PROCEEDINGS OF LEARNED SOCIETIES.

CAMBRIDGE PHILOSOPHICAL SOCIETY.

Nov. 30, 1840.—The President, Dr. Hodgson, in the Chair.

Prof. Henslow gave an interesting lecture upon the diseases of wheat, in which after pointing out the differences of effect of the *Uredo caries* or *Bunt*, and the *U. segetum* or *Smut*, he showed that the *U. rubigo* or *Rust* is only an earlier state of the *Puccinia graminis* or *Mildew*, having traced the progress of the plant from the state described under one of these names to that denominated by the other, and even found the simple, not septate, and nearly or quite sessile sporidia of the *Uredo* in the same sorus with the clavate, constricted and septate sporidia of the *Puccinia*. The Professor stated that he had submitted specimens to Mr. Berkeley, and that that eminent algologist had confirmed his conclusion that the two plants (referred to different genera) are in fact only states of one species. This is a conclusion that must cause great alteration in our ideas of the subcuticular Fungi. He then pointed out the distinctions between the *Æcidium Berberidis* and the blights of wheat, and thereby showed the improbability of the Berberry having any agency in the causing of blight in wheat. He stated, that it might possibly be the case, that the same soils and situations that are favourable to the production of *Uredo* are also appropriate for the growth of the Berberry, and that the Berberry had thus obtained the bad name which has been so unjustly attached to it.

The next point brought under notice was the prevalence of *Ergot* in *wheat* in that part of Suffolk in which Prof. Henslow resides; and he expressed it to be his opinion, that the presence of *Ergot* in the flour might be the cause of many of the grievous sores to which the poor are liable; he also stated that he had placed some of the wheat Ergot in the hands of eminent medical men, in order that they might ascertain if it possesses the same valuable medicinal properties for which the Ergot of rye is so celebrated. He concluded his very valuable communication by giving the history of the *Ear-Cockle* caused by the *Vibrio tritici*, and also of the *Wheat Midge*. The whole was illustrated by excellent magnified drawings and numerous specimens.

BOTANICAL SOCIETY OF EDINBURGH.

President, David Falconar, Esq., M.W.S.

Vice-Presidents, Robert Graham, M.D., Regius Prof. Bot. of Edinb.; Daniel Ellis, Esq.; Robert Kaye Greville, Esq., LL.D.; Prof. Traill, M.D.

Council, Prof. Christison, M.D.; H. Ivory, Esq.; D. Steuart, Esq.; Patrick Neill, Esq., LL.D.; William Scott, Esq.; W. C. Trevelyan, Esq.

Treasurer, W. Brand, Esq.—*Secretary*, W. H. Campbell, Esq.—*Corresponding Secretary*, J. H. Balfour, M.D.—*Foreign Secretaries*,

E. Forbes, Esq.; J. Macaulay, M.D.—*Curator*, G. Atkin, M.D.—*Artist*, J. M'Nab, Esq.

The Society met on Thursday, 10th December, when the following papers were read :—

1. Sketch of an Excursion to the Clova mountains in July and August last, giving an account chiefly of the Cryptogamic plants of that district. By Messrs. William Gardiner, jun., and William Jackson, jun., Dundee.

2. Remarks on *Aspidium spinulosum* and *Aspidium rigidum*. By Mr. J. Riley, Papplewick, Nottinghamshire.

3. Notice regarding the specific characters of *Asplenium Ruta-muraria* and *alternifolium*. By the Rev. T. Blizard Bell.

4. Notice of the discovery of *Phascum Flörkeanum*, Schwæg., a Moss new to Britain, on the coast of Durham. Communicated in a letter to the Secretary, by Mr. T. J. Bowman, Richmond.

