the rock, without which it would have been difficult to ascend. We passed a small cave with quantities of bats in it, and then got to a point where the path began to descend again. From this point we got a good view over the land, and could trace the courses of the rivers by the belt of forest which followed each bank; the horizon was closed by various lofty mountains, the only one I knew being Kedah Peak, between us and Penang. After going down some way we turned to the right and went up again and entered a precipitous-sided valley on the side of the mountain. Here, studded over the rocks, were very pretty little flowers and ferns galore. This valley would have been a *cul de sac*, but at the end was the entrance of the cave. We went in and found ourselves in a vast vaulted chamber, ornamented in the grandest fashion with stalactites and kindred limestone productions. The party waited here a bit, till someone pointed up, and there, on a ledge of rock, between us and daylight, stood, as a sort of silhouette, an old man leaning on a stick, as if a freak of the limestone. Then the figure vanished, and soon amongst us appeared a very old man in a tattered rug with a sort of peaked hood to it and a long staff. He went off, walking along the floor, which sloped down, and we all followed. The torches being lit, daylight was soon left behind and we scrambled down a tunnel as if going to the infernal regions. Sometimes we were on the level, sometimes on steep inclines, sometimes stepping on level terraces of limestone, sometimes slipping over rounded bosses of smooth hematite. The caves are wonderful, I do not remember having seen such big ones before, such immense chambers, domes, vaults, galleries, and such wonderful stalactites, stalagmites and columns. As we walked along it was a most weird scene, like something in a play or pantomime on a grand scale, the dusky Malays with their great smoking torches which they had to keep swinging to and fro and beating against the floor and walls to keep them burning. We had with us some port fires which we used from time to time, and they helped to show the great height and elaborate ceilings and cave-roofs better than the flickering native torches. Except for one little stream we passed, these caves seemed quite dry and devoid of animal life. At length daylight gleamed ahead, and we entered a cavern of the vastest proportions; it is most difficult to say how large it was, but to give some idea I should say 200 feet to 400 feet high. Soon our advance was stopped by the floor of the cave ending abruptly in a precipice over which a few of the great torches were thrown, that we might hear them thud down at the bottom. This great chamber was a lovely sight, as opposite us, across the great gulf, was an opening to the outer air, fringed and curtained with ferns and delicate green hanging-plants through which the sun's rays poured.

Then two Malays let a wire-rope ladder down over the cliff, and part of our party, including myself, descended to yet lower regions; the others, however, stopped above. I confess I did not like the look of the descent when starting it, but am very glad I went, as it was really all right, and led us to the most interesting part of the caves. Down below it was all damp and muddy, and we got into one great cellar where no daylight can ever penetrate. There we heard countless bats squeaking and flying about. I was wondering what they could find to live on, when the light fell on the wall and I found in the cave were thousands of a very curious-looking cricket, also a great many very large spiders. We left the cave by a steep ascent up a rocky "chimney" and then entered one where there were curious stalactite columns; all rounded knobs about the size of a man's head, so that the roof seemed as though supported on pillars of skulls with ice-cream poured over them. In the passage beyond this, in the dark, to our surprise, we found a man, the same old hermit we met and waited for at the entrance. We then went along a very narrow gallery with him and suddenly emerged into daylight in a door-like hole in the face of a cliff, the same cliff we had descended by the rope ladder, which one of the Malays climbed on to and then swung to us, as we were a yard or so to one side of it. Thus, one by one, the old man of the cave included, we reached the top. There the party formed up again for the return march, the ladder was rolled up, torches relit, and the old man set off at a good pace, some of our party following him, when one or two of the Malays called after them not to go as he was going somewhere else, not the way out. So we all, with the torches, retraced our steps, and the old man disappeared down a dark alley to the left. I don't know who he was, I expect an imbecile who had taken up his residence for many years there, and so was looked upon by the villagers partly with amused pity and partly with superstitious awe. One thing in the caves was unpleasant to see—persons' names carved and scratched on the rocks,—an extraordinary mania.

We regained the entrance all right, and the mysterious troglodyte was there asking alms. During our time on the hill, the tide had risen to full, thus enabling our canoes to be brought right up to the village; so about 4.30 p.m., we re-embarked. With the aid of the ebbing tide we were paddled down the tropical stream very quickly, each bank an ever-changing panorama of the richest vegetation. Kingfishers, green pigeons, and many another lovely bird ever and anon delighted our eyes. We returned rather a different way to that we had come, and got to within a quarter of a mile of the guest-house by water, and then walked; I found it was all I could do to carry the big monitor. That evening, I had great work skinning birds and beasts, till very late. A crowd of Chinese assembled to see the big monitor flayed, and were astonished and delighted when I threw away the liver, heart, etc. They thought, of course, that I had shot it for medicine, and nearly came to blows among themselves over the bits I let them take; as a monitor provides a Chinese druggist with much valuable stores.

That night I slept on a couch in the sitting-room, much better than a chair, and woke up and arose early as usual. The day's expedition was to be on the Kedah river, and the Tunkoo was going to provide us with boats. We had to wait about till ten o'clock, however, before the officials arranged anything, then two garries appeared and drove us down to the landing-place in Kota Star, where another wait of about an hour took place. As I had no rifle the Tunkoo lent me one, a funny old thing that had belonged to his father. It was originally built in Edinburgh. The extractor did not work, so to extract the cartridge-case I had to ram a rod down the barrel and then bang it judiciously on athwart, which, as may be imagined, gave me no chance of a second shot at anything. It was meant for a single 500 express, but kicked like a ten-bore. The boats placed at our disposal were two very good ones, like the smallest ship's boats of an English man-o'-war. They belonged to the "Good Luck," the Sultan's yacht. Each boat had a crew of two Keddah sailors, Malays, but dressed like English blue-jackets. They were fairly smart, rowed well, and, at any rate in my boat, got on well with us and obeyed orders. One boat had an awning, so I went for the other and we got under way first. I coxed my boat, and one of my friends sat in the bows with his Martini handy. We spent the whole day rowing and drifting on the river. I had no opportunity of using the Tunkoo's rifle, but shot three butcha crocodiles with my guns. We saw several little ones, but none bigger than about thirty inches. We saw a dead one about nine feet long, and the remains of a skeleton of another, that looked as if it had been of great size. On the carcase of the nine-footer was a monitor, five or six feet long; whether it was eating the flesh of the dead crocodile, or insects or crabs attracted by that flesh, I cannot say. We saw four monitors in all that day. My friend shot one three feet nine inches long. It was beautifully marked with eye-like spots down each side. Its food seemed to consist of crabs. As usual, we saw many monkeys and kingfishers. I forgot to mention that, on the previous afternoon, while descending the river, it came on to pour with rain, and we all got drenched to the skin. Well, unluckily, the same thing happened whilst we had our tiffin in the boat this day, We got back to Kota Star just before dark, and walked to the guest-house. As some of the party had expressed a desire to buy genuine krises, that evening the young Malay who specially looked after us brought in about a dozen for us to see; their prices were as much as thirty dollars (worth £6 to a Malay in Kedah, or from £3 to £3 5s. to an Englishman).

The next day we got up pretty early, dressed in our still wet clothes in the dark, and at daybreak drove off to Kota Star. While passing through the town we saw gangs of convicts going out for their day's work, manacled like the hero of an opera when he is cast "into the deepest dungeon beneath the castle moat," that is to say, iron anklets and belt, joined by heavy clanking chains, which must make even walking difficult and running out of the question. We also passed some police at drill, the words of command were English, but two or three drill-books behind that at present in use. Arrived at the landing stage, we got the same boats as on the day before, and were soon away down stream; we saw the dead crocodile again, and, lower down, another about twelve feet long; also, this day the tide being low, we saw a lot of live crocodiles on both banks. They were apparently of a different species to the one I knew in India, and the surroundings were different. Instead of the broad yellow sandbanks and country behind, here one hardly ever saw dry land, only banks of oozy mud overhung and covered with trees; as one got lower down stream mostly mangroves and attap palms. We saw about a dozen crocodiles altogether, big and small, their colouring was most vivid yellow and black; a good case of protective mimicry, as under the chequered light which came through the foliage they were very hard to see. Possibly, by being so inconspicuous, the monkeys walk within reach of their jaws while they wander on the mud looking for food. My friend shot one with his Martini; it was between three and four feet long. We were getting down towards the mouth of the river, and that was all our bag, when, as we swept past a projecting tree, the sailor in front of me exclaimed in an excited whisper, "Boya bazar boya! tuan" (crocodile, a great crocodile, sir), so we put about smartly and got above the tree again where I saw under the trees the head of an enormous looking animal about eight yards off; it being end on I could not get a good shot, but hit it in the side of the neck, where the bullet must have raked it fore and aft, and, unless turned by a bone, should have got to its heart. Anyway, it rolled over and kicked and lashed its tail about in a way grand to behold, then, righting itself, it rushed across the mud right at the boat; if my rifle had only been reloadable, I think we would have bagged it; as it was, I had the pleasure of looking into the open mouth of the wild creature at close quarters, as he was coming for the stern of the boat. My friend had a good view of him from his post in the bows, and fired his Martini bullet into him at about three or four yards range; this knocked him sideways again. But again he was up, dived into the water and rose against the side of the boat with a substantial bang. Very luckily we were in a high-sided boat, for if it had been a native canoe very probably it would have capsized. I tried to reload, but my friend got in another shot; standing up in the boat he fired down into its back, muzzle almost touching. If we had had a harpoon or boat-hook, we might have secured it; as it was, it disappeared in the water, probably to die at the bottom. I think it was really about twelve feet long, but being so close to one and so lively it seemed bigger. We saw no more till we reached Kwala Kedah, where we got out of the boat and had several hours to wait for a steamer.

I had plenty of time to explore Kwala; the old Dutch fort was very interesting as a fine example of Dutch architecture. It seemed like a bit of Holland, stuck down in this out-of-the-way corner of the world. There were two very handsome gateways, the workmanship was excellent—a little good red brick and well-carved stone, and a good deal of it granite. Except these gateways, nearly everything was in complete ruin. About the fort were eight or nine old rusting cannon; one was still mounted on the decayed remains of a wooden carriage, which some of the present inhabitants consider sacred. It was ornamented with coloured ribbon and a holy flag, and joss-sticks were being burnt in front of it. In the space enclosed by the old walls was a modern lighthouse, maintained by the Kedah Government. I went over it, and all seemed clean and satisfactory. About 200 yards from the fort was a wooden Malay house, the harbour-master's office, which also acted as coast-guard station, police station, post office, custom house, etc. I inspected this, and found the post-master had run out of both stamps and postcards. The coastguards were pukka Malays, dressed like English sailors. The station was armed with two small guns, a few sniders with bayonets, and a lot of brass-hilted cutlasses. At one end of a room were stocks with a prisoner in them, and he looked very dejected.

The surrounding country was quite flat, all a great mangrove swamp. I saw many pretty little birds about and in the fort, and sunning themselves on the old brickwork were lizards of three different genera, *Calotes*, *Mabuia*, and *Varanus*. Everywhere the ground, which was more or less dry mud, swarmed with little crabs, many being brightly coloured. At length, the "Flying Dragon" appeared, and we embarked; but even then our adventures had not ceased, as she had a load of live cattle on board, which got frightened and all crowded to port, and we stood a fair chance of capsizing. When the cattle were secured, we stood out to sea, and came in for a strong cross-wind, which also nearly sent the old boat on her beam-ends; however, she always righted herself in a wonderful way, and, as I was not sea-sick, I enjoyed the voyage, and eventually we cast anchor off Georgetown, in the dark, about 8 p.m., and got on shore in sampans, when I drove home in a rickshaw.

*Fifth (Northumberland) Fusiliers, Penang,*
*Straits Settlements; April,* 1895.

NEWSPAPER NATURAL HISTORY.—The following paragraph recently appeared in the London "Evening News" under the heading of "A Tame Butterfly." Comment is unnecessary. "I found in my garden a magnificent butterfly, says a French lady, quite numb with cold. Taking it into the house and putting it into a box for two hours revived the little thing. Then I dipped its antennæ in a solution of syrup and sugar, and continued this treatment for three days. On the fourth day the creature fluttered on to my hand and sucked the liquor of its own accord, and after this it became perfectly tame. I put flowers into my room, and it fed on them, and was perfectly happy. When it sat on the table I could pass my hand down its back without the slightest fear the butterfly might take to the wing. In fact, it arched its back as does a cat when pleased. After three weeks of perfect tameness its colours faded, its wings shrivelled up, and it died."

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

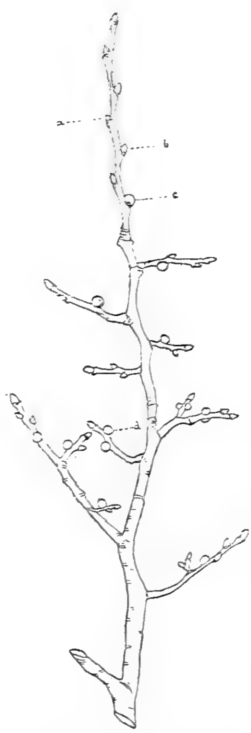
By the Rev. W. H. Purchas.

(*Continued from page* 238.)

## The Wych Elm or Scotch Elm.

We now come to consider those trees whose leaves are arranged in an alternate manner. We will take first the wych elm (*Ulmus montana*, Linn.), as a tree in which the conditions of growth are especially easy to follow. In this and the other English kinds of elm, we have the simplest form of spiral arrangement of leaves, namely, that in which they are distichous or two-ranked, borne alternately on opposite sides of the stem or shoot. In this arrangement, each third leaf stands directly over the first, the fourth over the second, and so on, and since the branches arise from buds formed in the axils of the leaves, the branches will necessarily follow the same arrangement. The two-ranked order is indeed lost or obscured in the main trunk, because many of the buds which are formed in the axils of the leaves of the primary stem remain dormant. Those buds which are nearest the tip of the annual shoot are generally the strongest and most ready to burst into growth when the spring arrives. Thus they get the start of those lower down and produce longer and more vigorous twigs, causing the others to grow but feebly or even to remain dormant, and eventually to perish through lack of nourishment.

The flowers are borne in small lateral tufts, which arise immediately from the last year's wood without any accompaniment of leaves; hence, when the seed has fallen off, a clean scar is left, and there is no farther growth from that point, there being no leaves in whose axils buds for another year may be formed. Thus those lengths of the branches or shoots which have flowered remain ever afterwards, as a general rule, leafless and unbranched. After some years, however, the bark will sometimes become knotty, and form adventitious buds, which give rise to little tufts of leaves, which give a short, bushy clothing to the branch, but quite unlike the normal branching. The wych elm produces flowers much earlier in its life than does its relative, the small-leaved elm, so that the flowering habit does not, as in that, affect chiefly the younger spray wood, but affects also those earlier branches which eventually become the main limbs of the tree. This leads to the comparatively loose and open mode of growth which characterizes the wych elm.




Spray of Wych Elm, Winter State.
*a*, *b*, leaf-buds; *c*, *d*, flower-buds.

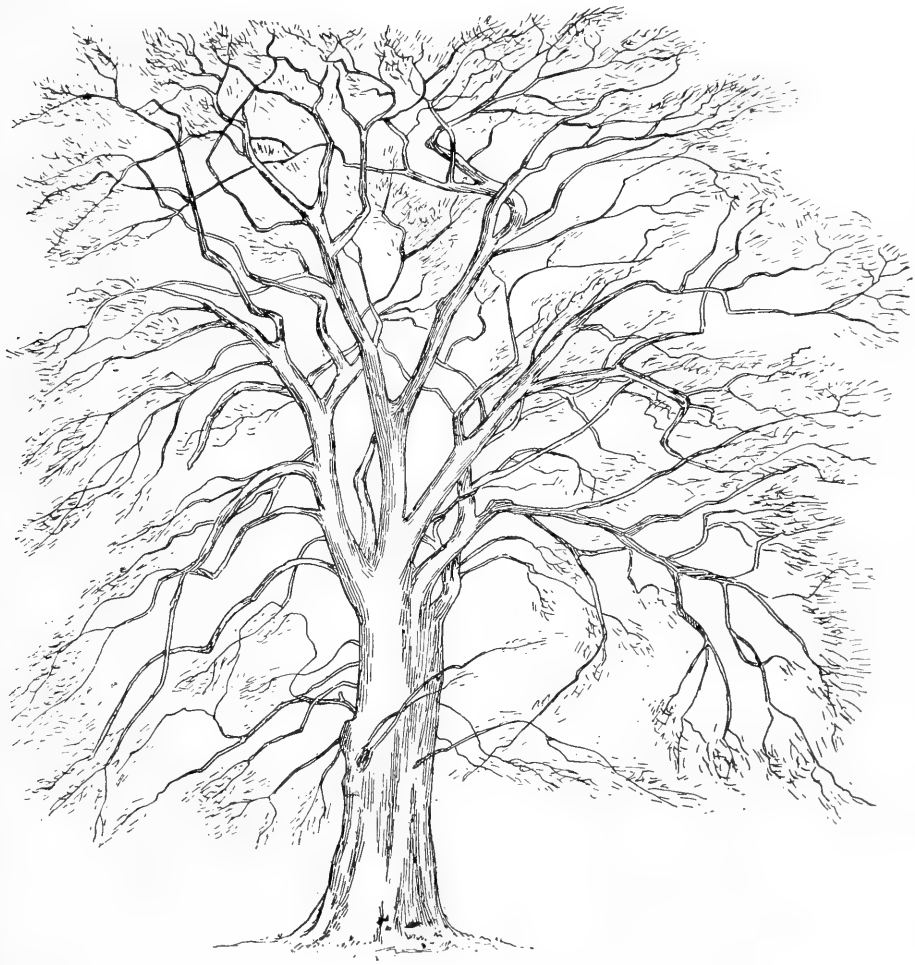
The angle at which the branches diverge from the main stem, and the lesser branches from their parent branches, is commonly a wide one, but it varies in different individuals, and is, I believe, wider in the youngest spray wood than in the earlier branchings. In the robust varieties, such as constitute what I will regard as the most marked and characteristic form of the wych elm, the leading branches ascend but little and are often almost horizontal, especially towards their end. As leaves ordinarily present one of their surfaces to the sky, the other to the earth, the twigs formed in the axils of those leaves spread out horizontally on each side in a fan-like manner. The branch thus keeps a regular form, and the leading shoot continues to maintain pretty nearly its original direction; for although, as pointed out by Henfrey, in his "Elementary Course of Botany" (page 35), the growing point itself perishes instead of being developed into a terminal bud, its office is taken up by the nearest axillary bud, which thus carries the branch forward in the original line. In the varieties which, through constitutional tendency or through uncongenial soil and surroundings, are of feebler growth, as well as in such as flower very freely, it is different. In these, very few leaf-buds are formed, and they are generally towards the tip of the annual shoot, and of such buds no more than two, or even only one, may start into growth. When it does so, it seems to have the constitution rather of a lateral than of a terminal bud, giving rise to a shoot which diverges at a wide angle from its parent shoot instead of following the same direction; hence arises the gnarled or zigzag growth which has been noticed by Gilpin in his "Forest Scenery" as giving to the wych elm somewhat of the character of the oak.

The internodes are always longer than in the small-leaved elm, especially in the luxuriant shoots of young trees; in such they vary from five-eighths of an inch to one and three-quarter inches, and hence the secondary branches are always wider apart; when, however, the flowering habit has set in, the distance between the secondary branches thenceforward produced is greatly increased as has already been pointed out.

The thickness of the yearly shoot varies considerably in different individuals, but one-eighth of an inch is a very common diameter.

With regard to the ultimate directions assumed by the younger branches and sprays, the leading shoot in the more robust forms seems to follow its own chosen direction, the force of its individual growth preventing its being either drawn upward by the influence of light, or bent downward by gravitation. In the more slender-growing varieties, the lesser branches become pendulous through the weight of their own spray and foliage, and hang as rich festoons.

It is a characteristic of the wych elm that the primary branches seem to have greater vigour and force of development than the central stem from which they spring, thus taking the lead of it and causing it, before it has reached any great height from the ground, to become lost among them. There is considerable variation in the branching of different individuals when full-grown or aged; but this character of losing the central trunk in large diverging limbs is always more or less present to distinguish the wych elm from the small-leafed elm, which is so much more common than it in the southern counties of England. In the wych elm the uppermost limbs



WYCH ELM. WINTER STATE.

show much greater tendency to ascend than do the lower ones; and the ultimate branching seems, as has been already stated, to follow three main types. In the more luxuriant, robust, and rapid-growing examples a horizontal fanlike form, a pendulous one in the slender-growing varieties, and a gnarled or zigzag in the more floriferous and in the slow-growing and less vigorous specimens of the tree. It is of this latter that Gilpin remarks: "It partakes so much of the oak that, when it is rough and old, it may easily, at a little distance, be mistaken for one." Whilst contrasting the loose growth of the wych elm with that of the small-leaved elm, he truly says of the former: "It is perhaps generally more picturesque than the common sort (*i.e. U. campestris*), at least on a foreground, as it hangs more negligently; though at the same time with this negligence it loses in a good degree that happy surface for catching masses of light which we admire in the common elm and which adapts it better to a distance."

(*To be continued.*)

## OSCILLATORIA IN HOT WATER.

A TANK in this town receives daily the boiling waste water from the engine-house of a large factory, but has time to cool to a normal state of 68 degrees, Fah., before the next inlet; it then reaches 105 degrees, Fah. The water is also often charged with a large amount of grease, and a dense scum or algæ grows in it. A week or so since I was asked to examine some of this growth. At first I doubted much if it was algæ, because, instead of being a very light clear green, as is the case with almost if not all the algæ, this, in mass, was so very dark as to be quite an invisible green, and the individual frond or filament appeared purple under a one-inch objective. Moreover, I failed to discover any division into segments or cells containing zoospores, or any sign of conjugation, budding, or germs characteristic of algæ and indispensable to life. I tried, for a long time in vain, to find some mature fronds, till I found what I thought might be its usual mode of increase, viz., multiplication by division. By what natural force or law I could not tell, but the two ends of a filament, originally in line, were brought together showing remarkable flexibility, they were then tightened by twisting to such an extent that the filament snapped in the centre, as a brittle stick would do under such a strain. The twisting was repeated again and again, but the filament did not always snap, nor did the twisting always begin at both ends, more frequently, perhaps, at one only. It was very curious to watch the end jerking about like the nervous twitching of a rat's tail. My first impression from its rapid motion was that it was *Bacillaria paradoxa* or something allied to it, though it had not the interesting gliding motion of that diatom, nor its prettily marked frustules. Neither could I satisfy myself that the movement was not due to the numerous monads swarming round it.

I increased my magnifying power to more than 1,000 diameters with advantage, having added fresh water. The colour was now bright green, the purple being apparently due to the grease. I then saw that the twisting was its own inherent motion, and never did I see bell-hanger twist a wire more perfectly. I could also see what appeared to be markings across the filament, and, by very close scrutiny, that the apparent markings moved up and down; in fact that it was the circulation or rotation of the endochrome. I noticed also that this circulation always preceded the twisting, and was in the same direction, and most probably the cause of it. The diameter of a frond is as nearly as possible the 5,000th part of an inch. Though I placed the object on a flat glass with thin cover glass over it, it was exceedingly difficult to keep in the field of view long enough for another person to see it, but I had the assurance of two witnesses as to the circulation. When my examination ended I referred to Carpenter, and have no doubt about identifying it with *Oscillatoria*. He notes the continuous tubular filaments, and says the endochrome which they contain usually exhibits some degree of transverse striation, as if breaking up into short segments, but this division is never perfected, the fragments of endochrome, which are to be regarded as gonidia, usually escaping from their sheaths, and giving origin to new filaments. The rhythmical movement must be considered simply as the expression of vital changes taking place in the interior of the frond. F. HARRISSON.

*Cheadle, Staffordshire; January, 1896.*

BLACK RAIN IN IRELAND.—About three summers ago a very curious phenomenon occurred in a district about six or eight miles in diameter, partly in Tyrone and partly in Monaghan County. One day in the middle of summer the sky became so dark and overcast that I wondered whether there was an eclipse. In about an hour it became lighter, but no rain fell in my neighbourhood which was about ten miles away. But round about Aughnacloy, and across from near Fintona to Emyvale, black rain, very heavy, like a thunder shower, overtook the country folk going to market. The runnels by the road-side were flowing with the dark liquid, and one farmer going to the water-butt after the shower found the contents black, as if someone had been washing an ink-bottle in it. Clothes from the wash, drying on the hedges, were deeply stained as if with sooty water; and even next day when I was in the locality I noticed the ruts in the road were of a dark colour. There is no city of considerable size whose smoke could be precipitated from the air nearer than Belfast, some fifty miles away. This, however, could not be the cause, or it would be of frequent occurrence, one would think, in England.—*W. F. de V. Kane, Drumreask House, Monaghan, Ireland; December, 1895.*

# CHANGING HABITS OF ANIMALS.

By J. Beecham Mayor, L.R.C.P., M.R.C.S.

THE relation of environment, that is, of the conditions of life, to variation is very interesting. From different causes old characters become of slight value, and so are discarded in favour of new ones, which, proving useful in the "struggle for existence," are preserved and transmitted to the offspring. These new qualities gradually produce in time a change in the animal's structure, or its habits. Thus, a sea-gull, a fish-eating bird whose stomach naturally has thin muscular walls, when fed for a whole year upon barley was found to have its stomach-walls increased in thickness, and pertaining more to those of a grain-feeding bird. Again, the increase of the European rabbit, due to its enormous fecundity, is kept within reasonable bounds in its native habitat by weasels, birds of prey and other destructive animals. The boldness of the weasel in pursuit of its prey was forcibly brought to my notice last summer while rambling across the braes above Callander, in Scotland. Walking along the path which crosses the open ground to the falls of Bracklin, in the middle of the day, and with several people in view, I saw two weasels chasing a young rabbit. Though I was only a few yards away, and accompanied by my brother, they caught it close to the path, and would not leave their victim until we came close up to them. The poor rabbit lay there on its side unable to move, giving a few convulsive kicks and soon expired. Now when man, regardless of such provisions of nature, introduced this prolific herbivorous animal into Australia he forgot that its natural enemies, the birds of prey and the smaller carnivora, were unrepresented on that continent. Consequently, though only a few pairs were let loose in Victoria in 1860, it has already overrun the greater part of the colony, and is spreading into other districts, bidding defiance to all means of repression. After a time it was found that wire-netting placed round the pastures and gardens, and sunk a few feet into the ground, entirely prevented the rabbits from burrowing under it. But now the rabbit, nothing daunted, is showing a facility for climbing over the netting, by the development of a modified hooked nail which enables it to hook its claws on to the wire strands and thus sustain its weight. By the same means it is also able to ascend the trunks of trees in its search after bark. The offspring of those rabbits possessing this structural modification are thus placed in a better position for survival over the ordinary form, and so will increase in numbers. From a similar alteration in environment, we see a variation in habit of the common English fox, which, introduced into Australia to keep down the rabbits and for sport, has taken to feeding upon the young lambs, and is proving very destructive Another well-known extraordinary change or variation in habits, has occurred in the Kea, a parrot found in the mountains of New Zealand. The natural diet of this bird is fruit and berries, but since England has occupied the country and introduced sheep-farming, it has gradually become carnivorous. At first it picked off the fragments of flesh on the sheep-shins hung up to dry; then it was attracted to the meat which was curing in the open air, and finally, about thirty years ago it attacked living sheep, alighting upon their backs and eating its way down to the kidneys, which are its special delicacy.

Lately, another instance of this variation in habit has been noticed in the case of the mongoose, an animal about the size of a weasel, which was introduced into Jamaica twenty years ago to destroy the rats which were very destructive to the sugar-canes. The natural food of the mongoose becoming scarce, and being also very prolific, they began to prey upon young pigs, kids, lambs, newly-dropped calves, young rabbits, game-birds and certain fruits, vegetables, and even the edible black-crab which has thus almost been exterminated in the island. The few rats remaining upon the island have also undergone a change of habit, in in order to escape this new enemy, and so now instead of making their nests upon the ground, build them high up in the banana and cocoa-nut trees.

The alteration in the mode of living due to change in the conditions of life, has been well shown in the beaver, Those specimens still surviving in Europe, though undoubtedly descendants of social, hut-building animals, being relentlessly pursued by man, have given up their colonising habits with the prominent domed huts and dams, and have taken to constructing solitary deep burrows in the margins of the streams they frequent.

A beautiful adaptation to environment is to be noted in a Brazilian frog, *Hyla faber*, in its efforts to protect its offspring from the destroyer. The female, instead of acting like the common frog and leaving the young tadpoles to the mercy of the first-comer, scoops out the mud on the bottom of the pond, thus making a little hollow, round which, by means of her hands used as trowels, she builds up walls. Inside these small shelters or nurseries, the eggs are deposited and the young tadpoles are confined therein until of sufficient strength to fight their own battles.

2, *St. Alban's Villas, Heaton Chapel, near Manchester*

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*By Tangled Paths: Stray Leaves from Nature's Byeways.* By H. Mead Briggs, 203 pp. crown 8vo., illustrated by a frontispiece. (London and New York: Frederick Warne and Co. 1896.) Price 3s. 6d.

After reading a few chapters of this charmingly printed book, one is apt to put it down with the remark "Jefferiesque." By that we do not mean Mr. Briggs to be a plagiarist, nor that he has even unconsciously acquired the style of Richard Jefferies by persistent reading of that author's works. A true love of the country, and familiarity with its denizens tend to enthusiasm in expression, as a contrast to the urban and scientific writer who coldly describes things as he thinks they ought to appear. In the course of education it is with the enthusiast we should start. Our later reading of the critical writer may then be safely left to a judgment protected from cynicism by the love of the beautiful which has come to abide with us. Gilbert White taught many a boy to love the country, long years after he slept in Selborne Church-yard. Boys who began as lovers of nature, progressed into naturalists and ended as scientific biologists—men who have left an impress on human civilization; but with all their later erudition, the love of the beautiful in nature was never lost. These are the true "naturalists," not the type created by the Board School examiner and Civil Service tests. These tangled paths of Mr. Briggs are pleasant enough, though at times intricate, but there are among his stray leaves those which promise good work in future. Here is the description of a common enough place, to be seen in the outer suburbs of many a city besides Canterbury, but our enthusiast lights it into a spot full of interest. "A bank that but a short time since was all in its pride. Rich at Eastertide with the delicate beauty of soft sallow bloom, noisy with ceaseless hum of bees. A rare sight, no less beautiful then in its softer tone of colour than the gorse opposite it to-day." These chapters are not all word painting, for we find on most pages, stores of information on the habits of our wild birds and beasts. Facts, they usually are, for our author is an observer, and we find him far more accurate in his statements than many prose poets with greater reputation. Altogether it is a book to recommend, and will make a delightful present for bright boys and girls as well as for some elder people.

From "*By Tangled Paths.*" by H. MEAD BRIGGS.
(*From a Photograph by Mr. Frederick H. Evans.*)

*Ice-Work, Present and Past.* By T. G. BONNEY, D.Sc., LL.D., F.R.S., F.S.A., F.G.S. 305 pp. 8vo, illustrated by 25 drawings and maps. (London: Kegan Paul and Co., Ltd. 1896.) Price 5s.

This is one of the volumes of the admirable "International Scientific Series" issued by this firm of publishers. Professor Bonney reminds us in his preface that, although many works exist in several languages on the subject of the work of ice in modifying the physical features of the world, they have generally been written to support some particular theory. In the book before us we have the whole subject admirably reviewed in three sections. These are: Section 1—Existing Evidence, in which Dr. Bonney discusses Alpine glaciers, past and present, and the Arctic and Antarctic ice-sheets; Section 2—Ice-Work proper, in Britain and other parts of the world. Section 3 is devoted to Theoretical Questions, including the number, temperature and possible causes of the glacial epochs; also a survey of glacial deposits. Considering the limited space allowed in the volumes of this series, it would not have been easy to have more successfully treated so large a subject. Though condensation has been necessary, as a treatise for the general reader and an aid to the geologist who has not yet commenced to think of the importance of a knowledge of ice-influence, we know of no book so useful.

*The Splash of a Drop.* By Professor A. M. WORTHINGTON, M.A., F.R.S. 76 pp., small post 8vo, illustrated by 138 figures. (London: Society for Promoting Christian Knowledge. New York: E. and J. B. Young and Co. 1895.) Price 2s. 6d.

This is a reprint of a discourse delivered at the Royal Institution of Great Britain in May last, by Professor Worthington, and it is excellently illustrated, as can be judged from the three examples which have been lent to us by the Secretary of the Society that published the book. This little work forms one of the "Romance of Science Series" of the S.P.C.K., which are all admirably done by first-class authorities on the dozen various subjects already published. As stated by Professor Worthington in his opening sentence, some people may wonder what he can say about such a rapid phenomenon, that can fill all his pages and provide subjects for so many illustrations. Yet it forms a most interesting little work, the more so as it is a simple subject anyone can investigate, if the instructions given by the Professor are followed. He com-

SERIES XIV.

*Engravings of Instantaneous Photographs of the Splash of a Drop of Water falling 40 cm. into Milk.*

Scale about $\frac{6}{10}$ of actual size.

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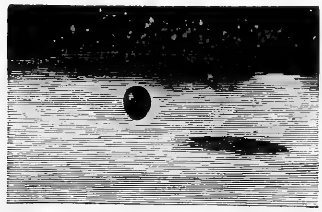

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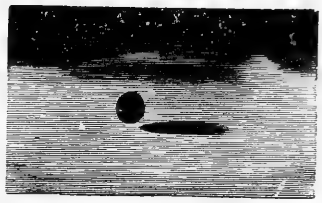

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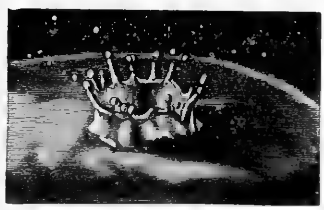

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From "*The Splash of a Drop*," by Prof. A. M. WORTHINGTON, F.R.S.

mences by giving the credit due to those who have preceded him in these investigations; the first of whom was a school-boy at Rugby some twenty years ago. Those early observations were conducted with great difficulty on account of the rapidity of the action and the improbability of exactly repeating the splash under observation. It was not until instantaneous photography was brought to bear that anything like trustworthy records were obtained. Besides this the author has constructed an apparatus, which he figures and fully describes, that permits an apparently exact repetition of the drop and its effects following. The drawings we reproduce show the different movements which take place through the concussion of a drop of water falling into milk. These form only one of several series of such drawings, but they are fairly typical. The subject is very common-place, for we may say that it is to be seen any day, but it shows how many common things there are to be investigated, and how beautiful are the results. We cannot refrain from congratulating the Society for Promoting Christian Knowledge for the liberal manner in which such subjects are placed before the people. This truly educational work carried on by the Society is beyond all praise, especially when conducted with the good taste shown in the manner of placing it before the public.

SERIES XIV.—(*continued.*)

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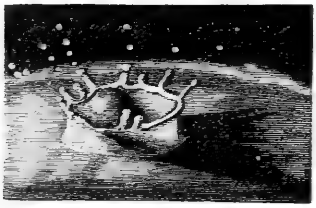

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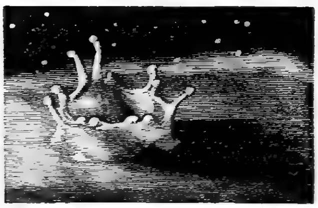

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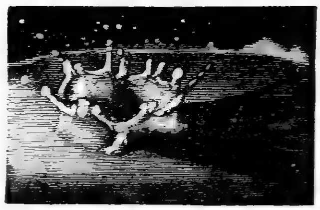

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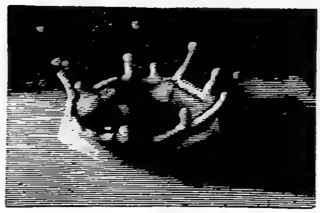

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From "*The Splash of a Drop*," by Prof. A. M. Worthington, F.R.S.

*British and European Butterflies and Moths.* (*Macrolepidoptera.*)—By A. W. Kappel, F.L.S., F.E.S., and W. Egmont Kirby, L.S.A. 289 pp. royal 4to, and 30 coloured plates. (London: Ernest Nister. New York: E. P. Dutton and Co. 1895.) Price 25s.

This is a highly ornamental work, beautifully printed and produced. It is just one of those books which will create beginners in the study of the lepidoptera, and for that reason cannot be too widely known. An advantage of the work is that it deals with a number of extra-British species, and will therefore have a tendency to help to break down the insular "British" lepidopterist. This book contains descriptions and coloured figures of nearly all species occurring in Britain. The sixteen pages of introduction will be found useful to many, as they contain instructions for learning how to collect, rear and preserve butterflies and moths, with illustrations in the text of nets, rearing-cage, setting-boards, etc. These latter, we are pleased to find, are "flat," in true continental fashion. With regard to the coloured plates, we may say at once that most of them are better than the average of such work. They are generally well drawn, though there is some inequality of size; as for instance, on plate iii., *Thecla betulæ* is represented as large as *Leucophasia sinapis* or var. *helice* of *Colias edusa* and *Gonepteryx rhamni*. It would have been better to have given the sizes in the text in a few of such cases where measurements are usually absent, though they are given after the names of the insects in the index. We repeat that the colouring of the figures is much above the average for machine work, and is amply sufficient for identification. The text is cut down as low as possible, the authors relying upon the plates, rather than on descriptions, though each species has some of the technical points indicated.

*British Moths.* By J. W. Tutt, F.E.S. 374 pp. 8vo. Illustrated by 12 plates in colours and 61 figures in the text. (London: George Routledge and Sons, Limited. 1896.) Price 5s.

The first feeling excited in us on looking over this work is one of sympathy with the author, in what he must feel towards the printers of his coloured plates. The workmen have not in some of them troubled to keep the register, and thus permitted patches of colour to extend where they should not be, even outside the insect itself. Several of the plain figures in the body of the book have likewise suffered from the too heavy attentions of the machine-man. We do not believe that Mr. Walter A. Pearce ever drew Fig. 27 in the worn, fringeless state it appears in the copy before us, he is too careful an artist. In the preface Mr. Tutt states "we are met with the positive fact that there is no text-book extant which deals, or attempts to deal, with our moths on the lines which the study of the last twenty-five years has convinced all true naturalists are the correct ones." Surely our author must have written this previously to the appearance of Mr. Edward Meyrick's "Handbook of British Lepidoptera." The author tells us that "the lines of classification adopted are those of the most recent authorities on the subject, as set out in a correlative of the recent systems published in the 'Transactions of the Entomological Society of London' in 1895, and are based upon

SERIES XIV.—(*continued.*)

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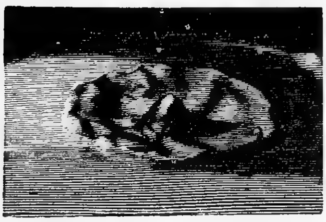

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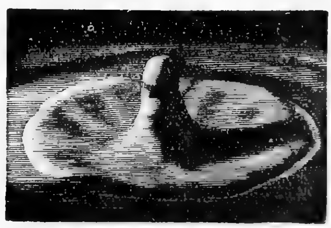

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From "*The Splash of a Drop*," by Prof. A. M. Worthington, F.R.S.

evolutionary lines." There is ample room for this work, and it cannot fail to be productive of good work among many, who, with the old manuals, would never become more than collectors of "rows" for the cabinet. Chapter i. is full of suggestions and should be carefully read by every beginner. Chapter xxii. will also be of use to them, for it includes the instructions for collecting and preserving the material for study. This chapter ought to be good, for Mr. Tutt is a collector of experience and when at work is most indefatigable. Our surprise is therefore great when we are startled with the apparition of the obsolete "clap-net," on page 359. Has Mr. Tutt ever used one? If so, will he kindly tell us how he got his captures out of it without injury? Again, why go on recommending the rounded setting blocks which do more than aught else to perpetuate the insular and unscientific moth-catcher, against whom he rails. If we might suggest, when he prints a further edition of this work, which will, we feel sure, be at an early date, he would leave out the whole of this block, which has done bad duty for too long a time already. In the new edition also an index would be a great improvement. No one knows the value of time better than the author, yet he leaves us to turn over the leaves in despair of finding—say—where he places the inevitable *Cossus*; though we eventually stumble across it on page 339, in its right place among the Tortricidæ. With regard to the main plan of the book and the arrangement of families and species, we agree with much of it. The new Lepidopterology is only commencing, and there will, for a long time to come, be much floundering and plunging to get a permament arrangement, but we think, so far as present knowledge of the biology of the subject permits, Mr. Tutt's plunges are in the right direction.

*Introduction to the Study of Fungi: Their Organography, Classification and Distribution; for the use of Collectors.* By M. C. COOKE, M.A., LL.D., A.L.S. 370 pp., large 8vo, illustrated by 148 figures. (London: Adam and Charles Black, 1895.) Price 14s.

Whatever the more advanced students of Cryptogamic Botany may say about Dr. Cooke's new book when under their criticism with regard to classification and the splitting of genera, they will all agree that it is a good book, well done, and one which will be for a long time to come indispensable to the student of fungi. Such should be the case, when we remember for how long a period Dr. M. C. Cooke had charge of the collection of fungi in the Kew herbarium. In fact no book so thoroughly brings up the subject to the modern condition of knowledge. Neither is the work written in a manner calculated to deter the advance of the beginner, for everyone knows Dr. Cooke's pleasant and almost popular style. In conformation of his own great knowledge of the fungi, the author places at the end of each chapter of the descriptive matter, a full bibliography relating to its contents. Added to this advantage to those engaged in research in the literature of the subject, there is for the general student an excellent glossary extending to four pages in length. Chapter xxviii. is devoted to instructions for collecting and preserving fungi. It will be found most useful to all readers of the work. A perusal of this chapter will save much valuable time, when, as often occurs, the season for some particular species is short, and perhaps a good many other different kinds are all out at the same time. In concluding this chapter, Dr. Cooke says, "Finally, we would urge also upon the young and inexperienced never to rest content with being mere collectors, since the knowledge so obtained is liable to become superficial and empirical; on the contrary, to examine for himself, as thoroughly and completely as possible, every organism which he acquires in his own selected group, and endeavour to ascertain all that is possible of its life-history. The whole history of one species, worked out with perseverance and intelligence, will present the key to a knowledge of many kindred species, and always prove a valuable contribution to science when the names of species are changed or forgotten." Such is Dr. Cooke's admirable advice, which many would do well to follow in other departments of science as well as fungology. Estimating the total number of described species of fungi at 40,000, the author tabulates them in divisions. With regard to the microbes, the knowledge of them is so comparatively recent, there being no standards for comparison that are twenty years old; it is doubtful whether the present information on the subject will be found by posterity to be very complete, though 689 species of yeast fungi and bacteria are mentioned.

*Insect Life.* By FRED. V. THEOBALD, M.A., F.E.S. 246 pp. 8vo, with 54 illustrations. (London: Methun and Co., 1896.) Price 2s. 6d.

The sub-title of this little book states that it is a short account of the classification of insects, and we further find it is intended for the general reader rather than the specialist. This, doubtless, accounts for its very elementary character, which will render it useful for school prizes, and village libraries. The figures will help the work considerably, being chosen, in most instances, from familiar examples of the groups they illustrate. In placing a figure of *Cossus* as the type of the Tineæ, the author is hardly wise, for he mentions it in conjunction with clothes-moths. If some one exclaims, on meeting with a fat caterpillar of the goat-moth, "There goes one of those nasty things which eat our clothes," we do not consider the observer would be quite blameworthy, after studying Mr. Theobald's work.

*Prehistoric Man in Ayrshire.* By JOHN SMITH. 256 pp. demy 8vo, illustrated by 281 figures, and map. (London: Elliot Stock, 1895.) Price 12s. 6d.

Mr. John Smith, of Monkredding, has contributed a useful summary of what is known in his county of the remains of prehistoric man. He is an ardent and painstaking observer and explorer, both of the country and of the literature of his subject. He has, as he states in his preface, "traversed nearly 'every inch' of the county on foot," and collected with his own hands hundreds of prehistoric relics from caves, crannogs, shell-mounds, rock-shelters. sands, gravels, etc." Besides these, he writes about early man "as revealed to us from cairns, stone-coffins, mounds, long barrows, shell-heaps, remains of cannibal feasts, cromlechs, rock-graves, camps, turf-spirals, hill-forts, stockades, dinans, kits, military trenches, Druidical circles, hut circles, vitrified walls, monoliths, rocking-stones, treaty-stones, sanctuary-stones, rock-sculpturings, cups and rings; and by flint, stone, jasper, agate, bone, horn, Druid's glass, iron, bronze, brass, gold, silver, leather," etc. This is a good long list, but it by no means exhausts Mr. John Smith's book, which should at least have a local sale.


| | 1896. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| | | A.M. | P.M. | | |
| *Sun* ... | Feb. 1 | 7.42 | 4.46 | 20.59 | 17° 19′ S. |
| | ,, 11 | 7.25 | 5.4 | 21.39 | 14° 5′ |
| | ,, 21 | 7.5 | 5.23 | 22.18 | 10° 38′ |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| *Moon* ... | ,, 1 | 8.4 | 2.35 | | |
| | | A.M. | A.M. | | |
| | ,, 8 | 5.35 | 8.49 | | |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| | ,, 15 | 1.30 | 7.24 | | |
| | | P.M. | A.M. | | |
| | ,, 22 | 6.39 | 3.45 | | |
| | | P.M. | P.M. | | |
| *Mercury*... | ,, 1 | 1.3 | 6.11 | 21.49 | 10° 51′ S. |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| | ,, 11 | 6.38 | 11.38 | 21.11 | 12° 26′ |
| | ,, 21 | 6.0 | 10.42 | 20.50 | 15° 34′ |
| *Venus* | ,, 1 | 5.27 | 9.30 | 18.14 | 21° 59′ S. |
| | ,, 11 | 5.36 | 9.42 | 19.6 | 21° 42′ |
| | ,, 21 | 5.42 | 9.55 | 19.58 | 20° 22′ |
| *Mars* ... | ,, 1 | 5.55 | 9.45 | 18.30 | 23° 49′ S. |
| | ,, 11 | 5.44 | 9.37 | 19.3 | 23° 21′ |
| | ,, 21 | 5.30 | 9.30 | 19.35 | 22° 28′ |
| | | *Souths.* P.M. | *Sets.* A.M. | | |
| *Jupiter* ... | ,, 10 | 10.55 | 6.52 | 8.17 | 20° 25′ N. |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Saturn* ... | ,, 10 | 1.1 | 5.45 | 15.8 | 15° 11′ S. |

MOON'S PHASES.

*Last Qr*... Feb. 6 ... 12.38 a.m. *New* ... Feb. 13 ... 4.13 p.m.
*1st Qr.* ... ,, 21 ... 9.14 p.m. *Full* ... ,, 28 ... 7.51 p.m.

THERE will be no prominent meteor showers this month.