5. Notice of the Cypresses in the gardens of Xeneralife, near the Alhambra. By Dr. James Macaulay.

6. Observations on *Jungermanniæ* found in the neighbourhood of Dumfries. By Mr. James Cruickshank.

The most important notice perhaps is the discovery of a Moss new to Britain, *Phascum Flörkeanum*, Schwæg., which will keep us in mind, that notwithstanding the many zealous botanists who have been lately engaged in investigating our Flora, there yet remains an open field which will not be carefully searched without its reward. Specimens of the Moss were exhibited; and Dr. Greville, with other muscologists present, had no doubt of the identity of this minute plant with the species to which Mr. Bowman had referred it.

The regular quarterly Reports, furnished by the kindness of the Secretary, will be published as soon as they are received.

ROYAL SOCIETY OF EDINBURGH.

President.

Sir T. Makdougall Brisbane, Bt., G.C.B., G.C.H.

Vice-Presidents.

The Hon. Lord Glenlee.	Right Hon. Lord Greenock, K.C.B.
Dr. Hope.	Rev. Dr. Chalmers.
Sir D. Brewster, K.H.	Dr. Abercrombie.

General Secretary, Professor Forbes.—*Secretaries to the Ordinary Meetings*, Dr. Christison, David Milne, Esq.—*Treasurer*, John Russell, Esq.—*Curator of Library and Instruments*, Dr. Traill.—*Curator of Museum*, John Stark, Esq.

Councillors.

Thomas Thomson, Esq.	Professor Henderson.
J. T. Gibson-Craig, Esq.	Professor Kelland.
Dr. Graham.	Sir George Warrender, Bart.
Dr. Alison.	Sir John Robison, K.H.
Sir Henry Jardine.	Sir John M'Neill, G.C.B.
John Shank More, Esq.	Professor Syme.

The Society has again commenced its ordinary Meetings; and at the first, on Monday the 7th of December, the following com-

munications were made, after the address to Her Majesty on the birth of the Princess Royal had been carried by acclamation :

1. On certain Physiological Inferences which may be drawn from the study of the Nerves of the Eyeball. By Dr. Alison.
2. On the Plane and Angle of Polarization at the Surfaces of Crystals. By Professor Kelland.

TWEEDSIDE PHYSICAL AND ANTIQUARIAN SOCIETY.

The Quarterly Meeting of this Society in its new apartments, Nov. 23, His Grace the Duke of Roxburghe in the Chair, was numerously attended.

The following donations to the Museum in the department of Natural History were reported :

From Mr. Burgess, Fochabers.—Minerals and fossil organic remains from Banffshire.

From a lady (through Mr. Stuart, surgeon).—Calc-tufa, quartz with olivine, limestone, &c., from Madeira and Gibraltar.

From His Grace the Duke of Roxburghe.—Egyptian Ichneumon (*Viverra Ichneumon*).

From Robert Wilkie, Esq. of Ladythorn.—Sea Eagle (*Aquila albicilla*), in excellent plumage ; Sapphirine Gurnard (*Trigla Hirundo*).

From an anonymous contributor, who continues his valuable donations to this department.—Snowy Owl, female (*Strix nyctea*) ; Tengmalm's Night Owl, male and female (*Noctua Tengmalmi*) ; Little Owl, male (*Scotophilus nudipes*) ; Grasshopper Warblers, male and female (*Salicaria locustella*) ; Wryneck, female (*Yunx torquilla*) ; Whimbrel (*Numenius Phæopus*) ; Velvet Duck, male (*Oidemia fusca*).

Other specimens have been received from Mr. Beckwith, Yetholm Hall ; Mr. Scarth, Aberdeen, &c. &c. ; and some valuable additions to the library and the collection of antiquities &c.

A list of the birds still required has been lately extensively circulated, and will serve as a guide to those who may be inclined to assist the Society in this interesting department of its labours.

In Entomology a most valuable and extensive contribution has been received from Mr. Selby of Twizell, one of the Vice-Presidents.