THERE will be an annular eclipse of the Sun on the 13th, invisible at Greenwich, and a partial eclipse of the Moon on the 28th, partly visible at Greenwich. The first contact with the shadow is at 6.16 p.m., and the last at 9.15 p.m. The Moon rises at 5.27 at Greenwich.

| | 1896. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| | | A.M. | P.M. | | |
| *Sun* ... | Mar. 1 | 6.46 | 5.39 | 22.58 | 7° 17′ S. |
| | ,, 11 | 6.24 | 5.56 | 23.29 | 3° 24′ |
| | ,, 21 | 6.1 | 6.13 | 0.5 | 0° 33′ |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| *Moon* ... | ,, 1 | 8.31 | 2.4 | | |
| | | A.M. | A.M. | | |
| | ,, 8 | 4.54 | 8.33 | | |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| | ,, 15 | 0.47 | 7.31 | | |
| | | P.M. | A.M. | | |
| | ,, 22 | 6.23 | 3.21 | | |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Mercury*... | ,, 2 | 5.49 | 10.28 | 21.11 | 16° 11′ S. |
| | ,, 12 | 5.44 | 10.34 | 21.55 | 14° 13′ |
| | ,, 22 | 5.36 | 10.49 | 22 49 | 9° 56′ |
| *Venus* ... | ,, 2 | 5.37 | 10.6 | 20.48 | 18° 3′ S. |
| | ,, 12 | 5.29 | 10.16 | 21.38 | 14° 52′ |
| | ,, 22 | 5.16 | 10.24 | 22.25 | 11° 0′ |
| *Mars* ... | ,, 2 | 5.14 | 9.23 | 20.7 | 21° 12′ S. |
| | ,, 12 | 4.56 | 9.15 | 20.38 | 19° 34′ |
| | ,, 22 | 4.35 | 9.6 | 21.9 | 17° 37′ |
| | 1896. | *Souths.* h.m. P.M. | *Sets.* h.m. A.M. | Position at Noon. R.A. h.m. | Dec. |
| *Jupiter* ... | Mar. 1 | 9.28 | 5.27 | 8.9 | 20° 52′ N. |
| | ,, 21 | 8.6 | 4.6 | 8.6 | 21° 3′ |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| *Saturn* ... | ,, 1 | 11.43 | 4.27 | 15.9 | 15° 10′ S. |
| | ,, 21 | 10.22 | 3.7 | 15.8 | 14° 59′ |
| *Uranus* ... | ,, 1 | 12.23 | 4.47 | 15.29 | 18° 37′ S. |
| | ,, 31 | 10.27 | 2.47 | 15.27 | 18° 31′ |
| | | *Souths.* P.M. | *Sets.* A.M. | | |
| *Neptune* ... | ,, 1 | 6.16 | 2.18 | 4.57 | 21° 13′ N. |
| | ,, 31 | 4.20 | 0.22 | 4.58 | 21° 17′ |

MOON'S PHASES.

*Last Qr*... Mar. 6 ... 11.29 a m. *New* ... Mar. 14 ... 10.48 a.m.
*1st Qr.* ... ,, 22 ... 11.57 a.m. *Full* ... ,, 29 ... 5.21 a.m.

No prominent meteor streams will visit us this month.

MERCURY is at its greatest elongation west on the 5th, at 4 p.m.

AN admirable short article upon indexing of scientific papers, by Mr. H. Seward, appears in the January number of "Monthly Notices of the Royal Astronomical Society." It bears especially with regard to astronomical records.

EARTH'S ROTATION AND SLEEP.—In looking through the last number of "The Asclepiad," the remarkable magazine entirely written, edited and published by Sir Benjamin Ward Richardson, M.D., F.R.S., I notice he returns to the often discussed question of the effect of position of human beings when reclining in the nightly sleep. That is to say, is it best to lie with the body in the direction of the earth's rotation or across its axis? Dr. Richardson considers it a matter of much importance, especially to invalids, feeble and sleepless people. The tendency of the blood in the body is to be affected by the rapid "swing" of the earth. Thus if the position taken is with the head in a westerly direction, the blood would be inclined towards the head, and the reverse occur when the feet are turned with the earth's rotation. Sir Benjamin finds he sleeps most comfortably, and awakes more readily, with his head in the westerly direction. One thing he points out is, that it is a subject which has not been properly investigated. There is another well-known fact connected with the effect upon sleeping animals of the earth's rotation to which Dr. Richardson does not refer, but which is more evident. About an hour before dawn of day, no matter at what time of the clock that occurs, according to the season, sleeping animals become temporarily uneasy. Children often turn round and moan in their sleep. Elder people frequently awake, turn over to a different position, and sleep again. Cocks crow, dogs become uneasy, though perfect stillness obtains in the place where they may be asleep. In a farmyard, horses and cattle may be heard moving for a short period, and then sleep and stillness returns for a time. What is the cause of this? Are the animals affected by some magnetic wave which precedes sunrise an hour or so, or is the habit one of those which are the outcome of heredity, passed down through numberless generations from an original wild state, a habit which was then of protective value, by causing a general alertness shortly before the hour when they would become visible to predatory enemies in the approaching daylight?—*John T. Carrington.*

## SCIENCE GOSSIP

A SHARP shock of earthquake occurred in Normandy on December 6th, about half-an-hour after sunset.

THE Manchester Museum is now open on Sunday afternoons. This will doubtless give great aid to the numerous workmen naturalists, for which that city has long been celebrated.

ALFRED E. BEACH, one of the proprietors of the "Scientific American," died on January 1st, in New York. He was well-known in American scientific circles, but his attainments were largely mechanical.

MR. WILLIAM L. SCLATER received the curatorship of the South African Museum at Capetown, vacant by the retirement of Mr. Roland Tremen, F.R.S. Mr. Sclater was at one time deputy-superintendent of the Indian Museum, Calcutta.

SINCE the resignation of the late Dr. Tyndall, who was Scientific Adviser to the Trinity House Corporation, the post remained unoccupied. It has now been filled by Lord Rayleigh, a successor to such men as Tyndall and Faraday, who will maintain its honour.

A WRITER to "Nature" suggests a fog scale, t determine the comparative amount of mist in the air, after the manner in which we approximate the rainfall and wind force. If a scale could be fixed and a series of observations taken, we should soon find out the mistier places in our islands.

THROUGH the death, at the end of November last, of Lord de Tabley, better known as the Hon. J. B. Leicester Warren, there passed away an eminent man among the botanists of this country. His knowledge of the intricate groups of British Brambles was exceptionally good.

FROM the "Transactions of the City of London Entomological and Natural History Society," for 1895, we find the society in prosperous condition, the membership being 74. The presidental address was devoted by Mr. Tutt to "Modern Principles on which the Classification of Lepidoptera is based."

Two large and important exhibitions of automatic carriages in London during the coming summer, with "races" or competitive trials at the Crystal Palace, indicate the progress of "horseless carriages." The Automobile Club of Paris has also arranged a race from that city to Marseilles and back. Application has been made in Paris to place on the streets, for hire, similar carriages, at one shilling and sixpence per hour.

ANTICIPATING the general movement in favour of motor-carriages, a new illustrated monthly journal has been started in New York, called "The Horseless Age." The first number appeared last November. We hardly think the title a good one, for we doubt the future existence of a horseless age. There are numbers of illustrations of useful-looking motor-carriages in the paper, but some of the names are too awful—for instance, the "Electrobat" and "Motortrap."

THE curatorship of the Fielding Herbarium at Oxford has been given to Mr G. C. Druce, the well-known botanist.

MR. MAX WEG, of 1, Leplaystrasse, Leipzig, has favoured us with a copy of his Catalogue, No. 48, of Zoological Books. It embraces 3,890 books, which are available for students and others to purchase.

"TABLES of Conjugate Force, for the users of Photographic Lenses," are issued by Messrs. Dawbarn and Ward, of London. They are compiled and explained by Mr. J. R. Gatz, and the price is to be sixpence.

"THE Agricultural Magazine" is now well into its second year, and is greatly improved since it first appeared. The articles, some having a scientific treatment, are varied, and devoted principally to the subject of cage-birds. The price is sixpence monthly, and the address of the hon. treasurer is, Mr. H. R. Fillmer, 52, Ship Street, Brighton.

MR. HAROLD BRIERLEY describes, in "Nature," the site, ten miles from Bridlington Quay, in Yorkshire, where an aerolite fell a century ago. It is marked by a column of bricks, which used to be annually whitewashed. There is a slab bearing an inscription stating that on December 13th, 1795, an extraordinary stone fell from the atmosphere, weighing 56 pounds. The meteorolite is now in the British Museum.

THE universally respected publisher, Mr. Alexander Macmillan, of Bedford Street, London, is dead, aged seventy-eight years. His name has been associated with the publication of more high-class scientific books than other person. He was one of the founders of our contemporary, "Nature." There were few men who have in a quiet and unostentatious manner done more to diffuse scientific knowledge.

WE have received two publications from the Bristol Museum, which have been recently issued. They are both by Mr. Edward Wilson, F.G.S., the curator. One is the sixth edition of a Guide to the Museum, which is both educational and useful to the visitors; the other is a Catalogue of the fossils, rocks and minerals in the students' geological collection in the Bristol Museum. It is printed on one side so that it can be cut up for labels, or the blank sides may be used for notes.

THE extermination of animals on the North American Continent still goes on, through the reckless greed of man. In addition to the many species which are quite or nearly lost, Mr. W. H. Dall draws attention in a recent number of "Science," to the fact that in Alaska "the whaling and sealing industries are practically exhausted, and the fur trade is in its decadence; the salmon canning is in full prosperity, but conducted in a wasteful and destructive manner which cannot long be continued.

ONE of the attractions of the Swiss National Exhibition, to be opened on May 1st, at Geneva, will be the use of acetylene, which gas is now produced by depressing and compressing the atmosphere down to 415 degress below zero, into a liquid. This is liquid Pictet, named after the discoverer. When the liquid is allowed to expand, it becomes thirty times the illuminating power of coal gas. Measure for measure, the cost of production is the same; thus, acetylene becomes one-thirtieth the price of the gas now commonly used.

## SCIENCE ABROAD

Bulletin de L'Académie Impériale des Sciences (St. Petersburg, 1895). Part 1 contains: "On Molecular Force and Elasticity of Molecules," by Prince B. Galitzin; "The Distribution of Wind over the Surface of the Russian Empire."

Il Naturalista Siciliano (Palermo, July-September, 1895). All malacologists who have had occasion to consult Benoit's Monograph "Illustrazione Systematica critica iconografrica de Testacei estramarini della Sicilia," a work which appears to be somewhat rare in this country, will be grateful to M. A. de Gregorio for contributing some critical notes and corrections upon this standard book, together with new records of localities, and some new species and varieties; the conclusion of a note upon "The Primal Larval Forms of *Anguilla vulgaris* (eel)," by Dr. Luigi Facciola; an article by M. Filippo Silvestri on "The Origin of the Copulative Organs of the Callipodidæ," with figures in the text; and the conclusion of "A Catalogue of the Hymenoptera of Sicily" are all important contributions. A third note on "Some Living and Fossil Mediterranean Shells," by M. A. de Gregorio, and a paper by Dr. G. Riggio on "The finding of some new Crustacea," with plate, will be found of interest.

Annaes de Sciencias Naturaes (Oporto, January, 1896). "Mollusca and Brachiopoda of Portugal," by Augusto Nobre. This is a first instalment of what promises to be an important and meritorious contribution to malacology. In the introduction the author informs his readers that it will consist of an enumeration of all the species found in the Portuguese seas, the citation of several works, and information respecting the habitat of the species in question. The classification adopted is that of Dr. P. Fischer in his "Manuel de Conchyliologie." A paper on the same lines is contributed by Drs. de Oliveira and Lopes Vieira, entitled "Catalogue of the Mammals of Portugal," in addition to the synonyms, citations of various works in which the species are described and figured, and habitats, the vernacular names are also given. The "Catalogue of Hemiptera of Portugal" is continued by Dr. de Oliveira. The "Floral Calendar" by Mr. Edwin J. Johnston, and the "Birds of Portugal" by Mr. W. C. Tait, are already well-known features of the magazine. E. Schmitz gives a list, with notes, on the "Ants of Madeira," in which ten species are enumerated.

Bulletin de la Société Zoologique de France (Paris, December, 1895). Dr. R. Koehler contributes a preliminary note on the Echinoidea collected during the excursions of the *Hirondelle*, in which the species taken are enumerated and one new species is described. The results of the scientific expedition of the Prince of Monaco in his now famous vessel have already proved of great interest and importance. The author makes one or two remarks to which we must shortly allude. The collections of Echinodermata brought home by the *Hirondelle* considered as a whole have brought to light one fact which is somewhat astonishing, the Echinoidea producing only one new species, while the other groups have contributed more or less numerous new types. A similar observation holds good with regard to the dredgings of the *Travailleur* and the *Talisman*, the Stelleridea containing numerous new species, amongst them many remarkable forms, while the list of Echinoidea, published by Mr. Bernard, contains but one species. These results contrast singularly with those brought to light by the first explorations of the deep seas. The expeditions of the *Challenger* and the *Blake* have produced a great number of new forms of Echinoidea, the greater part of which were of the first importance on account of their relation with ancient genera; they revealed a fauna which was believed extinct. It was hoped that the successive expeditions would continue to augment in the same proportions our knowledge on the Echinoidea, but it has turned out to be quite otherwise, which is certainly very singular. Just recently the author, in his report on the Echinodermata collected on board the *Caudan* by himself, in the Bay of Biscay, has established a similar fact; while four other groups contributed some fifteen new types, the Echinoidea offered not a single new species. The same author has another preliminary note on the Echinoidea of the first expeditions of the *Princesse Alice*, which is credited with one new genus and new species. Mr. A. Pettit discourses on the "Supra-renal Capsules in Reptiles," and Dr. de Magalhaes, of Rio de Janeiro, contributes a fourth note on the "Helminthologie of Brazil," the subject being *Filaria mansoni*.

Feuilles des Jeunes Naturalistes (Paris, February, 1896). M. Charles Oberthür, in an article on "Mimicry in Insects," enumerates and explains several well-known instances of protective resemblance. Ornithologists will find some interesting observations on the Lammergeier, or bearded vulture (*Gypaetes barbatus*), by M. Emile Anfrie; two woodcuts of male specimens, one from Algeria, the other from the Alps, accompany the text. M. Mathieu Mieg concludes his article on "Geological Excursions in Alsace." M. Galien Mingaud records the capture of *Platypsyllus castoris*, a beetle parasitic on the beaver. This appears to be the third time its occurrence has been recorded in France. The specimens taken in Germany, Holland and North America are stated to pertain to the same species.

Bollettino dei Musei di Zoologia ed Anatomia Comparata Della R. Universita di Torino (Turin, 1895). Among the articles contained in the latest batch to hand, we may mention the following as of special interest; want of space forbids us to give more than their titles.—Dr. Achille Griffini, "A New Blattid collected in the Island of Candia"; by the same author, "Note on some Ditiscidæ from Argentina and Paraguay." Dr. M. G. Peracca on "Reptiles and Amphibia"; Mr. G. A. Boulenger on "Fishes," the last two from the same source as the previous; Dr. Fr. Sacco on "Tertiary Mollusca of Piedmont and Liguria," part xvii. and xviii.; Dr. M. G. Peracca on "A New Species of Lepidosternum from Brazil"; Dr. A. Borcelli on "Freshwater Planaria from Argentina and Paraguay"; Dr. Daniele Rosa on "Oligochaeta," from the same source as the last; the same author on "A New European Lumbricid, *Allobophora dugesii*"; Signor Tommaso Salvadori on "Birds Collected in Paraguay."

## BOTANY

VARIETY OF BEECH FOLIAGE.—It appears that the variety of *Fagus sylvatica*, about which a note appeared in SCIENCE-GOSSIP for October, 1895, is the var. *heterophylla*, which seems especially fond of reverting to the normal form. Sachs seems to record a similar case from the Botanical Gardens at Munich ("Text Book of Botany," Eng. Trans. by S. H. Vines, ed. 2, 1882, p. 921).—*Arthur E. Boycott, The Grange, Hereford; January*, 1896.

NEW FORM OF POND WEED.—In the "Journal of Botany," Mr. Alfred Fryer describes a new variety which he has named *involuta* of *Potamogeton nitens*. He finds it growing abundantly in Blackbush Drain and adjacent ditches near Whittlesea, in Cambridgeshire. It is to be distinguished from all other forms of *P. nitens* yet described by its freely produced coriaceous floating leaves resembling those of *P. zizii*, and may be easily passed for the latter species.

BOTANICAL EXCHANGE CLUB.—The Report for 1894 of the Botanical Exchange Club of the British Isles, has recently arrived. The number of plants sent in during 1894 was slightly less than the average of recent years. The report, as usual, contains many notes which will repay looking over. One, on the specimens of *Rubi*, circulated among the members, states that there is a marked advance in the knowledge of these species. The examples were above the average in condition, and no error was detected in naming the species and varieties.

THE SHE OAK.—I was sorry to see in the newspapers, some weeks ago, the announcement of the death of your old and valued contributor, Mr. Thomas E. Amyot, of Diss, Norfolk. With reference to his lively communication on the "she oak," in the November number of SCIENCE-GOSSIP (*ante* page 234), the relationship of *Casuarina* to *Quercus* is not so distant as Mr. Amyot would seem to imply, both trees belonging to the sub-class of Exogens, named by Dr. Lindley "Diclinous," and both having their flowers in catkins. The *Casuarina*, however, appears to be more nearly allied to the Betulaceæ than to the Cupuliferæ.—*M. J. Teesdale, St. Margaret's, Thurlow Park Road, Dulwich*; *Jan.*, 1896.

UNUSUAL FLOWERING PLANTS.—The unusually mild weather prevalent here during the past two or three months has tempted many plants to open their petals long before the average date of flowering. During a walk in this neighbourhood on January 19th, the following plants were observed either in bloom or just about to flower: *Ranunculus acris, Stellaria media, Cerastium triviale, Ulex europaeus, Matricaria inodora, Senecio vulgaris, Taraxacum officinale, Primula acaulis, Veronica tournefortii, Lamium purpureum, L. album, Stachys arvensis, Euphorbia helioscopia* and *Corylus avellana*. The mild winter has also been a peculiarly favourable one for mosses, and I also noticed, on Sunday, the mosses, *Fissidens bryoides, Pottia intermedia, Dicranella heteromalla, Atrichum undulatum* and *Hypnum cupressiforme* in fruiting condition.—*A. B. Jackson, Mapledene, Enborne Road, Newbury, Berks.*

FLORA OF DERBYSHIRE.—A new "Flora of Derbyshire," to contain the Phanerogams, Cryptogams, Musci, Hepatics and Fungi, is being prepared for publication by the Rev. W. R. Linton, of Shirley Vicarage, Derby. The compiler is anxious to receive notes, especially of first records of plants found in that county.

EXOTIC TREES AT DULWICH.—We have numerous exotic trees on the College Estate at Dulwich, amongst which I may mention an unusually fine example of *Juglans nigra*, about eighty or ninety feet high, the circular spread of its branches covering an area of about seventy-two yards. We have also a *Catalpa syringæfolia*, which spreads over fifty-nine yards, two or three specimens of *Cercis siliquastrum*, several of *Ornus europœa*, of *Pavia lutea* and of *Quercus suber*. We have also *Taxodium distichum* (*Cupressus disticha*), several specimens, *Liliodendron tulipifera*, *Salisburia adiantifolia*, several, and *Celtis occidentalis*. But our rarest trees are three of the species *Zelkova crenata* (*Planera richardi*), order Celtideæ, family Urticacæ. The Celtideæ are, like most of the trees above specified, of North American origin, but they also inhabit Western Asia, and *Zelkova crenata* is only found in the latter part of the world, being specially abundant in the Caucasus district, between the Black Sea and the Caspian. It was introduced into England in 1760. The stem has most resemblance to that of a hornbeam, and the leaves to those of the oak, and it is called here the hornbeam-oak, although, as will be seen above, it is nearer allied to the elm than to either, and has, therefore, even less right to its popular name than the "she oak" described (*ante* page 234) by Mr. Amyot.—*M. J. Teesdale, St. Margaret's, Thurlow Park Road, Dulwich; Jan.*, 1896.

PYRUS JAPONICA FRUITING.—The shrub generally known as *Pyrus japonica* is very commonly grown, being frequently trained against a wall on account of the ornamental character of its flowers, which closely resemble those of the apple, but are deeper in colour. The plant is more correctly classed with the quinces than with the apples, and indeed is now often called *Cydonia japonica*. The distinction from the apple genus of the natural order Rosaceæ being in the fact that, like the quince (*Cydonia*), it has many seeds in each cell of the ovary, instead of two only. I have never seen the fruit of *P. japonica* come to maturity in the open air; and a friend who has grown the plants for years tells me that he had not either till last year, when he had many ripen. He was good enough to give me one a few days ago; it was of course ripe last autumn and, having been kept on a shelf as a curiosity, is now considerably shrivelled. It is nearly one and a half inches from base to apex, and about three and a half inches in circumference. It has a tough, very much wrinkled skin, and the fleshy part is about one-eighth of an inch thick only, but is very much shrunk. There are five loculi with cartilaginous walls just as in an apple, with many seeds, however, in each, instead of two. They are quite like those of the apple. A cone-shaped object appears through the outer skin at the top; apparently the upper part of the ovary, from which the flesh has retreated in drying, but there are no remains of the calyx. It has a very pleasant scent, as of dried rose-petals. I should like to know if the fruit is frequently perfected in the open air in this country, or whether the event may be attributed to the exceptionally fine summer with which we were favoured in 1895.—*J Burton, 9, Agamemnon Road, West Hampstead.*

# NOTES & QUERIES

CRYPTIC COLOURATION IN BRITISH CLAUSILIA.—Mr. W. H. Webb's observations on this subject are very interesting, but not, I think, too convincing. In cases of this kind we have to show that a species has imitated (in contour or colouration) objects among which it is habitually found. For instance, the larva of *Geometra papilionaria* always occurs among the catkins of *Betula* and *Corylus* which it so well imitates. Now I do not think *Clausilia* are at all generally found in the situations indicated. Old walls, quarries, etc., are notoriously the favourite haunts of *C. rugosa* at any rate. If this genus has imitated anything, we expect to find that it has sense enough to live among the objects copied. The shape of the shell is probably of use in enabling the molluscs to creep more easily among the stones and the chinks and crannies of the walls and old trees in which it lives. It seems to find its protection in concealing itself entirely.—*Arthur E. Boycott, The Grange, Hereford.*

EXTENDING RANGE OF LACERTA AGILIS.—The third and rarest British lizard, *Lacerta agilis*, is, I think, greatly extending its habitat. Gilbert White mentions seeing bright green lizards near Farnham, in Surrey, which were doubtless males of this species. *L. viridis*, to which he has been thought to allude, occurs commonly on the Continent and in the Channel Islands; and Bell gives it as only being found in Britain at Poole. In the "British Museum Catalogue of Lizards" English specimens are only noted as having been obtained from the former localities, and they are given in most other works as the only habitat of *L. agilis*. During the summer of last year I examined two specimens of this species caught in Kent, and also heard on good evidence that it is abundant on the Lancashire coast, and of its having been secured also in the neighbourhood of Falmouth, Cornwall. It is possible that *L. agilis* always inhabited these various localities, but was not observed; though I think this hardly probable, its markings and colour being so very distinct from the commoner *L. vivipara* If this is not so, it must either have migrated or been introduced. The best method of settling that question would be to ascertain if it is to be found in any of the intervening counties, which would most probably be the case if the first theory holds good.—*Julian T. Pym, Foxwold, Brasted, Kent.*

SPIDER CRABS.—Brighton has not the reputation of being a good place for hunters after marine creatures; but even here it is quite possible to collect a number of interesting specimens for the aquarium, although perhaps one may not find any rarities. During the spring tides, one day last August, we came upon several specimens of the four-horned spider crab (*Pisa tetradon*). This was the first time we had found them here; Bell gives Brighton as one of the localities for them. They were very sluggish, and covered with huge masses of algæ. On turning the seaweeds over on the rocks we saw them feebly moving their legs, and on capturing them they made no attempt to bite. Their slow habits would make them a very easy prey, and probably they would be devoured in great numbers, did they not possess their very effective mode of concealment. Spider-crabs all possess a hairy covering over the shell; if this consists of simply hairs it only holds slimy sand or mud, but if, as in the present cases, the hairs are barbed they hold firmly to the seaweeds or other organisms which the cunning crab plants over his back, effectively concealing himself from enemies. This costume is changed accordingly to the surroundings of the crab, which has been known to discard a covering of bright seaweed when placed in an aquarium amongst duller forms, and so adapt itself to its new conditions. Although the tank we kept them in was quite small, we often had a good deal of difficulty in discovering our specimens. Though not a lively inhabitant of the aquarium it is an interesting one, but unfortunately we did not find it very hardy, none of our specimens living very long. After death, we cleared them and set them, and they made rather effective museum specimens.—*Catherine A. W. Winckworth*, 11, *Old Steine, Brighton.*

ECHINUS NORVEGICUS IN SCOTTISH SEAS.—When Professor Jeffrey Bell published his Catalogue of British Echinoderms, in 1892, he gave a record of only three localities in British waters for this sea-urchin. Two of these were off the west of Ireland, and one for "Zeatland." For the latter no definite area is stated, whether it was the Atlantic or North Sea side of the islands. I have great pleasure in adding three other localities to the habitat of this small but interesting echinoderm within our area, which should be recorded. During one of my visits to the trawl-boats at Aberdeen, in April, 1885, my attention was arrested by seeing a few small patchy-red and green-coloured urchins, in the bag end of a trawl net. They were all more or less denuded of their spines. Associated with them were *Astronyx leoneni* and *Funiculina quadrangularis*. On enquiry I learned the boat's crew had been fishing between the Long Forties and Great Fisher Banks. This fishing ground is a muddy hollow, 60 fathoms deep, about 100 miles north-east by east of Aberdeen, or, taking the nearest land, 85 miles east of Buchan Ness. In consequence, through the kindness of the crew of the steam line boat "Mayflower," I obtained, in May and June, 1895, the results of several hawls of a dredge from distant fishing grounds. On one occasion, while fishing seventy to eighty miles off East Shetland, they found the dredge-bag quite full of *E. norvegicus*. Without the least exaggeration there must have been 500 specimens. They unfortunately, while in harbour, met with an accident, and only about a dozen specimens were saved. The depth of water in that locality is from seventy to eighty fathoms, and the bottom appears to be muddy with large boulders. To Mr. Herbert Howell, belongs the credit of finding *E. norvegicus* farthest south and nearest the British coast in the North Sea. Again in October he brought in four specimens which, he informed me, were brought up with the trawl at a distance of seventy miles east of Aberdeen, in 75 fathoms, the bottom being muddy. All the Scottish specimens of this species which I have yet seen belong to the small type described in Professor Bell's work, and by the foregoing notes it appears that they are gregarious in their habits and frequent the deeper parts of the North Sea.—*James Simpson*, 6, *North Street, Andrew Street, Aberdeen.*

# MICROSCOPY

Symbiosis and the Microscope.—I have recently been reading an article in the "Transactions of the Leicester Literary and Philosophical Society" for October last, by Mrs. Nuttall, upon "Symbiosis in Plant-Life." Can she or any of your readers give me some instructions as to how to proceed to study this remarkable phenomenon in some manner easily attained in this country? She certainly mentions some experiments in her paper, but not so explicitly as one would desire. Will some one give us particulars of his or her own work on this subject? That is to say, describe the mode of investigation with the aid of a microscope, and if we can do it in an average English home.—*Charles Johnson, Water Street, Liverpool; December,* 1895.