A fresh subscription has been opened for the liquidation of the sum remaining due for the building and internal fittings, some of the principal farmers in the neighbourhood having already contributed. The Meteorological observations, instituted under the auspices of Sir T. Brisbane and the Duke of Roxburghe, are ably carried on by Mr. Ferguson ; and an agreement has been entered into with certain eminent cultivators of natural science for sending abroad an experienced naturalist, to form a collection of objects of natural history, to be forwarded to this country, and divided among the several subscribers. For the means of effecting this, they have been indebted to the generosity of their President, Sir Thomas Brisbane. In the Ornithological department their collection now amounts to upwards of 300 specimens, illustrating nearly 200 different species of British

birds. In the selection of these, the greatest attention has been paid to the perfection of the plumage; and by far the greater part of them have been preserved by the skilful hand of Mr. Heckford, the Society's Conservator.

DUBLIN NATURAL HISTORY SOCIETY.

At the usual monthly meeting held on Friday the 4th of December, Mr. Allman called attention to a curious parasitic Entozoon discovered by him in the abdominal muscles of the Hake. Mr. H. Dombrain gave a notice of ornithological rarities which had lately occurred, among which four specimens of *Ibis falcinellus* had been shot during the last autumn. Mr. Andrews read an account of a botanical excursion through a portion of Clare and Kerry, and as this contained several new localities for some rare Irish plants, we add an abstract which has been forwarded to us by the author.

"Having been requested by my friend, Mr. Dombrain, to give a sketch of a hurried excursion which I made, in company with my friend Mr. Moore, through a portion of Clare and Kerry this autumn, I have to beg the indulgence of the meeting for any omissions I may make. I can only give a brief outline of our range, and state other interesting localities for plants that have been considered rare or not frequent in this country. Our steps were first directed to Clare, proceeding from Kilrush to Dunbeg, a small village on the coast; and we had to regret that the very unfavourable state of the weather prevented our making such collection of Algæ as the shores of that bay so promisingly offered. The *Fucus tuberculatus*, rare in the north, was there abundant, and *Cystoseira ericoides*, and *Chondrus norvegicus* frequent. In the great bog of Mon Mor, which extends over a considerable tract of country,we noticed, in the range between Killard and Moyasta, most of the rare bog plants of Connemara: the *Eriocaulon septangulare* in great abundance; *Carex filiformis* and *limosa*, *Rhyncospora fusca*, and *alba*, *Alisma natans*, *Utricularia minor* and *Scutellaria minor*, *Drosera rotundifolia*, *longifolia* and *anglica*, *Pinguicula lusitanica*, this plant appearing more general there, and also in Kerry, than the *vulgaris*. Near Tullaher Lake, the *Centunculus minimus* was found, and in the lake in abundance *Elatine hexandra*, *Eriocaulon septangulare*, and *Lobelia Dortmanna*. Mr. Murphy informs me that he has seen the *Eriocaulon* in Donegal, and I have heard of its having been noticed in Kerry; thus establishing an interesting connecting link along the western coast of a plant that has hitherto been considered limited to Connemara. The same remark is applicable to the *Asperula cynanchica*, this beautiful little plant displaying its white rose-tinged flowers, set off by its thickly-set dark shining leaves, in great abundance on the sand-hills of Dough-mor. It occurs frequently in the limestone district of Burrin, and on the sand plains of Ferriter's Cove and Smerwick Harbour in Kerry, and I have no doubt its range may yet be observed more northerly than Clare. The *Viola lutea* seemed to be confined to a portion of the sand-hills bounding the northern side of Screveleen river. In our rambles further west, along that narrow