Nymphon Gracilis.—Whenever I latterly brought home a supply of the seaweeds *Ulva* or *Entermorpha* for the tank, I found numbers of tiny specimens of Pycnogonidæ, though of what species I could not determine, probably *Nymphon gracilis.* They seemed very lively and hardy, and were continually waving their long, spider-like legs about, apparently without any particular object. Under a moderate power of the microscope it was easy to see the eight-jointed legs, each ending in the formidable pincers, the blind tubes (five pairs) running from the stomach to the limbs and cheliceræ; the jointed mandibles and the pointed rostrum. I am anxious to obtain further information on this group, and should be much obliged if any of your readers could tell me of any books on the subject. —*Catherine A. Winckworth,* 11, *Old Steine, Brighton.*

Interesting Microscopic Object.—The seed of *Collonia grandiflora* affords an excellent illustration of spiral fibre in cells, and as it may be readily obtained from any large seedsman, all microscopists who have not already examined a specimen should do so at the first opportunity. To observe this under the microscope, cut a thin slice transversely and place on a glass slide; cover with thin glass; get into position on stage and focus; then put a drop of water on top of cover glass so that it may flow under same to the section of seed. The instant it reaches this, the spiral fibre will dart out in all directions. If desired, the specimen may afterwards be mounted in glycerine jelly as a permanent object. Use a one-inch objective, and dark ground illumination.—*J. C. Webb,* 32, *Henslowe Road, Dulwich.*

Micro-botany in Norfolk.—After rain last year, and many times since, I have found immense quantities of the pretty little desmid *Cosmarium botrytis* in the water-troughs of my house. They grow in large patches of a beautiful light-green colour, and it is quite easy to obtain clean collections. In the same place, I found *Raphidium fulcatum,* one species of *Oedogonium* and one or two *Oscillariæ.* The drains running through a peaty meadow in my neighbourhood look extremely odd, owing to the abundance of *Lyngbya ochreacea,* which oozes out from the wet sides of the drains in several places. It makes the bottom of the drains look as if covered with a layer of iron rust. A shallow dirty pool close by is green with Eugleneæ. Kerner appears to class these with the Algæ in "Natural History of Plants," vol. i. I was greatly astonished, the first time I examined them, to see the apparently fine specimens of *Protococens* begin to glow in one spot in each, like rubies, and then to elongate and rapidly swim about.—*J. Lewton Brain, Swanton Morley, East Dereham.*

Interesting Leeches.—In May last, in one of my aquariums, I had several small leeches; they were milky white, about three-quarters of an inch long when moderately extended, "margin crenate," as a botanist would say. The interesting part about them was, that the body, rather further back than the middle, was broadened with the back convex; on the under side it was concave, making a hollow in which a number of young lived for several weeks. The young ones were shaped exactly like the parent, as probably it was, and of the same colour, but had two black spots, doubtless eyes, at one extremity, and a sucker at both extremities. When the parent extended itself in order to progress in the usual manner of leeches, of course the cavity underneath was lessened, and the young crowded together, stretched out their heads on both sides and moved them about, giving a very peculiar appearance to the whole. With some difficulty I detached a number of the small ones, and there was certainly more than twelve—perhaps as many as twenty of them. They made capital popular microscopic objects, and lived for a considerable time in the aquarium. Gradually all disappeared, possibly falling a prey to other inhabitants of their home. I have not been able to find a description of anything of the kind in the books to which I have access; perhaps some reader better provided would kindly give information.—*J. Burton,* 9, *Agamemnon Road, W. Hampstead.*

Pond Life under Ice.—I generally have all the year round, at least a *Melicerta* or *Limnia* ready to place upon the stage, but was not quite prepared for the following. Our canal was frozen over early in 1895, some weeks, with ice quite seven inches thick, so my supply of weed was cut off. On February 27th I was told the city council's men, with an iron boat drawn by four horses, were breaking the ice for the purpose of rendering the canal navigable. I proceeded there, and as opportunity offered managed, from between the big blocks of ice, to fill my can with weed, and was surprised to find a good lot of healthy *Melicertas, Limnias* and *Vorticella. Stephanocerous eichornii* was found in fair numbers and in good health, continuing to breed for some time. *Volvox,* being of the vegetable kingdom, may not have been such a surprise to me, but I was much interested by their behaviour during the same cold period. On October 1st, 1894, I brought home an ordinary light ounce medicine bottle full of water, with a fair sprinkling of *Volvox,* which increased wonderfully. A shady place out of doors I found to suit them best. When the hard weather came I omitted to take the bottle indoors, and one morning found the water had become a solid block of ice and the bottle burst. I proved the block to be frozen through by breaking it in pieces. The pieces were then placed in a basin to thaw, and the *Volvox* were found to be in as good condition as before. The water containing them was poured into a fresh bottle, the freezing process being repeated. They, however, did well, and continued to live with me until the end of March, 1895, when they disappeared. —*John Stevens,* 1, *Friar's Walk, Exeter.*

# TRANSACTIONS

Royal Meteorological Society.—The Annual Meeting of this Society was held on Wednesday evening, January 15th, at the Institution of Civil Engineers, Mr. R. Inwards, F.R.A.S., President, in the chair. The Report of the Council showed that the Society was in a satisfactory condition, thirty-four new fellows having been elected during the year. Mr. Inwards devoted his Presidential address to the subject of "Meteorological Observations," which he illustrated with numerous lantern-slides. After describing some ancient observatories, including the Nilometers, and the Tower of the Winds at Athens, he gave an account of National Observatories, of which the Royal Observatory, Greenwich, may be taken as a type. High-level observatories were next described, of which that on Mont Blanc was taken as a type. Special reference was also made to the observatory on the Sonnblick, the high-level observatory at Arequipa, on the Andes, and that on Ben Nevis. An account was next given of Tower Observatories, together with some of the results obtained from the Eifel Tower at Paris. Mr. Inwards, in concluding, said: "One can figure to oneself a tower piercing the air from any of the elevated table-lands of this country—Salisbury Plain, the Stray at Harrogate, or the downs between Guildford and Dorking—and from which the most interesting results could not fail to accrue. It is the opinion of M. Vallot, no mean authority, that a high tower is, for air-observing purposes, equivalent to a mountain-station of ten times the altitude; and this is plain when one considers that any mountain must act as an obstacle which thrusts upward the strata of the atmosphere into a form almost like its own, so that some of the effects are very little different to those observed below; while a tower like the Eifel Tower thrusts itself in the air without obstructing its movements. It is the boast of the Royal Meteorological Society that it is gradually covering the country with a network of private observing stations, and is collecting together, for the enlightenment of all future time, a mass of accurate knowledge on the subject of the changes in our atmosphere, its varying moods, its beating pulses, its calms and its convulsions, so that when the philosopher is born who is destined to unravel all its mysteries, he will have the tools and instruments ready to his hand." Mr. E. Mawley, F.R.M.S., was elected President for the ensuing year.

The South London Entomological and Natural History Society.—December 12th, 1895; Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Barrett exhibited on behalf of Mr. Brooks, of Rotherham, a long bred series of *Bormia repandata*, including black forms and forms having the dark markings intensified but not extended; a series of the grey form of *Tephrosia biundularia*, both from Rotherham; and a large number of specimens of Lepidoptera collected near Lake Tanganyika, from November, 1892, to February, 1893, including two recently-named species, viz.: *Pseudospiris paidiformis* and *Sapæa trimeni*. It was noted that several species exhibited also occurred in Natal. Mr. Carpenter, *Tæniocampa munda*, *T. gothica*, *T. stabilis*, *T. incerta*, *T. pulverulenta*, *Pachnobia rubricosa*, and red *T. gracilis*, taken at sallow-bloom in his own garden, at Streatham, near London. Colonel Partridge a nearly pure silvery-white *Cucullia absynthii*, bred at Portland, Mr. Barrett, on behalf of Dr. Mason, a number of extreme varieties of Lepidoptera, including *Agrotis segetum*, uniformly pale and destitute of markings, a unicolourous *A. corticea*, a dark suffused *Acronycta alni*, a unicolourous pale *Noctua augur*, extreme dark and light forms of *A. lucernea*, *A. simulans*, *A. agathina* and *Ptilophora plumigera*, a pair of *A. subgothica*, and a very large *Noctua subrosea*. Mr. Adkin, specimens of *Hydræcia micacea*, from Westmeath, similar in depth of colour to *H. petasitis*, and also a small *Agrotis saucia*, having purplish-grey primaries and black-outlined stigmata. Mr. Tunaley, a var. of *Lycæna corydon*, with a wide black border, and another with the black border absent, both from Freshwater; specimens of *Asilus crabroniformis*, with *L. icarus* impaled on their lancets; and a series of *L. corydon*, remarkable for the tendency to angularity in the hind wings, taken at Freshwater, also specimens of *L. bellargus* and *L. icarus*, showing the same tendency, and contributed notes on the peculiarity. M. South, specimens of adipocere of the horse and moth, received from Dr. Knaggs, and read the results of the latter gentleman's experiments. Mr. Winkley, on behalf of Mr. Montgomery, a large number of bred *Colias edusa*, and communicated a paper on the exhibit.—January 9th, 1896; Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Carpenter exhibited a long series of *Colias edusa*, being a third brood, and bred from ova deposited by a female captured in August, 1895. The last emerged during the third week in November. Mr. Mansbridge, a series of *Hybernia marginaria*, consisting of the typical London forms, and a long series of melanic and variegated forms from York. A long discussion took place on the occurrence of these melanic forms. Remarks were also made on the various forms of *Gnophos obscurata*, and it was noted that it invariably assimilated to the colour of its local environment. Mr. Adkin, specimens of very strongly marked forms of *Hybernia defoliaria*, from Sussex. Mr. Mera, a series of *Agriopis aprilina*, from Elgin and Sussex. The northern forms possessed very complete bands. Mr. Edwards, *Papilio cenea*, Stoll., and the three forms of its female, viz., *P. cenea*, Stoll., *P. hippocoon*, Fb., and *P. trophonius*, Westw., with intermediate forms; the three species of Danaidæ mimicked by the above species, viz., *Amauris echeria* of Stoll., *A. dominicanus*, Trim., and *Danais chrysippus*, L.; the closely allied species, *P. meriones*, male, from Madagascar, and *P. merope*, Doub., male and female, from West Africa, with *Amauris niavius*, which the latter mimicked; and also *Diadema misippus*, L., and *D. anthedon*, Bdv., which mimics *D. chrysippus* and *A. dominicanus* respectively. Mr. Hy. J. Turner read a paper on the above exhibit, entitled "Mimicry as exemplified by the South African butterfly, *Papilio cenea*, Stoll., its varieties and allied species."—*Hy. J. Turner* (*Hon. Report Sec.*)

City of London Entomological and Natural History Society.—The Annual Meeting was held on December 3rd, 1895. The exhibits were—Mr. Riches, a bred series of *Sesia myopæformis* from larvæ found in the bark of an old apple-tree. He stated that he had never found the larvæ in the solid wood but always in the bark, and that the imago emerges between 9 and 12 a.m., during June. Mr. May, *Hybernia defoliaria* and *H. aurantiaria*, from Epping Forest and Wimbledon Common. He said that he had found the males of both species very abundant in the former locality, but the females of *H. aurantiaria* were scarce; he had seen numbers of *H. defoliaria* females on the trees during the afternoon. He also exhibited a mole cricket, *Gryllotalpa vulgaris*, captured at light at Merton, about 1887. Mr. S. J. Bell, specimens of *Metrocampa margaritaria* and *Hemithea strigata*, which had been killed with ammonia, but their colour did not appear to have been affected. Mr. Prout, a series of the Sandown form of *Agrotis tritici* (mostly var. *aquilina*), with two specimens sent from Vienna under that name, though not entirely agreeing with any known British form. Mr. Sauzé, *Melecta armata* (females), a bee parasitic on the various species of *Bombus; Bombus harrisellus*; a rare black variety of the male of *Bombus hortorum*; a male *Myrmosa melanocephala*, one of the mutillidæ, or solitary ants; this species has an apterous female, and is found in the nests of the various species of *Bombus*. The following election of officers then took place: President, Mr. J. W. Tutt, Vice-Presidents, Messrs. J. A. Clark and F. J. Hanbury; Treasurer, Mr. J. A. Clark; Librarians, Messrs, T. Gurney and L. B. Prout; Curators, Capt. B. B. Thompson and Mr. A. F. Bayne; Secretaries, Messrs. C. Nicholson and L. J. Tremayne; and five other members as Councillors, Messrs. Bacot, Bate, Burrows, Newbery and Oldham. Messrs. A. Bacot and H. H. May were appointed Auditors for 1895.—DECEMBER 17TH, 1895.—Exhibits: Rev. C. R. N. Burrows, a specimen of *Heliothis marginatus* infested by a hair-worm (*Gordius aquaticus*), which is parasitic on fish, crustacea, and land and fresh-water insects at various stages of its existence. Also a preserved larva of *Ptilophora plumigera*, showing a curious, bifurcated appendage under the "chin" which was not visible when the larva was at rest. Mr. Tutt thought this structure was probably allied to the slit, through which an acrid liquid is ejected in *Dicranura vinula* and other larvæ.—*C. Nicholson and L. J. Tremayne, Hon. Secs.*

## NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

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THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

ALL editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to JOHN T. CARRINGTON, 1, Northumberland Avenue, London, W.C.

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NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

WANTED, Fabre's "Souvenirs Entomologiques," "Entomologists' Monthly Magazine," 1890, unbound preferred. Offered, "Annals and Magazine Natural History," January, 1896, double number, new; "Entomologist," 1890, green cloth, gilt.—G. W. Kirkaldy, Wimbledon.

OFFERED, sets of eggs—sparrow-hawk, kestrel, hooded-crow, magpie, nightjar, oyster-catcher, landrail, cormorant, shag, guillemot, razorbill, puffin, woodcock, chough. Wanted, complete clutches of others.—Rev. William W. Flemyng, Coolfin, Portlaw, Co. Waterford.

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OFFERED, Dixon's "Geology Sussex," 40 plates, 1850; "Memoirs Geological Survey," 1849—1861, plates; Wood's "Crag Mollusca" (univalves), 1848, etc.; cabinet, 17 drawers; desiderata, exotic land shells.—Miss Linter, Arragon Close, Twickenham.

WANTED, a platyscopic lens, 15 diameters, and paleontological memoirs by Owen, Wright, Jukes-Browne; also "Prehistoric Europe," "Ice Age" and other geological works.—Cooke, 123, Monk's Road, Lincoln.

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LANTERN MICROSCOPE (Newton's), with case and alum-trough, complete, cost over £5; exchange books, mosses, fungi, birds.—Edward Evans, Inglewood, Stroud.

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WANTED, a small specimen of living paste-eels for microscopic exhibition; exchange gladly given.—H. G. Madan, Bearland House, Gloucester.

# PREHISTORIC FLINT IMPLEMENTS.

By C. A. Mitchell, B.A. (Oxon.)

THE town of Thetford, in the extreme south of Norfolk, is the centre of a district in which worked flints are abundant, and where anyone who takes the trouble to search cannot fail to find a number of rough flakes, though arrow-heads and other finely-worked implements are of much rarer occurrence. Flint of a good quality is most abundant, and at Brandon, seven miles from Thetford, the gun-flint makers or "flint knappers," as they are called, may still be seen at work—probably the only place in England where the trade survives. It has been asserted that there are good grounds for supposing that the working of flints for one purpose or another has been continuously carried on there from prehistoric times down to the present day. There is certainly good evidence for the assumption that the ancient workers of flint made this place one of their manufacturing centres. In a wood close to the town there are a number of large depressions in the ground, which are known as "Grime's Graves." A few years ago, the Rev. W. Greenwell, the antiquary, obtained permission to explore one of these, and made the interesting discovery that the hollows were disused pits from which the prehistoric men had dug the flint for their weapons. There were upwards of two hundred and fifty of these hollows, and the one selected for exploration was about twenty-eight feet in diameter.

Fig. i.

Fig. ii.

At the bottom of the pit was found the stone known as "floor flint," which is still used in the manufacture of gun-flints. For the purpose of obtaining this, various galleries had been cut horizontally in the chalk, and the general plan of the pit showed a strong resemblance to that of the modern pits. Picks made from the horn of the red-deer had been used for excavating, and some eighty of these were found. Where the hand had grasped them they were worn quite smooth, and the marks left by them on the walls of the gallery were as fresh as if they had only just been made. Curiously enough, the pick used by the modern flint workers closely resembles its ancient prototype in form. Flint chips, arrow-heads, and the bones of various animals were found in abundance, and, as will be noticed by anyone visiting the spot, the fields all round are covered with the broken bits of flint. The gamekeepers of the district occasionally find beautifully worked arrowheads or polished axes, and as such command a price varying from three shillings to fourteen shillings, many of them, in this way, make substantial additions to their incomes.

Fortunately, it is extremely difficult to imitate flint weapons so as to deceive an expert, or fraud might be more frequent than it is. The flint knappers in Brandon showed the writer some of their attempts to imitate the old arrowheads, and confessed they were unable to produce work so finished. This is the more remarkable as their tools must, of course, be superior to those of their predecessors in the art, who probably used one piece of flint to chip another.

Fig. iii.

Most of your readers know that the period when these stone implements were used is called the stone age, and it is the general opinion that this was followed by an age of bronze, which, in its turn, gave place to one of iron. The evidence of a separate age has, however, been denied by some archæologists, but since the working of metals requires some metallurgical skill, which the earliest ancestors of man were unlikely to have possessed, a separate stone age appears probable. The fact that stone and metal implements are often found in the same barrows may be explained by looking upon them as instruments of a transition period.

During the early part of the present century much doubt was thrown on the theory that these worked flints were really the productions of early man, and Boucher, of Paris, had a hard fight, from 1836-41, to prove that such must have been the case. In 1858 the Brixham Cave was examined by a Commission from the Royal Society, which reported that the flint implements found there were undoubtedly the work of man at a far distant period. Since then the question has been regarded as definitely settled. Sir John Lubbock divides the implements of the stone age into two great classes—the *Neolithic*, or those found on or near the surfaces; and the *Palæolithic*, or those found in the caves and alluvial deposits. The palæolithic are much rougher in workmanship, and are considered to be much older than the neolithic.

Fig. iv.

Flint implements were formed either by chipping from fragments of flint picked up on the surface, or, as in the majority of cases, from blocks dug out of the chalk. The simplest form is the flake (fig. i.), and much light is thrown on the method by which these were probably manufactured by watching the modern gun-flint makers at work. The flakes are first split off from the selected block or core, and are afterwards shaped into gun-flints by another hand. A circular-headed hammer is used to remove the flakes, and its blows on the edge of the core produces the protuberance which is to be seen on all artificial flakes, and which is called the bulb of percussion. The cores from which flakes were chipped are occasionally picked up, and one found by Mr. Brooks near Thetford is shown in fig. ii. These flakes are found in the neighbourhood of ancient encampments and barrows. This is not surprising, as they were themselves well adapted for cutting and scraping, and were, moreover, the first stage in the manufacture of arrowheads and other implements; and while many were used for that purpose, many more must have been thrown away as unsuitable. The use that could be made of such flakes is illustrated by the purposes to which they are applied by modern savages. The Australians use flint flakes to form the heads of javelins, and minute flakes are employed as the teeth of rough saws. In Mexico, sharp flakes of obsidian are used to shave with, these razors being thrown away as soon as they became blunt. Flakes were well adapted for scraping the surface of bone or wood, and Sir John Evans asserts that in many cases he has noticed the signs of such wear.

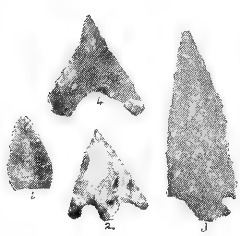


Fig. v.

Among the implements most frequently met with near Brandon is that form of worked flake to which the name of scraper has been given. They were probably formed by carefully chipping round the edges of a good broad flake so as to form a fairly sharp bevelled edge. They were formed in various shapes and were usually about two inches in diameter. Those most frequently found have one end rounded into semi-circular form, the other end, which was probably fixed into a wooden handle, being left unworked (fig. iii., *a*). Occasionally they are longer and more finger-shaped, and a few have been picked up having the shape of a disc with sharp edges (fig. iii., *c*). In fig. iii., *b*, a scraper with an indented edge is shown. This was possibly used for scraping the wood for bows.

Sir J. Evans proved that it was possible to produce the round margin of a scraper by successive blows of a piece of flint on a flake. The blows of the stone hammer were brought to bear a slight distance within the margin of the flake, and the block of stone on which the flake was placed acted as a stop to bring the hammer up sharply as soon as the fragment had been chipped from the edge.

Fig. vi.

There can be but little doubt that the name "scraper" correctly describes one of the uses of these instruments, and that they were employed either with or without handles for preparing the skins of animals. In fact, the modern Esquimaux use a flint implement of very similar appearance, fixed in an ivory handle, for scraping skins. It has also been suggested that these scrapers were used as a means of obtaining fire, and the curious resemblance they bear to the modern French "strike-a-lights," extensively used before the introduction of matches, has been urged in support of this view. Perhaps the most favourable evidence was the discovery in 1870 of a scraper and a nodule of iron pyrites with a groove in it lying together in a tumulus.

In addition to being rounded into scrapers, flakes were also trimmed on one or both sides into various cutting or piercing tools, or missiles.

Some were skilfully chipped all over the surface, and the edges ground, as in the specimen represented in fig. iv., which was possibly used as a small knife. Others have been found with serrated edges, and must manifestly have been used as small saws; while others again, roughly chipped on each side and varying in diameter from one-and-a-half to three inches, supposed to have been employed as hand-missiles or sling-stones.

Fig. vii.

Perhaps the most interesting of the flint implements are the arrowheads, which often show the finest workmanship. Various forms of these are shown in fig. v. These stone heads were probably fixed to the shaft by being inserted into a cleft made in the wood and bound there by means of tendons or fibres. Arrowheads, with pieces of the shaft attached to them in this way, have occasionally been found in peat marshes.

Stone axes or "celts" were probably among the earliest neolithic implements, though it is uncertain up to what period they continued to be used. Bronze was probably known about 500 B.C., and it is generally agreed that by 1100 A.D. stone axes were no longer in use in Britain, even in the more remote parts. We can therefore fix the probable date at which they began to fall into disuse at about 2,000 years distance from the present time. These celts have often been found in burial places, and at later periods bronze weapons were placed in the tumuli with them. It is extremely rare to find one with any trace of a handle remaining, though one or two have been found where the wood has been preserved by being buried in a peat moss. A neolithic celt, found near Grimes Graves, is represented in fig. vi. In this implement the cutting edge, after being chipped, had been carefully ground down and polished.

Palæolithic implements, as was said before, are found in caves and alluvial deposits, and are believed to belong to a much earlier period than the neolithic, though it is impossible to say whether they are the earliest evidence of the existence of man. In the caves they are found together with the bones of the mammoth, cave bear and other extinct animals, and prove that man must have been contemporary with these.

Palæolithic implements have been classified into three rough divisions:

(1) Flakes pointed at one end;

(2) Oblong double-edged splinters, truncated at each end;

(3) Oval-shaped discs from two to three-and-a-half inches across (fig. vii), and some diminished to a point like wedges (fig. viii).

No signs of grinding or polishing have been found on them, and it is doubtful whether they were fixed in handles or simply held in the hand.

The following are particulars of the figures illustrating this article, and the author is indebted to Mr. C. J. Brooks for the photographs, from which they are reproduced. The negatives were taken from the flint implements by a modification of Mr. Hepworth's process for vertical photography. Fig i., flake, half-size; found at Croxton, Thetford. Fig. ii., flint core, half-size; common at Two-mile Bottom, Thetford. Fig. iii., scrapers, half-size—*a*, duckbill; *b*, bow; *c*, circular; Croxton. Fig. iv., trimmed flake, half-size; Thetford. Fig. v., arrowheads, half-size,—1, the Warren, Thetford; 2, 3, Park Farm, Thetford; 4 (basalt), North America. Fig. vi., polished axe; Grimes Graves, Norfolk. Fig. vii., palæolithic celt, quarter-size; Croxton. Fig. viii., palæolithic celt, half-size; Park Farm, Croxton.

It has been noticed as strange that no other evidence of prehistoric man, beside such weapons as these, should be found; but this is easily explained by the perishable nature of other substances as

Fig. viii.

compared with flint, and the remote period at which they were used. The evidence seems to point to man living in caves and leading a wandering life, hunting and fishing for his subsistence. As to the antiquity of man, we can form no idea beyond that it reaches back to remote ages. When we take into account the long periods which have elapsed since bronze and iron superseded the neolithic weapons, and then, again, consider the ages going further and further back to epochs when the mammoth and cave-bear flourished and palæolithic weapons were used, we are lost in amazement at the extreme age which must thus belong to the human race.

*11, Hubert's Grove, Clapham.*

# THE SITE OF LONDON.

By J. J. Stewart, B.A., B.Sc.

IT is difficult to gain an idea of what must have been the condition of the region now occupied by the City of London in the more remote geological ages, for the earlier rocks are covered over by the great deposit of London clay, which is in many parts several hundreds of feet thick. But certain deep well borings enable us to gain some insight into the conditions which prevailed at this spot of the earth's surface during certain epochs in the long procession of time. From the records left in the deposits laid down when the area was covered by the sea, or by estuaries, we can determine with some probability at what period the region was dry land, and when it lay beneath the waters; and besides this, the pebbles and débris which have been found embedded in localities near London, and which must have come from the spot on which the city now stands, enable us to judge of the climatic and other conditions which held sway at different periods in this region. Amongst the most ancient records that we have are specimens of rock, which, brought up from a depth of over 1,100 feet below the level of the present Oxford Street, indicate that during the Devonian period, or in a portion of that long interval which elapsed between the Silurian and Carboniferous times, the site of London was covered by the shallow waters of the Devonian Sea. During this period coral reefs were numerous, and the shallow lagoons became filled up with muddy sediment. On the land surface, which probably existed to the north of the region we are considering, fern-like plants abounded, and the organisms belonged to the less highly developed types.

In the succeeding Carboniferous period the south of England seems to have formed part of that extensive basin which stretched eastward over part of France, Germany and Russia, covering a considerable portion of the present Continent of Europe. This sea was probably land-locked and resembled the present Mediterranean. In deeper portions towards the North of England great deposits of limestone occurred, produced from the calcareous shells of organisms which inhabited it. To the north-east, over the site of Scandinavia, a stretch of land, forming a large continent, probably existed. Owing to the deposit of sediments, the shallower portions of the Carboniferous sea became silted up, and in the marshes thus formed, the luxuriant vegetation flourished which, on its decay, gave rise to the coal deposits. There seems to be not much likelihood of coal being found beneath the site of London, though coal seams may at one time have existed there. During the succeeding geological periods the site of London seems to have been on land, and the erosion and denudation which took place during long ages most probably wore away all the deposits laid down in the Carboniferous epoch. Fragments of anthracite, mingled with pebbles formed from the sandstone of the coal measure period, have been found at Richmond above and below the great oolite, indicating that land with coal measures upon it occupied the region of London while these beds at Richmond were laid down.

During the ages following the Carboniferous times, the site of London was chiefly dry land. Few records of these periods therefore are found, but the prolonged effect of weather and streams was gradually removing the deposits previously accumulated, and laying them down afresh beneath the waters of the neighbouring sea.

At the beginning of the Cretaceous epoch, the site of London seems to have been close to a great estuary which formed the mouth of a mighty river. From the fragments of animal remains which have been preserved, and which were drifted down by the river, we learn that on the site of the City must have roamed huge deinosaurian reptiles, living partly on land and partly in the waters of the estuary, some of them being provided with fin-like paddles. Bird-like forms also existed at this time which had great affinities with reptiles. After the long exposure and erosion of previous periods, whilst this district remained part of the land surface there followed, owing to depression of the surface, a long tract of time during which this portion of England was covered by the waters of the ocean, in which the thick deposits of chalk were formed. This ocean covered the greater part of England and nearly the whole of southern and western Europe; it seems to have occupied two basins, the site of London being in the northern one. On the land surface, which extended itself on the north-west, ferns, cycads, and trees resembling pines flourished, and some of the modern species of trees now began to appear. The sea, which extended over the district we are considering, altered the estuarine character of the south-east of England which existed in early Cretaceous times. It was probably deep, and the thick deposits of chalk formed from the remains of calcareous animals show that this interval must have lasted a long period of time. It has been disputed whether the chalk was deposited in a deep ocean or in shallow seas whose bottom was gradually sinking, as they tended to become filled up by the deposits; but it seems certain that the London area must have been covered for long tracts of time by a sea resembling that of some parts of the Pacific in which a rain of the shells of foraminifera and other marine animals gradually formed a pulverulent limestone on the bottom. This sea was that of a tropical region, a barrier of land towards the north shutting out the colder waters and allowing warm southern currents to enter it. The traces of organisms found in the centre of the flint nodules which occur in layers in the chalk show us the nature of the creatures which existed in the sea at this time. The siliceous deposit of the masses of flint seems to have gradually formed around the remains of sea-urchins, sponges and other marine inhabitants, the forms in some cases closely resembling those now existing.

After the long continuance of the warm tropical waters, a gradual upward movement began to take place; the floor of the Cretaceous sea was raised into dry land, and some of the deposits seem to have been worn away by the action of denuding agents at this time.

After the time of the Chalk, in which a sea resembling that now extending round the coral islands in the Pacific covered the site of the London basin, a shallowing of the water occurred, sand was spread over the bottom, and afterwards the regions became covered by the waters of an estuary. In the period during which the great masses of London clay were deposited, the site of London must have been near the mouth of a great river. The mud brought down by this river was piled up on the spot where London now stands, and, from the remains of animals and plants floated down and finally covered over by the sediment which fell upon them after they had sunk to the bottom, we can gain some idea of the character of the surrounding land. From these indications it is evident that the climate must then have been tropical or sub-tropical; the fish whose traces have been discovered were chiefly sharks, whilst bones of turtles and portions of crocodiles and birds have been preserved. It has been estimated that the sea existing at the time of the deposit of the London clay may have been about 600 feet deep. The upper portions of the deposit indicate a shallowing of the water, and it is in the higher portions that most of the traces of terrestrial vegetation and reptilian and other animal remains have been found. The reptiles were noticeably different from those of the preceding period of the Chalk. An immense interval of time must have elapsed between the dates of the marine conditions represented by the chalk and by the clay. The trees on the land adjoining the London basin were such as must have flourished in a sub-tropical climate. The chief place of the occurrence of these plant remains is the Isle of Sheppey, and fossil fruits, seeds, and leaves of numerous species have there been found, such as magnolia, eucalyptus, etc. Amongst the mammals which existed round the sea-margin, several tapirs have been found. The remains of an opossum and a bat have also been discovered. These carcasses must have been carried out to sea by the current of the great river which transported so many of the plant remains.

During the periods which succeeded that in which the London clay was deposited, the district of the South of England formed a land surface, and there are no records on the spot to show the vicissitudes of succeeding changes. The country was then inhabited by various highly developed animals, including the huge mastodon. During the course of the time which elapsed between the last deposits beneath London and the present period, the almost tropical climate changed, and gave place to one of extreme cold. The great ice-sheet which covered nearly the whole of the northern portion of our country did not extend so far south as London, though it touched the hills bounding the London basin on the north, extensive tokens of the glacial drift having been found at Muswell Hill. After the glacial period, continued upheaval raised the level of the land and the sea-bottom till Britain was united to the Continent across the plain of the North Sea and the valley which now forms the English Channel. At this time the rivers of Britain were probably tributaries of larger ones traversing the continent of Europe. Later, another general subsidence of the land took place, which separated England from the mainland, and left the boundaries of our island of the same general form which they retain at present. The climate gradually grew warmer after the glacial epoch, but the profusion and variety of animal forms which existed in our island previous to that cold period, and were destroyed by the frozen conditions, never returned.

*7, Mountview Road, Crouch Hill, London, N.;*
*January*, 1896.

PREHISTORIC HUMAN REMAINS.—In the public museum of the town of Le Puy, in Auvergne, a block of volcanic breccia is preserved, in which portions of two human skulls are imbedded. They are of the same reddish brown colour as the rest of the material, which is hard but brittle. The frontal bone of one skull is exposed and is small and narrow, but not receding, and not remarkable in development in any way. These relics were got in the course of excavations in a quarry of that material near the town, at the foot of a low cliff, the material of which shows hexagonal columnar stratification like that of the Giant's Causeway. Seeing that the volcanoes of Auvergne have been extinct long ages ago, though geologically speaking of recent date, it is curious that no reference to this interesting find is made by writers on the subject of the antiquity of man.—*W. F. De V. Kane, Drumreaske House, Monaghan, Ireland.*

# NOTES OF A HOME NATURALIST.

By Mrs. Emily J. Climenson.

I MUST tender my thanks to Mr. T. R. Billups for his information (*ante p.* 232), as to my singular pearly-green boatmen being *Velia currens*, which I had shrewdly suspected, only in the books I possess there is no perfect description of adult form; to Mr. H. Nunney I also offer thanks for his note (*ante p.* 272), anent *Hydra fusca*, described by me under date of September 27th (*ante p.* 232). That particular creature disappeared permanently; but in another deep glass bottle in which I have kept a water-spider and other things ever since the first week in September last, on January 22nd this year, I suddenly espied a curious creature which I concluded was a *Hydra*. It was fastened to a piece of *Anacharsis* weed, and when first seen resembled a *champignon* fungus, a white stalk, a brown, mushroom-like head, six tentacles, more or less retracted, looking like white silk filaments. On consulting my books I felt sure it was *Hydra fusca*. January 23rd, the creature had elongated its body till it resembled a tube, the tentacles reaching a great distance, nearly two inches, one fastened on to upper *Anacharsis* stalk as a sort of guy rope. January 24th, the creature more retractile; 25th, greatly elongated and a dark round spot at right-hand base of body where stalk joins on. Sunday, January 26th, the dark spot upon *Hydra* developed into a perfect baby *Hydra*, first perceived at 2.30 p.m.; it was still attached to its parent, two tentacles only, but appeared to be feeding itself; so in twenty-four hours the baby had been born and was self-supporting though still attached. On January 27th, mother and baby doing well; but another dark spot or bud visible on opposite side of the mother. Fearing there was a lack of small water animals to feed on, I poured cautiously some stagnant water on the top of the bottle, but in doing so the *Hydra* disappeared, and when found, after a weary search, the little one was washed off and nowhere visible, the dark spot seemed invisible on the mother, too. January 28th, *Hydra* at first fat and squat, afterwards elongated. January 30th, *Hydra* at first invisible, at last perceived at the top of bottle, as it were, astride a root of duckweed, one tentacle of the six broken almost short off, one fastened in duckweed above; through a hand lens the creature was quite transparent, pinkish looking in body, and at base of stalk a red spot was to be seen. I was obliged to leave off my observation till next day, the 31st, when I found the *Hydra* fixed to to the side of the bottle, the shortened tentacle a little longer and a little knob formed at the end. Later, a small bud was perceptible near the base. February 1st, injured tentacle longer; still a knob at the end; the others much elongated, quite two and a half inches long; bud larger. February 2nd, *Hydra* looks weak and small; bud has detached.

This *Hydra* must now be called No. 2. February 5th, No. 2. in great beauty and a large bud on it. February 6th, bud on No. 2 perfect; fishing with two tentacles; another bud forming on the other side; old *Hydra* No. 1 has a fresh bud forming. February 7th, old *Hydra's* bud is perfect. February 8th, a troublesome caddis tumbling round in search of garments, I removed him with nippers, which disturbed the *Hydra*. On February 9th, to my astonishment the water-spider, who was supposed to be dead or lost, reappeared. It had hidden in the niche of duckweed on the top of the bottle, and, I suspect, bit off the old *Hydra's* tentacle; the spider is suspended in an air-bell head downwards. Both *Hydra* well. No. 2 has both buds attached, one with four tentacles, the other with six. February 10th, same report. February 11th, the water-spider very active and hungry; I carefully put in some small food and saw it catch a cyclops.

The spider has apparently made a nest, as a cobweb with minute granules in a pouch-like form is to be seen arranged in *Anacharsis* and *Fontinalis* moss. The *Hydra* No. 2 and its two children, still attached, all fishing, and their tentacles so mixed together that they appear inextricable, like a mass of ravelled floss silk. February 12th, spider has got into its nest, head downwards in a crystal house. Old *Hydra* has a perfect bud as long as herself attached still to her. February 14th, the bigger bud on *Hydra* No. 2 has separated from mother and floated up to a stalk above. February 15th, the young *Hydra* now attached to glass. February 16th, old *Hydra* has separated from its young one. I notice in the little ones, first two tentacles, then four, then five, and six when they are perfect. I have now five *Hydra* and one bud, an increase of five since January 22nd. The extraordinary retractibility and elasticity of the tentacles and whole body must be seen to be appreciated.

Mr. C. Nicholson, with whom I am in correspondence, has twice sent me, most carefully packed, two small bottles with specimens of *Hydra viridis*. In the first instance not one *Hydra* survived, nor were there visible any remains out of fifteen. In the second instance, three meagre-looking ones were perceived, but in an hour or so disappeared. In both cases *Cauthocamptus* had been placed with *Hydra* for food, but they even seemed to lessen hourly. Will anyone say if they have managed to to pack *Hydra* to pass by post alive?

*Shiplake Vicarage, Oxon.; February 16th, 1896.*

# NATURAL HISTORY AT PENARTH.

THE Penarth Entomological and Natural History Society met for tea, at their chairman's house, on Saturday, January 25th, after which several of the members addressed the meeting on various subjects.

Mr. Geo. N. Dunn, M.R.C.S., gave an interesting *resumé* of the various accounts given of the so-called new discovery by Professor Röntgen. Certain rays of light or energy, emanating from a Crooke's vacuum tube, lit by electricity, were found to pass through bodies hitherto considered opaque. In seeking for an explanation of his own want of success Dr. Dunn found his apparatus to be quite useless, and ascertained that the successful operator, Mr. Swinton, had employed an apparatus almost identical with that used by Nicola Telba, at his epoch-making lecture, given at the Royal Institution, February, 1892.

Mr. A. H. Trow, B.Sc., gave a short account of the "Material Basis of Heredity," illustrated by microscope slides. He showed that the germ in all cases, both of plants and animals, consisted of the same component parts, viz., a cell of protoplasm, in which a minute nucleus existed. These nuclei in the animal closely resembled each other, until the male and female germs combined, when the apparent bundle of threads, which appeared to be inextricably entangled, broke up into pairs of rods, varying in number according to the species. From these pairs evolved the offspring, usually partaking of the characteristics of both parents; but an irregularity in this order of procedure would most likely involve a turning back to the special characteristics of earlier ancestors. The generation of plants was more complex, there being frequently an intermediate state. For instance, the spores of ferns do not produce ferns, but a flat-lying plant, from beneath which the ferns are finally produced.

Mr. C. W. Williams, the chairman, read some notes on *Sirex gigas* and *S. juvencus*, to settle a doubtful point. These two insects are the only ones in the tribe Xylophaga, which feed upon and burrow in the wood of trees. The two species, unlike the Phyllaphaga, which feed upon and deposit their eggs in the softer portions of plants cannot withdraw their ovipositors into the abdomen, but they project in a most conspicuous manner, obtaining for them, with country people, the name of tail-wasps. The ovipositors consist of two double-jointed plates, the second joint of each being prolonged so as to form a sheath, within which are these bristle-like organs, the upper being the largest and channelled for the reception of the two others, which together form an expansible tube for the passage of the eggs. These three bristles are serrated. The larvæ have remarkably powerful jaws, instances being known, notably during the Crimean War, of their having gnawed through lead. *Sirex gigas* is frequently found in this country; *S. juvencus* much more rarely. There is a marked difference between them. The female *S. gigas* has the thorax, base of the abdomen below and a broad band around it of deep black. The rest of the body and the sides of the head are yellow. The thighs of the hind legs and the bases of the others are also black. The other legs and the antennæ are yellow. The abdomen is terminated by a straight, pointed tail about five times as long as its diameter, with the ovipositor beneath and projecting beyond it about an equal length. The male is considerably smaller and is black, except a broad yellow band (four segments) around the middle of the abdomen. *S. juvencus*, (female) is distinguished by its deep metallic blue body. It has yellow legs, its pointed abdomen closely resembles that of the male *S. gigas;* the ovipositor, however, is exactly similar to that species. It is rarely recorded. Occasionally it has obtained a footing for a short period in England; Mr. Drane, one of the Presidents of the Penarth Society, having frequently taken it, when a boy, near Llanberis Major. It does not appear to thrive here. *Sirex gigas*, on the contrary, is frequently captured, and a log of pine, cut down at Southerndown, was recently exhibited, which was honeycombed by this species. Mr. C. W. Williams suggested a use for the horny "tail." Entomologists must frequently have witnessed the crane-fly ovipositing, standing upright on her hind legs, and probing with her tail until a suitable place is found, and then pausing a second to deposit her egg. He believed observation of the Sirices would reveal a similar process. The ovipositor he assumed to be capable (its unique attachment to the middle of the abdomen favouring the idea) of being bent forward by the hinge-like joint towards the thorax. Being thus out of the way, the horn is brought into requisition by the insect standing upon its hind legs, holding on by its splendid claws, and feeling, with the ovipositor-sheath, for a crevice or soft place in the trunk. When that is discovered, the ovipositor is brought back into position, the jointed plates turn aside to right and left, and the boring proper, with the united and flexible triple-edged saw, completed, the insect now standing upon all its legs. The tube is then expanded by the loosening of its component parts, and the egg extruded. The hope was expressed that the members would endeavour to confirm, or otherwise, this suggestion, should opportunity offer.

# WILD BIRDS PROTECTION ACTS.

THE Society for the Protection of Birds has issued its annual report for 1895, and appended is printed a list of districts where the Wild Birds Protection Acts of 1880 and 1894 are now in force. We give these particulars for the convenience of our readers who are interested in ornithology. Upon the application of the various County Councils, the following orders have been issued by the Home Secretary, or by the Secretary for Scotland, under the powers conferred by the above Acts.

ABERDEENSHIRE.—I.—The taking or destroying the eggs of the following species of wild birds is prohibited throughout the entire County of Aberdeen for a period of one year, from the 1st day of September, 1895, viz.: peregrine, known also as hunting hawk, blue hawk, blue sleeves; kestrel, known also as windhover; merlin hawk, long-eared owl, short-eared owl, barn owl, tawny owl, nightjar, known also as goat-sucker, night-hawk, churn-owl, and fern-owl; black-headed gull, herring gull, kittiwake, common gull, common plover, lark, crossbill. II.—The taking or destroying the eggs of the lapwing is prohibited throughout the entire County of Aberdeen in the year 1896, after the 15th day of April in the said year. III.—The Wild Birds Protection Act, 1880, shall apply within the County of Aberdeen to the following species of wild birds as if they had been included in the Schedule to the said Act, viz.: peregrine, known also as hunting hawk, blue hawk, blue sleeves; kestrel, known also as windhover, merlin hawk and crossbill.

ANGLESEA.—All birds from March 1st to October 1st, except for the following:—Curlew, diver, dunbrid, eider duck, lapwing, mallard, peewit, plover, pochard, shoveller, snipe, teal, widgeon, wild duck and woodcock (the close time for these birds being March 1st to July 31st).

ARGYLLSHIRE.—The taking or destroying of the eggs of the following species of wild birds is prohibited in the islands of Islay, Colonsay, Coll, and Tiree, for a period of one year from the 1st day of October, 1895, viz.: common wild duck, teal, eider duck, merganser, snipe, dunlin, grebe, lapwing, tern, all kinds; Richardson's skua, pochard, tufted duck, chough. The Wild Birds Protection Act, 1880, shall apply within the islands of Islay, Colonsay, Coll and Tiree, to the tufted duck, as if that species had been included in the Schedule to the said Act.

BERWICKSHIRE. — Prohibiting throughout the entire County of Berwick for one year, from the 1st day of July, the taking or destroying the eggs of the following species of wild birds, viz.; dipper or water-ouzel, redstart, stonechat, lark, peregrine falcon, barn owl, long-eared owl, tawny owl, goldfinch, bullfinch, redpole, siskin, wagtail, kingfisher, snipe, ringed plover or sea lark, common tern, teal, great spotted woodpecker, cuckoo, dunlin, redbreast heron, rock pipit, sandpiper, missel thrush, wren, coal tit, blue tit, and long-tailed tit, and by the same order the following among the above wild birds are, in addition, to have the protection of the Wild Birds Protection Act of 1880, as if they had been included in the Schedule to that Act, viz., the dipper, or water ouzel, redstart, stonechat, peregrine falcon, bullfinch, redpole, siskin, wagtail, redbreast, heron, rock pipet, missel thrush, wren, coal tit, blue tit, and long-tailed tit.—Dated June, 1895.

CAMBRIDGESHIRE.—The taking or destroying of wild birds' eggs within that part of the County of Cambridge known as Wicken Sedge Fen, is prohibited for a period of three years from September 7th, 1895.—Dated September 23rd, 1895.

CHESHIRE.—Throughout the whole of the County of Chester. I.—The time during which the killing and taking of wild birds or any of them is prohibited by the Act of 1880, shall be extended in the County of Chester so as to be from March 1st to August 12th in each year. II.—The Act of 1880, as extended by Section I. of this order, shall apply within the whole of the County of Chester, to the kestrel and heron, as if those species were included in the Schedule of that Act. III.—The taking or destroying of the eggs of the owl, the bittern, the kingfisher, the kestrel, the heron, the sheldrake, the dunlin, the black-headed gull, the common tern and the oyster-catcher, shall be prohibited in the whole of the County of Chester. Within a portion of the Hundred of Wirrall (area defined).—IV.—The Act of 1880, as extended by Section I. of the foregoing order, shall apply within the above-named area to the following species of birds: red-backed shrike, whinchat, spotted flycatcher, sedge warbler, blackcap warbler, grasshopper warbler, wood warbler, garden warbler, missel-thrush, common bunting, reed bunting, goldfinch, wheatear, chiffchaff, golden-crested wren, yellow wagtail, pied wagtail, water wagtail, skylark and titlark, as if they were included in the Schedule to the Act of 1880. V.—The taking or destroying of the eggs of all wild birds shall be prohibited within the above-named area.—Dated July 10th, 1895.

CORNWALL.—Whereby the taking or destroying of the eggs of the Cornish chough is prohibited throughout the County of Cornwall.—Dated December 12th, 1894.

DEVONSHIRE.—I.—The taking or destroying of the eggs of any species of wild bird is prohibited for the period of 1896 to 1900, both years inclusive, within the following area:—(1) Lundy Island and the neighbouring islets. (2) Baggy Point district (area specified). (3) Lynton district, parishes of Lynton and Countisbury. (4) Slapton Ley and Start district. II.—The taking or destroying of the eggs of the following species of wild birds is prohibited throughout the entire County of Devon, viz.: the ring ouzel, wheatear, whinchat, redstart, nightingale, black-headed warbler, garden warbler, Dartford warbler, fire-crest, wood warbler, reed warbler, grasshopper warbler, dipper, nuthatch, white wagtail, golden oriole, pied flycatcher, goldfinch, hawfinch, common cross-bill corn bunting, cirl bunting, reed bunting, rose-coloured pastor, chough, raven, woodlark, nightjar, great spotted woodpecker, kingfisher, lesser spotted woodpecker, green woodpecker, hoopoe, barn owl, long-eared owl, tawny owl, marsh harrier, hen harrier, Montagu's harrier, buzzard, kite, honey buzzard, peregrine falcon, hobby, merlin, kestrel, osprey, gannet, little bittern, night heron, bittern, rock-dove, quail, oyster catcher, woodcock, common snipe, dunlin, green sandpiper, lesser black-backed gull, greater black-backed gull, razorbill and common guillemot. III.—The Wild Birds Protection Act, 1880, shall apply within the County of Devon to the bearded titmouse, nuthatch, Richard's pipit, water pipit, mealy redpoll, lesser redpoll, snow bunting, nutcracker, buzzard, honey buzzard, hobby, merlin, kestrel and osprey, as if those species were included in the Schedule to the said Act.—Dated November 27th, 1895. Cormorants and shags within the limits of the River Exe are exempted.

DUMFRIESSHIRE.—The taking or destroying the eggs of the following species of wild birds is prohibited throughout the entire County of Dumfries for a period of one year from the 1st day of June, 1895, viz.: buzzard, goldfinch, great crested grebe, common gull, black-headed gull, kingfisher, kestrel, barn owl, tawny owl, long-eared owl, short-eared owl, oyster catcher, ringed plover, pochard, sheld-duck, shoveller, great spotted woodpecker, cross-bill, dipper, siskin, skylark, tufted duck, osprey, nightjar, chough, quail. The Wild Birds Protection Act, 1880, shall apply within the County of Dumfries to the following species of wild birds as if they had been included in the Schedule to the said Act, viz.: Buzzard, kestrel, crossbill, dipper, siskin, tufted duck, osprey, quail.—Dated May, 1895.

GLAMORGANSHIRE.—Prohibiting the taking or destroying of the eggs of the kingfisher and goldfinch in any part of the County of Glamorgan.—Dated March 12th, 1895.

HUNTINGDONSHIRE.—I.—The Wild Birds Protection Act of 1880, shall apply to the linnet, the nuthatch and the swallow, as if those species were included in the Schedule to the Act. II.—The taking or destroying of the eggs of the kingfisher, the nightingale, the nuthatch, the owl, the wild duck and the woodpecker, is prohibited within the whole of the County of Huntingdon.—Dated June 25th, 1895.

KENT.—I.—The taking or destroying of wild birds' eggs is prohibited within the following areas in the County of Kent for the space of two years from March 20th, 1896. (1) So much of the Isle of Sheppey (including therein Elmley Island) as lies south of the road running from Queenborough through Eastchurch to Warden Point. (2) So much of the Sittingbourne and Sheerness Railway as lies between Kingsferry and the Sittingbourne Railway Station, and bounded on the south by the London, Chatham, and Dover Railway, from Sittingbourne Railway Station to Whitstable Railway Station, and bounded on the east by the main road from Whitstable Station to the sea, and bounded on the north by the Swale and Whitstable Bay. (3) The west by the Minster and Deal Branch of the South-Eastern Railway from Minster Railway Station to Deal Railway Station, and bounded on the south by the road from Deal Railway Station to Deal Pier, and bounded on the east by the sea, and bounded on the north by the South Eastern Railway from Minster Station to Ramsgate Station. (4) East and south of the main road from Walmer through Dover to Folkestone from the point where such road passes through the southern boundary of the Walmer Urban District to the point where such road enters the Borough of Folkestone, such area being bounded on the east and south by the sea, and on the north by the Walmer Urban District, and on the south by the Borough of Folkestone. (5) South and west of the main road which runs from Appledore Railway Station through Snargate, Brenzett, and Old Romney to New Romney Station, and thence to Littlestone-on-Sea, such area being bounded on the north-west by the Royal Military Canal from Appledore Railway Station to the Sussex boundary, and bounded on the south-west by the Sussex boundary, and on the south and east by the sea. II.—The taking or destroying of the eggs of the following species of wild birds is prohibited within so much of the County of Kent as is not within the Metropolitan Police District: Bearded tit (reedling or reed pheasant), buzzard, goldfinch, golden oriole, great plover (thick knee), hawfinch, hobby, honey buzzard, Kentish plover, kestrel, kingfisher, martin, merlin, nightingale, osprey, owl (all species), peregrine falcon, swallow, swift, turtle dove, wryneck. III.—The Wild Birds Protection Act, 1880, shall apply within so much of the County of Kent as is not within the Metropolitan Police District to the following species of wild bird in the same manner as if those species of wild bird were included in the schedule to the Act, viz.: Bearded tit (reedling or reed pheasant), buzzard, chaffinch, hawfinch, hobby, honey buzzard, Kentish plover, kestrel, martin, merlin, moorhen, osprey, peregrine falcon, swallow, swift, turtle dove, wryneck. IV.—The time during which the killing and taking of wild birds is prohibited by the Act of 1880 shall, except as regards the common wild duck, be varied throughout the County of Kent so as to be from the 1st day of March to the 12th day of August in each year. A separate order has been made by the Secretary of State under the said Acts applying to so much of the County of Kent as is within the Metropolitan Police District.—Dated March 11th, 1896.

KIRKCUDBRIGHT AND WIGTOWN.—The taking or destroying of the eggs of the birds named in the Order for Dumfriesshire is prohibited for a period of one year, from June 1st, 1895.—Dated May, 1895.

LINCOLNSHIRE.—The taking or destroying of the eggs of the following species of wild birds, viz.: sheldrake, sea-pie or oyster catcher, ringed dotterel, arctic, common and lesser terns, redshank and common sandpiper, is prohibited within the following area within the administrative County of the Ports of Lindsay, Lincolnshire, viz.: the sea coast, sandhills, dunes, waste lands, fitties, foreshore and warrens, situate between the sea and the land side of the sea wall, embankment, ditch, quick fence, or other artificial boundary separating the same from the cultivated land. This Order came into force June 10th, 1895.—Dated May 10th, 1895.

LINCOLNSHIRE (Kesteven).—I.—The Wild Birds Protection Act, 1880, shall apply within the administrative County of the parts of Kesteven, Lincolnshire, to the following wild birds, viz.: Kestrel, merlin, hobby, common buzzard, honey buzzard, swallow, house martin, sand martin, swift and wryneck, as if those species were included in the Schedule to the Act. II.—The taking or destroying of the eggs of the following wild birds is prohibited within the administrative County of the parts of Kesteven, Lincolnshire, viz.: Goldfinch, kingfisher, nightjar, nightingale, owls (of all species), ruff or reeve, woodpecker, kestrel, merlin, hobby, common buzzard, honey buzzard, swallow, house martin, sand martin, swift, wryneck, teal and wild ducks (of all species).—Dated January 3rd, 1896.

MIDDLESEX.—I.—The Wild Birds Protection Act, 1880, shall apply within the County of Middlesex to the wryneck (cuckoo's mate or snake bird), swallow martin (2), swift, bearded tit (reedling or reed pheasant), shrikes, kestrel, merlin, hobby, buzzard, honey buzzard, osprey and magpie, as if those species were included in the Schedule to the said Act. II.—The taking or destroying of the eggs of the following wild birds is prohibited within the County of Middlesex, viz.: nightingale, goldfinch, lark, nightjar, woodpeckers, kingfisher, cuckoo, owls, kestrel, buzzard, honey buzzard, merlin, hobby, osprey, wryneck (cuckoo's mate or snake bird), swallow, martins (2), swift, bearded tit (reedling or reed pheasant), shrikes, magpie, wheatear, stonechat, winchat, red start, flycatchers, sedge warbler, reed warbler, black cap, garden warbler, wood warbler, willow warbler, chiff-chaff, white throat, lesser white throat, longtailed tit, nuthatch, wren, golden-crested wren, wagtails (4), hawfinch, linnet, buntings (3), starling, landrail or corncrake, and coot.—Dated January 29th, 1896.

NORFOLK.—In the County of Norfolk: I.—The taking or destroying of the eggs of any species of wild bird is prohibited for a period of one year, from May 1st, 1895, within specified areas (which include Hickling and neighbouring broads with surrounding country to the sea shore, and the series of broads known as Ormesby, Rollesby, Hemsby, Filby and Burgh Broads). II.—The taking or destroying of the eggs of any species of wild bird is prohibited for a period of one year, from May 1st, 1895, within a further specified area—namely, the whole of the foreshore . . . . from the estuary sluice at North Wootton to the eastern boundary of the parish of Cley-next-the-sea. III.—The taking or destroying of the eggs of the following species of wild birds is prohibited throughout the entire County of Norfolk, viz.: (1) The bearded titmouse or reed pheasant. (2) The crossbill. (3) The white or barn owl. (4) Wild ducks and teal of all species. (5) The Norfolk plover, stone curlew or thicknee. (6) Ruff or reeve. (7) The ring dotterel, ring plover or stone runner. (8) Oyster catcher or sea-pie. (9) The terns, sea swallows, pearls or dipears, all species. (10) The great crested grebe or loon. IV.—The Wild Birds Protection Act, 1880, shall apply within the County of Norfolk to the bearded titmouse or reed pheasant and the crossbill as if these two species of wild birds had been included in the Schedule to the said Act. This Order came into operation on May 1st, 1895.—Dated April 8th, 1895.

NORTHAMPTONSHIRE.—I.—The Wild Birds Protection Act, 1880, shall apply within the whole County of Northampton to the heron, hawks (buzzard, honey buzzard, kestrel, merlin, hobby, osprey and hen-harrier), nuthatch, wryneck, as if those species were included in the Schedule to that Act. II.—The time during which the taking and killing of wild birds is prohibited shall, so far as regards the heron, be extended so as to be from March 1st to September 1st. III.—The taking and destroying of the eggs of the goldfinch, hawks (buzzard, honey buzzard, kestrel, merlin, hobby, osprey and hen-harrier), kingfisher, nightingale, nightjar (goat-sucker, night hawk or fern owl), nuthatch, owls, sandpiper (summer snipe), woodpeckers, wryneck (cuckoo's mate or snake bird), is prohibited throughout the County of Northampton. —Dated January 15th, 1896.

NORTHUMBERLAND.—From March 24th to August 11th for all birds except the following :—Dotterel, eider duck, guillemot gull (not black-backed gull), kittiwake, oyster catcher, puffin, razorbill, sea parrot, sea swallow, and tun (the close time for these birds being March 1st to August 31st).

OXFORDSHIRE.—Prohibiting the taking or destroying of the eggs of the owl in any part of the County of Oxford.—Dated March 22nd, 1895.

SHETLAND.—Prohibiting the taking or destroying of the eggs of the following species of wild birds, viz.: white-tailed or sea eagle, great skua or bonxie, arctic or Richardson's skua, whimbrel or tang-whaup, red-necked phalarope, red-necked diver, or rain bird, or ember goose.

SOMERSETSHIRE.—The Wild Birds Protection Act, 1880, shall apply within the whole of the County of Somerset, to the kestrel, the merlin, the hobby, the buzzard and the osprey, as if those species were included in the Schedule to that Act. —Dated July 27th, 1895.

SOUTHAMPTON.—The taking or the destroying of the eggs of common buzzards, honey buzzards, kingfishers, Montagu's harriers, nightingales, owls and woodpeckers is prohibited in any part of the County of Southampton.—Dated September 7th, 1895.

STAFFORDSHIRE.—I.—The taking or destroying of the eggs of the following species of wild bird is prohibited throughout the entire County of Stafford, viz. : the goldfinch or thistlefinch, buzzard, merlin, kestrel, hobby, osprey, kingfisher, nightingale, nightjar (fern owl, goatsucker or night hawk) ; all owls, nuthatch, sandpiper (summer snipe) ; all woodpeckers, wryneck (cuckoo bird, snake bird), curlew or whaup, great crested grebe, loon or diver. II.—The Wild Birds Protection Act, 1880, shall apply within the whole of the County of Stafford to the spotted flycatcher, pied flycatcher, tree creeper, sand martin, martin, swallow, wagtail and swift, as if those species were included in the Schedule to the Act.—Dated November 28th, 1895.

SUFFOLK, EAST.—The taking or destroying of wild birds' eggs is prohibited in the years 1896, 1897 and 1898, in the following places within the administrative County of East Suffolk—namely: the seacoast, beach, foreshore, sandhills, saltings or salt marshes, situate between the sea or estuaries and the land side of the sea or estuarial wall, embankment, ditch, fence, or other artificial or natural boundary separating the same from the cultivated land, from the north side of the River Blyth to Landguard Point (excluding the estuary of the Alde above the ferry at Slaughden Quay, Aldeburgh).—Dated December 24th, 1895.

WESTMORLAND.—The taking or destroying of the eggs of the barn owl, brown or wood owl, long-eared owl, short-eared owl, common buzzard, merlin, kestrel, goldfinch, black-headed gull, peregrine falcon, kingfisher, dotterel, raven, heron, bittern, woodcock, dipper or water ouzel and golden plover, is prohibited in any part of the County of Westmorland for five years, from June 25th, 1895.—Dated May 29th, 1895.

YORKSHIRE, E. RIDING.—Prohibiting the taking or destroying of wild birds' eggs on the promontory of Spurn, including Kilnsea, Warren, south of the line taken by the road leading from the village of Kilnsea towards the site of the old village of Kilnsea, for a period of five years from March 31st, 1895.—Dated April 1st, 1895.

YORKSHIRE, E. RIDING.—The time during which the killing, wounding and taking of wild birds are prohibited under the Wild Birds Protection Act, 1880, shall be varied in the East Riding of Yorkshire, to be from March 1st to August 15th in each year.—Dated May 10th, 1895.

In addition to the above, variations in the close time have been made as follows :—Hertfordshire and Middlesex (County Council area), from February 1st to August 31st ; Durham, March 1st to August 31st; Yorkshire (North Riding), March 1st to August 11th ; Essex, March 15th to August 1st ; Huntingdonshire, Isle of Ely, Liberty of Peterborough and Lincolnshire, March 15th to August 31st.

PENALTIES.—Under the Wild Birds Protection Act, of 1880, all birds are protected during close time, but they are divided into two distinct classes, in order that two differing sets of penalties may be applied against offenders. In the higher division, the maximum fine is £1 and costs, and the birds have *absolute protection* during close time (March 1st to August 1st, with variations in different parts of the country). These birds are named in Schedule of Act; the lark added by the Act of 1881, and certain species have been added by the foregoing orders. In the lower division the maximum fine is 5s., with absolute protection, *except* against the owners and occupiers of land, who may, on their own property, destroy birds not included in the Schedule. Under the Act of 1894, "Any person who shall take or destroy, or incite any person to take or destroy (*a*) the eggs of any wild birds within an area specified in the Order; or (*b*) the eggs of any species of wild bird named in the Order shall, on conviction before any two justices of the peace in England, Wales, or Ireland, or before the sheriff in Scotland, forfeit and pay for every egg so taken or destroyed a sum not exceeding one pound." Offenders under these Acts refusing to give full Christian and surnames, with correct address, or giving such falsely, are liable to additional penalties not exceeding ten shillings and costs. We have not any information as to the application of this Act in Ireland.

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

(*Continued from page 294.*)

## The Small-leaved Elm, or Common Elm.

THE name "small-leaved elm" (*Ulmus campestris*, Smith) is here used in preference to "common elm" as being less open to misapprehension. This is indeed the "common elm" of the southern half of England but not so of the northern portion, nor yet of Scotland, where it becomes rare or wholly absent. In many of the southern counties of England it is the prevailing tree in hedgerows and in the open country, but it is in parks and pleasure-grounds, where it is suffered to grow unmolested and to develop itself at will, that we see it in its full beauty and perfection.

The leaves of the small-leaved elm are arranged in a two-ranked manner, as in its near relative the wych elm, each third leaf standing immediately over the first, and so on. During the early vigorous growth of the tree the secondary branches will, as in the wych elm, spread horizontally right and left of the branch from which they spring; but, as the limb extends farther and farther from the main trunk, and its branchlets increase and multiply, these, and the leading shoots also, manifest an increasing tendency to forsake the straight horizontal direction and to turn upwards towards the sky. Perhaps, through being less robust and vigorous than the earlier branches, and having less force of development, they may be more readily attracted upward by the influence of light. The result, however, is very generally the formation of rounded compact masses of foliage instead of the loose, straggling, and often pendulous branches of the wych elm. And not only the primary branches, but branches of the secondary order also, exhibit this feature and follow out the character of the tree, each one standing out in some degree from the general mass and receiving broad lights above and giving deep transparent shadows beneath.

Typical Small-Leaved Elm.
Near Suspension Bridge, Clifton, Bristol.

A reason for the compactness of growth is found in the shortness of the internodes. In consequence of this the smaller branches and sprays arise at very short distances from each other; and as the small-leaved elm rarely flowers until it has attained considerable age there is, in the lower and early parts of its branches, no interruption to the formation of axillary leaf-buds and resulting branchlets, so that we see none of the bare spaces which are so noticeable along the branches of the wych elm, hence it is that the lower limbs show such a wealth of foliage. It is on the outer and uppermost twigs or sprays that the small-leaved elm is found chiefly to flower, and here we perceive the foliage to be less crowded than below. Still, as each year's spray-wood is but short, and always has one or two axillary leaf-buds near the tip, the interruption to leafy growth by the production of flowers is less manifest than it would be in the case of longer shoots.

Unlike the wych elm, the small-leaved elm increases greatly by suckers from the root, and, like many plants which exhibit such a tendency, it rarely ripens its seed, at least in England. On the Continent it is said to do so not unfrequently.

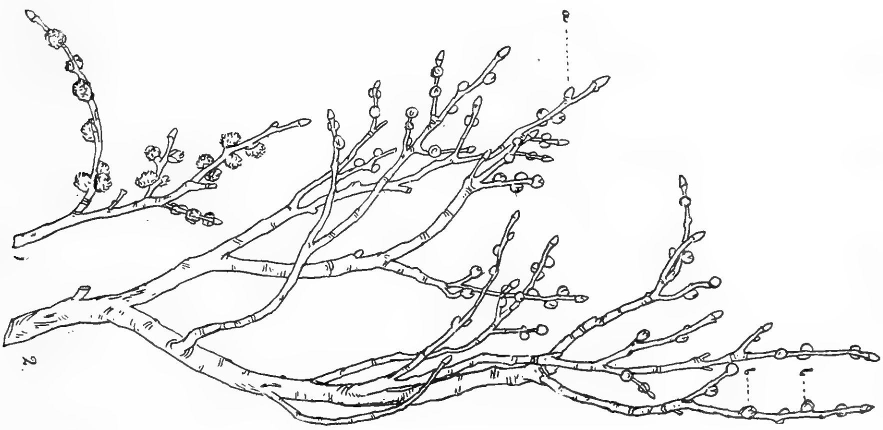
The characteristic features of the small-leaved elm, as contrasted with the wych elm, may be said to be its taller growth, with straight main trunk giving off large limbs but maintaining its own distinctness and not losing itself in them at a comparatively small distance from the ground. The shorter internodes, and consequently more crowded leaves and branchlets, are also a feature. So, too, are the slenderness of these last and their strong tendency to turn upward and form rounded masses of spray and foliage. Also the smaller angle formed by the branches with the stem, *i.e.* their more upright direction, in consequence of which they are more exposed to view from below, instead of being so much hidden by pendulous wreaths of foliage as in the wych elm. I think, also, that the small-leaved elm does not exhibit in old trees the tendency to clothe the larger limbs with adventitious branchlets and spray which we not unfrequently observe in its relative.

Gilpin, in his "Forest Scenery" (sect. iv.), happily remarks on the small-leaved elm: "No tree is better adapted to receive grand masses of light. In this respect it is superior not only to the oak and the ash, but, perhaps, to every other tree." Selby, with equal justice, says ("Forest Trees," page 109): "The foliage of the elm, though massive and thick, and affording an almost impenetrable shade, never appears heavy to the eye. . . . . This is owing to the lightness of the spray, the comparative smallness of the leaves, and the loose, free manner in which they hang."

"The elm is one of the first trees to show the influence of spring, and is among the last to shed its leaves in winter. Early in March and often in February, whilst other trees are still in the depth of their winter's sleep, the elm gladdens the eye with the reddish purple tint from the numerous little tufts of blossom-buds that adorn every spray. In April and May the leaves begin to appear, and their light and cheerful green colour soon makes an agreeable contrast with the olive tint of the oak foliage. As the summer advances the leaves gradually deepen in colour until they become of a dark and glossy green, harmonising well with the sombre hue of the Scotch fir, or even the yew-tree, which are often planted near it, and in the autumn they fade away to a fine clear yellow in successive patches, often making the individual trees very beautiful objects in the oblique light of a sun low in the horizon, and always mixing kindly with the orange and red of the beech-tree, the duller yellow of the oak, and the many other hues of the fading woods."—Dr. H. G. Bull, in "Transactions of the Woolhope Club for 1868."

I do not attempt to say anything of the cork-barked elm, *Ulmus suberosa*, Sm., and of the numerous other forms which have received names and which figure as species or varieties in botanical works and in nurserymen's catalogues. I have had no sufficient opportunities of studying them, and I think there is little doubt that these names have as yet very little certainty or constancy of application. I believe that Loudon, in his "Arboretum Britannicum," enumerated no less than eleven species and sixty-eight varieties of elms, and this he did not consider to have been an exhaustive list.

(*To be continued.*)





SPRAYS OF SMALL-LEAVED ELM.
1, Spring state (from Herefordshire). 2, Winter state (from near Bristol); *a*, Leaf Bud; *b b*, Flower Buds.

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*The Present Evolution of Man.* By G. ARCHDALL REID. 370 pp. 8vo. (London: Chapman and Hall, Limited. 1896). Price 7s. 6d.

This is one of those books through half of which one has to peruse before coming to its object. Not that the first half is lost labour, for we find therein many things which will be new to some readers. We suppose the author is correct, though it is difficult to believe, when he states, "To many, and, surprising as it may seem, even to some medical men, in spite of what ought to be a scientific training, the theory of evolution means nothing more than the theory of the descent of man from the monkey." As this is so, there is evidently need for all the recapitulation of facts bearing on the subject in the first moiety of his book. The real object of Mr. Reid's work is to draw attention to the bearing of evolution on man in adapting himself to resist the attacks of various forms of disease. He claims that it is a branch of study of animal adaptation, which has not been sufficiently investigated. He also includes some considerable enquiry into the evolution of man in adapting himself to the use of narcotics and their general results upon him and his posterity. This section of the book is treated without any apparent object beyond enquiry, and is in no way influenced by the opinions of those who object to the use of intoxicants of whatever kind. Summing up his views on the effects of intemperance in the use of narcotics generally, and of opium and alcohol in particular, the author says: "It is surely clear that if the world is to become more temperate, it must be by the elimination, not of drink, but of the excessive drinker. If artificial selection be found impracticable in the future, as, owing to the state of public opinion, it undoubtedly is at present, then the only alternative is natural selection, in which case the world will never be thoroughly sober until it has first been thoroughly drunk." Some of the views propounded in this book are daring, and, as he says, are contrary to the present state of public opinion. His statements of facts and arguments are well worth following, and altogether the book is one which should be read by thinking people able to form their own opinions.

*Hymenoptera Aculeata of the British Islands.* By EDWARD SAUNDERS, F.L.S. 400 pp. demy 8vo. Illustrated by three plain plates. (London: L. Reeve and Co. 1896.) Price 16s.

Any work on the bees, wasps and ants, otherwise aculeate or stinging hymenoptera, which bears Mr. Edward Saunders' name on the title-page is sure to command respect. Since the days when charming Frederick Smith used to preside over the insects at Bloomsbury, there has been no greater authority on hymenoptera than the author of the present work. Like so many other subjects, human knowledge of the aculeata has progressed with long strides since Frederick Smith's time, and now we have a standard work by a recognised author. This should give a great impetus to future investigations into one of the highest orders in intelligence among insects. It is a group which is easily worked, with materials accessible to all who search for them. The number of species is not large, so they may soon be learned by an attentive beginner. The opportunities for research into the habits, intelligence and economy of the British aculeata are almost unlimited, and the possible results of enquiry may be extraordinary. Altogether the study of these insects is one to be highly recommended, now that Mr. Saunders has issued the work before us

*Chats about British Birds.* By J. W TUTT, F.E.S. 209 pp. 8vo, illustrated by 93 figures. (London: George Gill and Sons. 1896.) Price 2s. 6d.

This little book is one of the "Hedgerow and Woodland Series," and is evidently written for those who may "read as they run," for it appears to have been compiled in haste. It is a gossiping account of "British" birds for young people. Among the birds are mentioned and figured Savi's warbler (*Acrocephalus luscinoides*), river warbler (*A. fluviatilis*), fantail warbler (*A. cisticola*), penduline titmouse (*Parus pendulinus*), golden oriole and nest, roller, bee-eater, bittern, white stork, passenger pigeon, crane, and some others which the young ornithologist is not likely to meet with in a wild state in Britain, at least not whilst he is still young. Some of the figures are far from good; take figure 31—it would have been well to have stated that the nest is *not* that of the bullfinch. We are glad that there is an inscription under figure 80, otherwise we should not have recognised the bird as a common ptarmigan, as it was probably drawn from another species. We do not find the author's usual success in this book; perhaps he has got above, or below, his own plane.

*Manual of Lithology.* By EDWARD H. WILLIAMS, Jr., E.M., F.G.S.A. Second edition. 418 pp. royal 8vo, illustrated by six plates. (New York: J. Wiley and Sons. London: Chapman and Hall, Limited. 1895.) Price 12s. 6d.

This book, well known in its first edition, appears again with additions. It deals with the science of lithology in especial reference to megascopic analysis. To quote from the preface to the second edition, "The microscope has forced lithology and petrography so widely apart that the layman is often at a loss to recognize old acquaintances under new names." A good arrangement in this book is the use of a capital M for whatever can be seen by the eye with the aid of a lens, signifying "megascopic" examination, as against that requiring a microscope to investigate, which is indicated by a small *m*, for "microscopic." The work is also designed for engineers who have to study rocks for economic purposes; but the reader is supposed to be practiced in the use of the blowpipe and ordinary methods of chemical analysis. The plates are models of what such illustrations should be like.

*Missouri Geological Survey.* Vols. iv., v., vi., vii. 1,400 pp. royal 8vo, illustrated by 97 plates, maps, and many figures in letterpress. (Jefferson City: State Department for Geology. 1894.)

We have recently received these handsome volumes, which reflect the highest credit upon Mr. Charles Rollin Keyes, A.M., Ph.D., the State Geologist of Missouri. Volumes iv. and v. are devoted to the palæontology of Missouri, and are profusely illustrated by fifty-six plates. Practical, as is the habit of his countrymen, Mr. Keyes opens his introduction to these two volumes with a dissertation upon the economic value of the study of fossils, which he considers to be to generally overlooked. "To the laity these remains of life are merely curious, to the specialist the interest in the ancient organisms is largely scientific. But with him who wills it, even a slight acquaintance with the true character of fossils enables him to read the rocks as a printed page. It is one of the best established facts in modern geological science that there is an intimate relation between mineral deposits and the surrounding rocks; hence the geological age of the particular beds becomes an important factor in the early attempts to develop new mineral industries. The geological succession of strata is determinable readily by the remains of life contained. A very little study of these forms soon determines whether or not the rocks of any given district are liable to furnish coal." He goes on to point out instances of expensive and futile adventures after minerals, where the loss would have been spared to the prospectors had they had even elementary knowledge of geology. The State of Missouri is one of the most favoured provinces in all the great Mississippi basin for the study of geology. The range of formations represented extend from the earliest or Cambrian to the close of the Paleozoic. It is a rich field for the student of fossils. In speaking of the magnitude of the work of the State Geological Survey and its publications, Mr. Keyes says: "Private enterprise cannot undertake such work, and it thus becomes the duty of the State to vouch for its accomplishment." These two volumes sum up what is known of the subject dealt with, besides giving much information that is new. Volumes vi. and vii. are nominally devoted to the lead and zinc deposits of the State, but really include in addition a valuable treatise upon those minerals, historically and geographically considered, from all parts of the world. This work has been ably undertaken by Mr. Arthur Winslow, assisted by Mr. J. D. Robertson.

*Our Country's Butterflies and Moths, and how to know them. A Guide to the Lepidoptera of Great Britain.* By W. J. GORDON. 150 pp. 8vo, illustrated by 1,000 examples in colour by H. Lynn. (London: Day and Son; and Simpkin Marshall, Hamilton, Kent and Co., Ltd. 1896.) Price 6s.

This is indeed a picture-book, as may be gathered from the fact that it devotes only about 150 pages of printed matter to all purposes. The style of work may be understood from the following quotations. "It is not so easy as it might appear to name a butterfly or moth. The technical nomenclature is in so chaotic a state. . . . Hence it is that entomologists have got into the way of using specifics alone. . . . Another difficulty lies in the enormous number of ill-defined species. . . . The lepidoptera have suffered severely from the mania for species-making. At least half the accepted species are of no more relative value than the varieties of the horticulturist, and it would really be to the general advantage if the existing classification were in many cases put down a step, so that genera became species, and the families genera. Then a new classification, on the basis of neuration, probably, would be possible, and there would be an end to those vague and futile attempts at definition which are now but a source of amusement to everyone but the definer." Was ever greater bathos written? What the "lepidoptera have suffered severely from" in this work, is book-making, and certainly not from either scientific description or investigation. As an example of the author's style, if further were needed, we will only refer to the chapter headed "Sortation," which is his word for identification and classification. In it the evidence and system recommended is of a negative character. Having, in fifteen lines, proved a white butterfly is *not Papilio machaon*, "it must be one of the Pieridæ, and as there are only six genera in the family, we ought easily to locate it." Eventually, by the aid of seven more lines of negative evidence, it turns out to be *Leucophasia sinapis*. With regard to the plates we find the figures very unequal. Many suffer from the number of colours used or unemployed on a particular plate. The white plume-moth, *Aciptila pentadactyla*, appears in the same vivid green colour as the "Foresters" of the genus *Ino*. In figure 213 we at first think of a new species, for we find a "buff-tip" moth of most gorgeous colouration, whilst, on the opposite page, on plate 13, there are some varieties which would fetch long prices at Mr. Stevens' auction rooms, especially the three upper and three lower specimens. We must regret that Mr. Gordon should have taken this manner of bringing out works on certain groups of animals and plants, but he may nevertheless do some good with them if the pictures attract people to different branches of natural history.

*Historical and Future Eclipses.* By Rev. S. J. JOHNSON, M.A., F.R.A.S. New Edition. 178 pp. 8vo, illustrated by diagrams. (London: James Parker and Co., 1896.) Price 4s. 6d.

This is a popular account of the eclipses of the sun and moon to which is appended Part ii., devoted to general matters astronomical, including notes on planets, double stars and constellations. The first edition was published in 1874, followed in 1889 by a Supplement. The subjects in this book are treated pleasantly and brightly, carrying one on, page after page, with increasing pleasure. The chapters on historical eclipses are especially entertaining. In his diagrams the author looks well ahead, and they will doubtless last out the present edition of his work, for they represent the various occultations of the sun and moon from April 22nd, 1902, until March 9th, 2491, being 222 in number. These diagrams give one an excellent idea of eclipses, far more than could be gathered by calculating. When we see a number thus displayed we find how rarely observed in this country, is a total eclipse of the sun.

*The Story of a Piece of Coal: What it is, whence it comes, and whither it goes.* By EDWARD A. MARTIN, F.G.S. 179 pp. 12mo, with 38 illustrations. (London: George Newnes, Limited. 1896.) Price 1s.

This is one of the "Library of Useful Stories," and is not the least pleasantly told of those already issued. Of necessity, this little book is exceedingly popular in character. We do not quite agree with the author that those who lived fifty years ago did not generally know of the association of coal and "gorgeously verdant vegetation of a forest of mammoth trees," as indicated by his opening sentence. It is a pity to start badly with such a statement; it makes the reader suspicious of more loose statements to come. The story of coal has, in this instance, been carefully arranged and well told. Altogether, the book is one to be recommended as a nice and useful present for young people.

## SCIENCE GOSSIP

BRIGHTON is to have a new museum-building, which is much needed. The Corporation are about to borrow £23,000 for this purpose, and a new public library.

A USEFUL article appears in the January American "Geologist," with bibliography and portrait of the late Professor J. D. Dana, on his life's work from the geologist's point of view.

MESSRS. TAYLOR BROTHERS, of Leeds, are issuing a second edition of "The Collector's Manual of British Land and Fresh-water Shells," by Mr. Lionel E. Adams. This is satisfactory.

A GLASGOW correspondent points out that this is the jubilee year of Lord Kelvin as Professor of Natural Philosophy in the university of that city. There are to be demonstrations in celebration next June.

WE learn from "The Official Gazette" of British North Borneo, of August 1st, 1895, recently to hand, that no permit to travel for the collection of orchids in Province Keppel and the District of Kinabalu is to be issued until further orders. Any person travelling or collecting orchids without a permit is liable to a penalty of 500 dollars, or to imprisonment under Proclamation vii. of 1890.

THE Croydon and Norwood Branch of the Selborne Society is showing considerable activity. There have been a winter series of fortnightly lectures on various subjects, and there will be excursions once a month to various places of celebrity among naturalists. Mr. E. A. Martin, 69, Bensham Manor Road, Thornton Heath, is the Hon. Secretary.

MESSRS. BAILLIÈRE, TINDALL AND COX are about to issue Part 2, with eight coloured plates, at £2 8s. net, of "Researches on Mimicry: on the basis of a natural classification of the Papilionidæ," by Dr. E. Haase, who is the Director of the Royal Siamese Museum, Bangkok. This work has been done into English by Dr. C. M. Child, and the edition is limited to 150 copies.

NATURALISTS residing in the northern suburbs of London may not all be aware that the district has a society of its own. The North London Natural History Society meets at the North-East London Institute, close to Hackney Downs Station. Mr. Lawrence J. Tremayne, of 51, Buckley Road, Brondesbury, will give any information to those who apply to him, as he is the hon. secretary. The annual subscription is five shillings.

PROFESSOR R. MELDOLA, F.R.S., read his presidential address before the Entomological Society of London on January 15th. He took for his text the advantage of an association of entomology and chemistry in the study of the former subject. He followed with an exhaustive "comparison between the methods of research in vogue in the two great departments of science of which these two subjects are respectively typical." The address was of exceptional importance and great scientific value.

MR. R. WELCH, the celebrated photographer of geological views in Ireland, has issued a second supplement to his already lengthy catalogue. The additional list contains many pictures of the highest interest to naturalists generally, as well as to geologists.

WE have received a copy of Mr. Ernest Swinhoe's priced catalogue of exotic butterflies and moths. It contains nearly 3,500 species which are guaranteed correctly named, as are the localities attached to each specimen. The address is Avenue House, Oxford, England.

AMONG the increasing wonders of photography are pictures of moving scenes, where people and animals are shown on a screen by aid of a lantern. One of the most astonishing we have seen is that of a way-side railway station with the arrival of a train and consequent bustle among officials and passengers.

THE application of the new photography is developing rapidly. We have seen some remarkably good examples depicting internal bony structures of various animals. That it has a great future most people believe, but it is amusing to hear some remarks upon its possibilities. These remind one of the time when it was considered correct to say that "electricity is in its infancy."

WE have received the new or thirteenth edition of Messrs. W. Watson and Sons' illustrated catalogue of microscopes, objectives and accessory apparatus. It has been much expanded, over a hundred pages having been added. We observe on page 72 that the new parachromatic objectives are as low in price as those of any Continental makers, whilst the apertures are larger. This catalogue will be found most useful to students.

SOME time since, by the courtesy of Mr. Fred. H. Evans, we had the pleasure of inspecting some beautifully executed drawings in colours of British fungi by Mr. Edwin Wheeler, of Clifton, near Bristol. We understand these and others by the same artist, to the number of nearly three thousand, have been presented to the British Museum, and will be added to the Department of Botany, in Cromwell Road. Should a portion of these be publicly exhibited they cannot fail to command universal admiration.

AT the request of several correspondents, Mr. John T. Carrington has prepared a label list of the varieties of the British banded land-shells included in the group Pentatænia. These are *Helix pomatia*, *H. aspersa*, *H. nemoralis* and *H. hortensis*. He has added the band formula for the two latter species, with instructions for its use. The list is in the hands of the printers, and will be blank on one side of each page. Copies, price one penny each, may be obtained, when ready, at the office of SCIENCE-GOSSIP, and will be useful also in exchanging these shells.

REMEMBERING the rough-and-ready way in which electrical conducting wires are fixed up in the United States, it is not surprising complaint comes that trees through which wires with high-tension currents are made to pass, soon dwindle and die. This occurs especially after a wet period, for the damp leaves act as conductors through the branches and stem to the earth. One would have thought the waste would have rendered the loss sufficient to have made it worth while to keep the wires clear of tree-branches, so that the insulation would not be fretted off.


| | 1896. | Rises. h.m. A.M. | Sets. h.m. P.M. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* ... | April 1 | 5.36 | 6.31 | 0.45 | 4° 51′ S. |
| | ,, 11 | 5.14 | 6.48 | 1.22 | 8° 36′ |
| | ,, 21 | 4.52 | 7.5 | 1.59 | 12° 8′ |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Moon* ... | ,, 1 | 0.2 | 3.34 | | |
| | ,, 8 | 4.9 | 9.29 | | |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| | ,, 15 | 1.38 | 10.12 | | |
| | | P.M. | A.M. | | |
| | ,, 22 | 7.53 | 3.2 | | |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Mercury* ... | ,, 1 | 5.24 | 11.10 | 23.50 | 3° 37′ S. |
| | ,, 11 | 5.13 | 11.39 | 0.57 | 4° 27′ N. |
| | ,, 21 | 4.58 | 12.13 | 2.13 | 13° 26′ |
| *Venus* | ,, 1 | 5.1 | 10.31 | 23.12 | 6° 38′ S. |
| | ,, 11 | 4.42 | 10.37 | 23.57 | 1° 58′ |
| | ,, 21 | 4.28 | 10.43 | 0.42 | 2° 51′ N. |
| *Mars* ... | ,, 1 | 4.13 | 8.57 | 21.39 | 15° 22′ S. |
| | ,, 11 | 3.50 | 8.47 | 22.9 | 12° 54′ |
| | ,, 21 | 3.25 | 8.37 | 22.38 | 10° 13′ |
| | | *Souths.* P.M. | *Sets.* A.M. | | |
| *Jupiter* ... | ,, 10 | 6.49 | 2.49 | 8.7 | 8° 57′ N. |
| | ,, 30 | 5.37 | 1.34 | 8.14 | 8° 36′ |
| | | *Rises.* P.M. | *Souths.* A.M. | | |
| *Saturn* ... | ,, 10 | 8.57 | 1.44 | 15.4 | 14° 40′ S. |
| | ,, 30 | 7.31 | 0.20 | 14.58 | 14° 15′ |
| | | P.M. | P.M. | | |
| *Uranus* ... | ,, 30 | 8.18 | 12.44 | 15.23 | 18° 15′ S. |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| *Neptune* ... | ,, 30 | 2.25 | 10.27 | 5.1 | 21° 23′ N. |

### Moon's Phases.

*Last Qr.*... April 5 ... 0.24 a.m. *New* ... April 13 ... 4.23 a.m.
*1st Qr.* ... ,, 20 ... 10.47 p.m. *Full* ... ,, 27 ... 1.47 p.m.

THERE will be a rather brilliant meteor shower on the 20th. The radiant point is $\alpha$ 270° $\delta$ + 33°.

MERCURY, an evening star, at end of month.

VENUS and Mars are not well placed, but Jupiter is, and Saturn is coming well up.

OVERSTALL'S IMPROVED DRIVING CLOCK.—This instrument, as supplied by Horne and Thornthwaite, of London, is arousing considerable interest in the astronomical world, as by its great simplicity, and consequent low cost, it comes within the reach of many who have hitherto found a driving-clock too expensive a luxury. The clock drives the equatorial quite independently of the hand motions, and the telescope can be moved rapidly by hand, or slowly by the Hook's joint, without interfering with the action of the clock. A weight of about four pounds is sufficient to drive the telescope, and with the ordinary length of fall, about five feet, the clock will run for over two hours with this weight. No jerkiness is visible even with a high power. When carefully regulated, the clock will keep a star practically stationary for about four minutes, and will keep it in the field of the telescope for about half-an-hour.

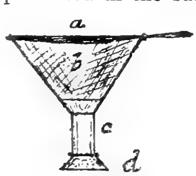

WHITE VARIETY OF COMMON CENTAURY.—On page 272 of the present volume of SCIENCE-GOSSIP, Mr. A. P. Gardiner notes the occurrence of a white-flowered variety of *Erythraca centaurium*, Pers., on the Somersetshire coast, between Clevedon and Portishead. It may interest Mr. Gardiner to know that I have seen the same form in North Gloucestershire, on the Cotswolds, and at Ecchinswell, Hants. If he refers to page 212 of Mr. Townsend's "Flora of Hampshire," he will see that the author records it from the latter locality, where it has been noticed for several seasons past, growing amongst specimens with flowers of the normal colour. I believe it is not an unusual thing to find this plant with white flowers.—*H. Weaver, Caxton Villas, Newbury, Berks.; February, 28th*, 1896.

EFFECTS OF FROST.—In the "Transactions of the English Aboricultural Society" (for 1895–6, vol. iii., p. 54), just to hand, is an important paper upon the effects of frost on trees and shrubs, by Dr. William Somerville, Professor of Agriculture and Forestry in the Durham College of Science, Newcastle-on-Tyne. The data upon which this paper is founded was gathered from many quarters after the great frost of January and February, 1895, and the spring frosts of May, 1894. The spring frosts are apparently more destructive in the end than severe winter frosts. The trees most liable to damage from the former, are beech, oak, larch and spruce, and to a lesser degree, ash, sycamore, silver-fir and yew. Young trees are most liable to injury. Trees and shrubs suffer more in hollows and valleys than on level or high ground, and areas facing south and south-east are more liable to be affected than other aspects.

ATROPHY OF TREE BRANCHES.—Mr. Carrington's remarks (*ante* page 281) remind me very much of the characters exhibited by some elm-trees and lime-trees, which were cut down in the spring of 1895, in Grange Road, Selhurst. These were sawn off close to the ground, leaving only the stumps. In a very short time twigs commenced to grow between the wood and the inner bark, and when about a foot high, were so thick in foliage that they appeared as small bushes, with a birds'-nest-like hollow within the circle. It was noteworthy, too, that when the tree was a large one, and the roots protruded above the ground all round the trunk, in those places where the roots had also been subjected to the sawing process, the twigs had sprouted similarly on the outer edge of the wood. Also, that where the roots of such trees came to the surface of the ground, as much as six yards away from the stump, these also gave out shoots of rapid and vigorous growth. The explanation of this seems to me to be that the creature having lost its means of dissipating its tremendous energy, which must have been in proportion to its growth, it has fallen back upon what remains of it to utilise the rising sap. By the end of last summer some of the upright shoots could not have been less than four feet in height.—*E. A. Martin, 62, Bensham Manor Road, Thornton Heath.*

# MICROSCOPY

Study of Fresh-water Algæ.—With the advent of spring the lovers of nature are enabled to sally forth under favourable conditions which have been denied them during the long winter months, and many will no doubt be turning their attentions to new fields which have hitherto had but passing thoughts. It is the object of these notes to suggest the study of that most interesting section of the vegetable kingdom, the fresh-water algæ. The tyro will find the happy hunting-grounds of these small organisms almost universal, and need never take an excursion without returning rewarded. First, I would say a few words as regards the apparatus necessary. All that is requisite is a few corked test-tubes, and a wide-mouthed bottle that can be fitted on to the end of a stick. A useful addition to this is a small piece of apparatus consisting of a muslin ring net, which can be affixed to the stick in the same manner as the bottle, and is represented in the subjoined outline




sketch. *a* represents a ring of brass wire about six inches in diameter; to the lower part is fixed a glass tube *c*, open at both ends; the top of the tube is fixed to the muslin net *b*; and the lower end, which has the mouth turned back (the same as the upper end), permits a piece of muslin (*d*) to be stretched over the opening and secured by an elastic band. This apparatus will be found very useful in collecting small organisms floating in the water, such as the volvox, etc. The presence of any such algæ is quickly determined in small ponds by the aid of the net. A student's microscope with one inch objective will be necessary to determine the different species. The first question, perhaps, which will be asked is: "Where are the best spots for seeking the algæ?" and the answer is, wherever there is water, such as ponds, quiet streams, damp places, wet rocks, in greenhouses, or near factories where warm water escapes in quantities. Almost everyone has noticed the green, slimy patches in still water; and what microscopist has not admired the more generally known species such as the Diatomaceæ, Desmids, etc.? As regards the plants themselves, their form is very varied, and according to the excellent work by Dr. M. C. Cooke, there are about twenty orders, although the real nature of some is doubtful. Some species can only be determined during fructification, and are exceedingly interesting; as for instance the Zygnemaceæ, which are filamentous algæ found universally. The filaments in some species are about the size of a hair and of a rich green colour. Each filament is divided throughout its whole length into separate cells by septa. The chlorophyll in each cell assumes the shape of a spiral band. At certain periods these algæ will be observed in the different stages of fructification: first, two filaments may be seen lying side by side, then a small tube will be pushed out from each cell, meeting one similarly formed from the opposite filament; these tubes meet at last and the septum of each disappear, there being formed a tubular bridge connecting opposite cells. The contents of the cells in one of the filaments will then pass over into the cells of the neighbouring filaments, and oval or round spores will be formed; these zygospores at length escape, and eventually, after an active state, pass into the resting stage and produce new plants. Numerous other examples could be given showing the interesting nature of these plants, but the above will be sufficient for these notes, which, it is hoped, may lead some readers of this journal to take up the study of this interesting section of botanical research.—*R. L. Hawkins, Park Houses, Willesden Green.*

Seasonable Objects for Microscopists.—The spores of Equisetaceæ, which are easily obtained in the spring of the year, will be found exceedingly interesting objects if placed on a glass slip and examined under the microscope with a one-inch objective. Each of these spores has two pairs of elaters or elastic fibres, which, when exposed to moisture, twist and curl about in a most extraordinary manner, the object of their movement being the fertilization of the embryonal corpuscle. The fructifying organs of the mosses are also interesting objects for microscopic examination at this time of year, and if carefully prepared by washing and soaking in glycerine, and then mounted in glycerine jelly will make permanent objects of great beauty; as all the fresh green tint of their leaves will be preserved. Our ponds and streams will also furnish many good objects if carefully hunted, and there are probably few microscopists who do not delight in examining these wonderful specimens of nature.—*J. C. Webb*, 32, *Henslowe Road, Dulwich.*

Symbiosis and the Microscope.—I have not had the advantage of reading Mrs. Nuttall's paper on the above subject, referred to by Mr. Johnson (*ante* page 306), but I am enclosing a short paper to the Editor which may be of some use. The subject is too wide for detailed treatment in a magazine article, but Mr. Johnson will find much information in Strasburger's "Practical Botany," Goebel's "Outlines of Classification" and Sach's "Physiology of Plants," all of which authors give copious references, mostly to German works, however. — *Jas. Burton*, 9, *Agamemnon Road, West Hampstead.* [The article referred to will appear next month.—Ed. S.-G.]

Miller's Caoutchouc Cement.—For the December number of Science-Gossip, Mr. Cole states that methylated spirit is the solvent for this cement. This, indeed, is printed on the lable, but is certainly incorrect. The spirit dissolves only one constituent, the shellac, of the cement, but not caoutchouc, which remains at the bottom of the bottle undissolved. Caoutchouc is soluble in very few fluids, but one of these is chloroform, and therefore a mixture of equal parts of chloroform and absolute alcohol forms a perfect solvent for Miller's cement. Strong methylated spirit could be substituted for the absolute alcohol, only the former does not mix quite so well with the chloroform. The mixture keeps very well in a glass-stoppered bottle.—*C. F. Rousselet, F.R.M.S., Castle Street, Regent Street, London.*

# NOTES & QUERIES

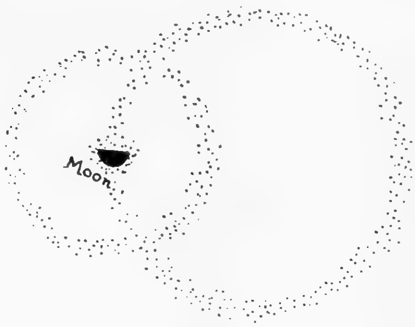
Woodpeckers near London.—Both the large pied and small pied woodpeckers occur all the year round in Wanstead Park, about six miles only, from the Bank of England, which may be termed the centre of London. In the winter of 1894-5, I frequently saw a pair of the larger species, and small pied woodpeckers were often to be seen. During the following summer both species nested in one tree in the Park. It is an old and decayed birch. The nest of *Picus major* was in the trunk of the tree, but was cut out by some boys. The pair of *Picus minor* which had selected a rotten branch, successfully brought off their young.—*J. A. Cooper, Sussex Villas, Harrow Road, Leytonstone, Essex.*

Abnormal Goldfish.—Some time ago, when obtaining a supply of *Cyprinus auratus* for the aquarium, I noticed one had a peculiar form of tail. There seemed to be three distinct divisions, which were joined about half way down, and gave the tail a distinctly oval form. The end of the vertebra, instead of being flat, as is the case of fish in general, was circular, and the caudal fin was growing round this, so that if the fish were stood on its head there would be a perfectly flat surface almost surrounded by the caudal fin. The specimen was of the delicate pink variety, and seemed very weakly, only living a few months after I had it. I have it still preserved in spirits, as it is the only specimen I have seen of the kind.—*H. W. Ford-Lindsay, The Shrubbery, Clive Vale, Hastings.*

The Splash of a Drop.—The striking illustrations reproduced on pp. 297-8-9 of the last number of Science-Gossip, are most interesting, and will at once cause all who are not astronomers to ask: "Are all the volcanoes and craters of the moon, after all, correctly described as such?" There seems to be a remarkable resemblance in these reproductions of a process which, on a much larger scale, must have taken place on the moon's surface. I throw it out merely as a suggestion, but may it not have been likely that some of our palæozoic volcanoes subjected our satellite, when she was beginning to cool, to a tremendous bombardment, resulting in some cases, by rapid cooling, in the so-called craters (figs. 1 to 14), and volcanic vents within craters (figs. 15 to 18)?—*E. A. Martin, 62, Bensham Manor Road, Thornton Heath.*

Booth Museum of Birds.—The fine collection of British birds in the Booth Museum, Dyke Boad, Brighton, has, during the past few months, been thoroughly overhauled and cleaned by the curator, Mr. Frank Murray. In all there are 318 cases and about 1,500 specimens, which are much improved, the whole being now bright and clean looking. We wonder this museum is not more visited by naturalists, even if they be little interested in ornithology. It is, probably, one of the finest collections of birds in the world, and celebrated for the life-like manner in which the late Mr. Booth directed the arrangement of the groups represented. The admission to the museum is free, and it is hardly more than quarter of an hour's walk from Brighton station. Mr. Murray, having been associated with this collection in Mr. Booth's time and for the past nine years, is most willing to tell visitors the graphic stories attached to various cases. Every bird in the Booth collection was shot by their late owner, who travelled far and wide to obtain specimens in our islands. Since it became the property of the Brighton Corporation there have been some few additions to the Booth Museum.

Lunar Phenomenon.—On the night of February 28th, 1890, at about 8 o'clock, I witnessed what I believe to be a rather unusual phenomenon, at any rate in this country. There was a hazy ring round the moon, as is often seen, but in addition to this there was another larger ring, with its centre entirely outside of the smaller ring and with its circumference cutting the moon in the manner shown in the accompanying diagram. It continued




to be visible for about half an hour, and I was enabled therefore to carefully examine it, and take notes on the spot. Am I right in supposing the occurrence to be uncommon? — *F. G. Provis, Coleford, Gloucester; September 7th*, 1895.

Colonising "British" Insects.—Some interesting notes have recently been passing through the pages of the "Entomologists' Record" relative to the introduction of *Sphinx pinastri* as a "British" insect. Whether insects which are very rare or naturally absent from our fauna are to be artificially introduced without proper announcement is a question about which there cannot be two opinions. From whatever aspect such action is considered, whether joke, experiment or fraud, it is reprehensible, unless the fact is publicly announced. I fear there is an increasing tendency to colonise rarities in Britain.—*John T. Carrington.*

Preservation of Fungus Spores.—Last autumn I started the study of fungi and found it exceedingly fascinating. There was one difficulty, however, that I experienced while trying to preserve the specimens, and that was, that I could not get the spores to stick to the mounting paper. When the pileus is cut off from the stem and left to rest, gills downward, on the paper all night, next morning quantities of the spores are found to have fallen from the gills and formed on the paper a beautiful figure of radiating lines. How to keep these lovely forms from being destroyed by the slightest touch is quite a puzzle to me. Could any of your readers help me in my difficulty?—*W. Royal, 10, Bank Street, Arbroath, N.B.*

## SCIENCE ABROAD

BULLETIN DE LA SOCIÉTÉ ZOOLOGIQUE DE FRANCE (Paris, January, 1896).—Besides list of members and corresponding societies, this part contains little of interest to our readers. Dr. Paul Marchal contributes a paper dealing with the life-history of *Polistes*, a genus of honey-gathering wasps.

REVUE BIOLOGIQUE DU NORD DE LA FRANCE (Lille, 1895, No. 12). M. R. Koehler concludes his important paper on "Deep-Sea Dredging on board the 'Caudan,'" with sixteen figures in the text (Echinoderms), and M. H. Foeken also concludes his interesting contribution on "Some Galls of Syria," with three lithographed plates.

NATUR UND HAUS (Berlin, 1895, part 12). Mr. A. John contributes a brightly-written article "On Snipe," which is accompanied by a handsome page illustration, while Herr Karl Huth gives some practical hints on the "Treatment of Diseases Peculiar to Domesticated Birds." Aquarium enthusiasts will be delighted with the instructions given by an expert on the subject of "Sea Anemones," while horticulturists will be interested in what Herr Max Hesdörffer has to say on "Amaryllis." Both these articles are illustrated with nice woodcuts.

BOLLETINO DEI MUSEI DI ZOOLOGIA ED ANATOMIA COMPARATA DELLA R. UNIVERSITÀ DI TORINO (Turin, 1895).—The numbers to hand complete vol. x., for 1895, to which is added an alphabetical index for the ten volumes. The results of the expedition of Dr. Alfredo Borelli to the Argentine Republic and Paraguay are still bearing fruit, to witness, notes on new genera and species of Arachnidæ (*Opiliones laniatores*), by William Sörensen; new species of Hemiptera, Heteroptera, by M. A. L. Montandon; new species of *Decapod* Crustacea, by Signor Guiseppe Nobili. Dr. Achille Griffini discourses on the Halobates of the voyage of the "Magenta." Professor Pietro Pavesi contributes an annotated list of the Arachnidæ collected by Dr. Festa in Palestine. Bibliographical reform in zoology is in the air, and we are therefore not surprised to see Dr. Haviland Field invade this publication with a discussion of the proposed new system. Dr. Griffin further describes a new species of Nemoptera from Cyprus, with a figure in the text. Dr. D. Rosa contributes descriptions of new worms from Eastern Europe.

FEUILLES DES JEUNES NATURALISTES (Paris, March and April, 1896).—A paper on "The Biology of the Foraminifera," by M. Charles Schlumberger, with some figures in the text, will be found of interest. The editor, M. Ad. Dollfus, contributes an important communication on "The Exotic Fauna of the Hothouses of the *Jardin des Plantes*" in Paris. A fairly large number of exotic species are found to exist under conditions more or less abnormal; these are frequently met in different houses, they multiply, and their presence can only be looked upon as purely accidental. They are in general animals which have a very wide distribution in hot countries, and which have, consequently, considerable powers of acclimatization. To this imported fauna are joined indigenous species from outside, and others whose normal habitats are precisely these warm moist places, rich in humus. There are, in fact, two interesting faunas in these hothouses, one native and one acclimatized. But these include, properly speaking, neither indigenous species from outside, nor certain tropical forms introduced accidentally with exotic plants, and which, not being capable of acclimatization, do not increase, and are destined to disappear rapidly. A curious fact which has come to light is the complete absence, so far, of acclimatized tropical insects, with the exception of Formicidæ (ants) and Coccidæ (scale insects). On the other hand, Myriopoda, Crustacea, Arachnidæ and Mollusca are well represented. Three species of exotic Mollusca, all belonging to the genus Stenogyra, are enumerated; one of these, *Stenogyra goodalli*, is well known as occurring in hothouses in different parts of Great Britain. The Crustacea contain one species described as new, an Amphipod. For full particulars we must refer the readers to the paper itself. Some further notes on adventitious plants, by M. R. Maire, will be found of interest for botanists, while conchologists are catered for by M. Caziot, in a list of "Mollusca of the Department of Vienne."

BULLETIN DE LA SOCIÉTÉ PHILOMATIQUE DE PARIS (vii., No. 2, 1895).—The bulk of this part is taken up by a Paper by M. Jules Mabille, on "The Mollusca of Lower California," collected by M. Diguet. In the introduction the author refers to a note in the "Bulletin du Museum d'Histoire Naturelle," by Dr. Rochebrune, where it is stated that a remarkable similarity exists between the fauna of Lower California, a comparatively cold district, and that of tropical countries such as Panama and Colombia. A careful study of the material brought home by M. Diguet confirms these views; and in addition to the facts enumerated by this *savant*, the following observations are published by the author: "The mollusca living at the mouth of the gulf are found only in a very small number at its northern extremity, *i.e.* Lower California. The malacological fauna of this latter country emanates from Peru, the Galapagos Islands, Panama and Mazatlan, therefore from districts situated considerably to the south of it." It is stated to be understood that no notice is taken of the reputed new species, nor of some others already known to science, living further north, such as, for example, *Cerithidea sacrata*, which appears to exist on nearly all the coasts of North America, and may be considered to some extent, as a cosmopolitan species; some other species which, possessing a singularly wide area of distribution, inhabit the Philippines, the Bermudas, Australia and the Senegal coast; but the presence of these mollusca in Californian waters does not deprive this fauna of its essentially American character. These remarks apply only to the marine fauna, the terrestrial and fluviatile forms comprising only Californian types. We note, not without a degree of astonishment, that the author includes *Euparypha*, a section of the *Helicidæ* confined to Europe, North Africa and the Atlantic islands. We imagined that Mr. Pilsbry, in his able monograph, had exploded this myth. As might have been expected, a goodly number of forms figure as new species, particularly the land shells. It is to be regretted that no figures are given, neither is any indication of their affinities vouchsafed.

# TRANSACTIONS

CONCHOLOGICAL SOCIETY.—On January 17th, some of the London members met at the Borough Road Polytechnic to consider the question of forming a London branch. The Rev. J. W. Horsley took the chair, and it was resolved that monthly meetings for the exhibition and exchange of specimens be held at the various members' houses. The next meeting is to be held on February 21st, at St. Peter's Rectory, Walworth, by invitation of Rev. J. W. Horsley. The undersigned will be glad to hear from anyone who wishes to join the branch. The subscription will be nominal. It is not intended to compete in any way with the Malacological Society.—*J. E. Cooper*, 93, *Southwood Lane, Highgate, N.*

ROYAL METEOROLOGICAL SOCIETY.—The monthly meeting of this society was held on Wednesday evening, February 19th, at the Institution of Civil Engineers, Westminster, Mr. Edward Mawley, F.R.H.S., President, in the chair. The Report on the Phenological Observations for 1895 was presented by Mr. Mawley, in which it was shown that, owing to the great frost at the beginning of the year, all the first spring flowers made their appearance very late, and it was not until the middle of June that plants began to come into blossom in advance of their usual time. During July, the dates recorded were, as a rule, exceptionally early. The yield of all the farm crops, except potatoes, was exceedingly poor. Pears and plums yielded badly, but there was a splendid crop of apples, and also of all the small fruits. As regards vegetation generally, seldom has a year ended under conditions as favourable for the one succeeding it. Mr. R. H. Scott, F.R.S., read a paper on the recent unusually high barometer readings in the British Isles, in which he stated that the Daily Weather Chart for 6 p.m. on January 8th, was the first in these islands that ever showed 31 inches. The station was Stornoway, and by the next morning all over the northern portions of Great Britain and Ireland the barometers were above 31 inches. The highest reading of all was 31·119 inches, photographically recorded at Glasgow, at 9 a.m. on the 9th. The barometer-pressure then gave way, and the region of highest readings moved southwards along our west coast, and finally left the south of Ireland on the 15th. Weather throughout the period was mild, an unusual thing with a very high barometer. At the end of the month a second anticyclone spread over the country, when the barometer rose to 30·96 inches at Cork. Reference was made to previous excessively high barometer readings in England and in Siberia, and it was stated that a reading of 31·62 inches at Barnaul in Siberia, in 1877, was probably the highest ever observed. Mr. R. Inwards, F.R.A.S., read a paper on "Turner's Representations of Lightning," which he considered to be true to nature, and demonstrated the same by placing an actual example of Turner's work side by side with a photograph of a real flash of lightning.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Annual General Meeting, January 23rd. Mr. T. W. Hall, F.E.S., President, in the chair. The reports of the Council and treasurer were read and showed that the society still maintained its very satisfactory condition both numerically and financially. The election of officers and Council for the ensuing year then took place as follows:—President, R. South, F.E.S.; Vice-Presidents, C. G. Barrett, F.E.S., T. W. Hall, F.E.S.; Treasurer, R. Adkin, F.E.S.; Librarian and Report Secretary, H. J. Turner, F.E.S.; Curator, W. West; Hon. Secretary, Stanley Edwards, F.L.S.; Council, C. A. Briggs, F.E.S., J. H. Carpenter, John T. Carrington, F. W. Frohawk, F.E.S., W. Mansbridge, F.E.S., W. A. Pearce and H. A. Sauzé. The President then read his Address, which comprised a short *resumé* of the Society's history, notices of the additions to the British insect fauna, an obituary of the year, an epitome of the Society's work during the year, and other matters of general interest. The President announced the donation to the Society, by Mr. C. A. Briggs, of the herbarium of British plants which had been formed by the late Mr. W. H. Tugwell.—February 13th, Mr. R. South, F.E.S., President, in the chair. Mr. Tolhurst, of Beckenham, Mr. E. Montgomery and Mr. A Montgomery, of Ealing, were elected members. Mr. McArthur exhibited a very long series of *Triphæna comes* from Hoy, all of them being intermediate between the type and var. *curtisii*, and without black suffusion of hind wings; also a number of extinct, rare, and unique British species of lepidoptera, including a series of *Chrysophanus dispar*, a pair of *Lasiocampa ilicifolia*, *Abraxas grossulaiata*, two completely banded and one with yellow ground, two Killarney specimens of *Notodonta bicolor*, the original specimen of *Nyssia lapponaria*, Bav., two *Synia musculosa*, Hb., specimen of *Hadena peregrina* from Lewes, three *Caradrina ambigua*, one *Xylina lambda*, var. *zinkenii*, three *Ophiodes lunaris*, one of which was a beautifully banded var., the example of *Catocala electra*, taken by Mr. Vine at Brighton, one *C. fraxini* and a series of *Eupæcilia gilvicomana*, Zell. Mr. R. Adkin, a specimen of *Cucullia gnaphalii*, bred by the late Mr. Tugwell. Mr. Sturt, specimens of *Sphinx convolvuli*, bred from Cornish larvæ. Mr. Sturt was congratulated on being the first to rear the species from British larvæ. Mr. Oldham, *Comia affinis* from Epping Forest, and several shells of the genus *Helix* from Folkestone. Mr. Frohawk, the contents of a pheasant's crop, consisting mainly of the larvæ of the Dipteron *Bibo marci*. Mr. Moore, an ichneumon, with an extremely long ovipositor, from the Upper Amazon. Mr. Auld, a bred series of *Tortrix cratægana* from the New Forest. Mr. Carpenter, a very large number *Argynnis paphia* and its vars. Mr. South, a number of *Argynnidæ* from the Palæarctic region, and read a paper on "The genus *Argynnis*, with reference to varieties having pale areas."—*Hy. J. Turner* (*Hon. Report Sec.*)

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—At the meeting of January 7th, 1896, exhibits by Mr. Prout included: continental types of species, or varieties of the *Caradrina quadripunctata* group, viz: *C. selini*, from Germany; var. *anceps*, from Syria; *C. albina*, from Russia; *menetriesii*, from Siberia; and *infusca*, from central France. Excepting *selini*, all the specimens bore a very strong resemblance to some of the forms of *quadripunctata*. Mr. Bate, a very dark specimen of *Luperina testacea* from Dulwich, and a nearly black var. of *Hypsipetes sordidata*. Mr. Sauzé a box of Diptera, including *Melanosioma quadrimaculatum*, Sydenham, March, '95; and *Oxycera trilineata*, Deal, July, '95. Mr. E. Heasler, the following species, taken at Brokenhurst last summer: four male *Selidosema ericetaria*, *Pseudoterpna primata*, unusually green for captured specimens; two *Gnophos obscurata*, one nearly black, the other ash-grey; and four *Acidalia straminata*. Mr. Tutt observed that one of the latter had the very distinct dark band generally regarded as the distinguishing mark of *A. circellata*. Mr. Frost, two examples of *Epinephele hyperanthes*, with pale or xanthic blotches; a very dark *Hadena dissimilis*, var. *confluens*, strongly resembling some of the forms of *H. oleracea*, and a short series of *Noctua glareosa*; all from Ipswich. Mr. Tutt read a most interesting and instructive paper, entitled, "The Modern Principles on which the classification of Lepidoptera is based."—January 21st, 1896. Exhibits: Mr. May, two sets of cocoons of *Saturnia pavonia*, the larvæ having been reared on whitethorn by himself and Mr. S. J. Bell. Both sets were offspring of the same parents, and the latter had evidently been somewhat starved while in the larval stage. The cocoons in one set, sixteen in number, were all dark in colour; while in the other set, were eighteen pale cocoons and one dark one. The sixteen dark cocoons were spun by larvæ which had been badly fed in a damp cage without ventilation; the eighteen pale cocoons and the dark one were well fed in a roomy, dry, and well ventilated receptacle. On six of the pale cocoons being accidently damped, they immediately became dark brown like the other set, and Mr. May supposed that the larva, when spinning, incorporated with the silk a kind of "cement" produced by itself, and that this "cement" was affected by damp. Mr. Tutt said that this material had been determined as an oxalate of lime. The sixteen dark cocoons were mostly small and some of them almost round, while the nineteen other cocoons were large and well-formed. Mr. Tutt: a humble-bee's nest completely filled with the cocoons of *Aphomia sociella*, and a specimen of that moth bred from them. Rev. C. R. N. Burrows, a fine and variable series of *Calamia lutosa* taken during the past season at Rainham, and he read a most interesting and humorous paper on that species. Messrs. Bate, Heasler, Prout, and Tutt, exhibited the species to help to illustrate Mr. Burrow's paper. Mr. Newbery said that, in order to relax coleoptera, he was in the habit of soaking them in water for twenty-four hours or more, drying off the superfluous moisture, and then applying wood naphtha with a brush,—*C. Nicholson, L. J. Tremayne* (*Hon. Secs.*)

Victoria Institute.—At a full meeting of the Victoria Institute, held on March 2nd, Sir George Stokes, Bart., F.R.S., in the chair, Dr. H. B. Guppy gave an interesting account of his researches as to the light thrown by a study of the differences in plant names in use among the Polynesians. He said: The more useful plants of these islands, and many also of their littoral plants, have in each case a story to tell not only of the history of a plant, but of a people. The distribution, the uses, the vernacular nomenclature, etc., are all so many guides in such an investigation. The wide range of the useful plants in this region, such as the banana, the breadfruit, and the paper-mulberry, is an indication of an age of free intercourse over the Pacific, an age long since passed away. Under the conditions prevailing in this region in the time of Cook a newly-introduced plant would acquire a very local distribution; and among such plants we may include the shaddock of Fiji and Tonga. Almost all the plants, and in most cases their names, have their homes in the Indian Archipelago and in Further India. On comparing the names of the different regions, the Malagasy names are found to be more closely connected with those of Fiji than with those of Polynesia. The Melanesian variety of man is regarded as the original possessor of the Malayo-Polynesian type of speech, which it has imposed to a greater or less degree on all that have come in contact with it.

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

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The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc. to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Cuckoos' eggs with those of foster parent wanted.—W. Wells Bladen, Stone, Staffordshire.

Exotic Orthoptera wanted in exchange for Pachytylus cinerascens (Cadiz), Caloptenus italicus. Œdipoda fasciatum, blue and red forms.—Harry Moore, 12, Lower Road, Rotherhithe, S.E.

Offered, several books and pamphlets on Conchology in exchange for others on Helicidæ or for foreign Helices; exchange lists.—G. K. Gude, 5, Giesbach Road, Upper Holloway, London, N.

Duplicates.—Pleistocene mollusca from Crayford; desiderata, British and Continental land, freshwater and marine shells, and Pleistocene shells from other localities.—A. S. Kennard, Mackenzie Road, Beckenham, Kent.

A large collection of birds' eggs, blown two holes, including black-headed bunting, kestrel, sparrow, hawk, crow, landrail, etc.; also some side-blown eggs and excellent specimens of Helix aspersa v. exalbida. Wanted, side-blown eggs of coot, red grouse, red-legged partridge, golden plover, water-rail, sandpiper (common), snipe, woodcock, etc., localised if possible.—Chas. D. Heginbothom, 3, Estcourt Street, Devizes.

British and Australian land, freshwater and marine shells offered. Wanted, Helix aspersa, var. unicolor; liberal exchange given for good specimens. Foreign correspondents desired in any part of the globe.—A. Hartley, 14, Croft Street, Idle, near Bradford, Yorkshire.

Large collection freshwater shells to exchange for good marine shells, such as Conus mussatella. Oliva maura, O. subulata, Ovulum volva, O. ovum, Cassis tuberosa, C. testiculus, C. erinaceus, Ricinula horrida, Triton pilcaris, T. anus, T. lotorium, T. cutaceus, Rootellaria curvirostrum, R. columbaria, Pleurotoma babylonia, P. strombiformis.—P. J. Roberts, 11, Ash Street, Bacup.