peninsula beyond Carrigaholt towards Loop Head, the country is uninteresting to the botanist, consisting of moory hills and bogs. The cliffs and hills of the coast, chiefly quartzite, amphelite, and clay slate, are very unproductive; but the numerous little bays offer fine scope for the algologist, particularly that of Ross, lying three miles to the north-east of Loop Head. Its sheltered and extensive reefs and extreme westerly situation no doubt would afford many new and interesting species. In Reinvellagh Bay were found fine plants of the rare *Gigartina acicularis*, and the *Dictyota dichotoma β. intricata.* At Rehy Hill the *Scirpus Savii* and *Rubia peregrina* were abundant; and in the bogs the delicate and pretty *Radiola millegrana* appearing in great quantity in those newly cut. In Scattery Island, opposite to Kilrush, the *Pimpinella magna*, the *Radiola* was also noticed; and in Hog Island, *Ruppia maritima.* Thus time permitted but a superficial view of a small portion of Clare; and I am satisfied that the limestone barony of Burrin, and those hills and numerous lakes eastward of Miltown Malbay, may still give accessions to our flora. Crossing the Shannon to Tarbert opportunity permitted but a hasty examination of the Salt Marsh, beyond the Revenue Station, where we obtained in abundance that beautiful and singular alga, *Rhodomela scorpioides*, only before collected by Mr. Moore, and but sparingly, in the north. In our drive from Tralee to Dingle, bordering the roadside for a mile beyond Blennerville, we noticed *Verbena officinalis*, and east of Dingle, a station already recorded, the *Bartsia viscosa.* From Dingle our walk was directed up the old mountain road to the summit of Connor Hill, remarking as we passed the beautiful little *Sibthorpia europæa*, and occasionally plants of *Pinguicula grandiflora.* From the point where this road terminates, or forms its junction with the new line, words cannot describe the awful grandeur and wildness of mountain scenery that burst upon our gaze. On one side Giant Brandon with its towering companions enveloped in rolling masses of dense clouds. On the other Connor Hill, and the range leading around the Lake of the Pedlar's Well to lofty Ben-uisgeach—following the course of the winding stream that appeared like a line in the deep valley beneath, we look seaward to the Magherees, view the headlands of the broad-rolling Shannon, Kerry, and Caun-lean, and even catch a glimpse of the Hag's-head, the southern termination of the cliffs of Moghur on the coast of Clare. In our rear lay Dingle's beautiful bay, skirted by a long line of Iveragh's mountains, which, mass upon mass, and ridge upon ridge, appeared like huge billows of the ocean—Valencia Island stretching to the southern entrance, the dark and gloomy great Blasquet guarding the northern.

> I've wander'd long, and wander'd far,
> And never have I met,
> In all this fairy Western land,
> A scene so wildly savage yet.

On Connor Cliffs were obtained the plants before discovered, with the accessions of *Jungermannia Woodsii* and *ciliaris.* The awful fogs and rain storms of Brandon did not intimidate my friend Moore from

facing the almost inaccessible precipices that present themselves on that side where stands the village of Clehane. Unweariedly he pursued his way, and sundry were his risks, ere the summit was attained, where he did penance around the cell of the patron saint. Here all those rarities were found, whose first record is due to the unbounded zeal, acuteness, and perseverance of my friend Mr. Mackay, and well did he explore those wearisome wilds. The rare *Saussurea alpina*, the elegant little alpine *Alchemilla*, the several interesting species and varieties of Saxifrage—to these have been added new stations for the *Aspidium lonchitis*, *Grimmia spiralis*, and new to our flora the *Hypnum rugulosum*. In all the mountain range the *Wilsoni* was the only species of *Hymenophyllum* detected. At Mount Eagle, seven miles from Dingle, the most western highland in the county, the rare *Trichomanes speciosum*? was found in the chasm of a moist but exposed cliff, unprotected by brushwood, and at a much greater elevation than the sheltered and shaded locality of these beautiful ferns at Turk. The *Jungermannia Woodsii* was again there met with, and at the foot of the mountain the *Bartsia viscosa*. This mountain appears to consist of coarse gray conglomerate similar to that of Brandon. North-easterly and northerly of Mount Eagle are the beautiful bays of Smerwick and Ferriter's Cove, rich in Algæ. Here were seen magnificent specimens of *Cystoseira ericoides* and *fæniculacea*, *Gigartina acicularis*, *Griffithsiæ*, and *erecta*: and abundantly at the Cove *Polyphonia violacea* and *Griffithsia corallina*—the former only before noticed by Dr. Drummond at Cairnlough Bay, coast of Antrim. Our tarrying was brief—Killarney our next station; but so often has that fairy ground been trodden, that what in a botanical way could be said after Mackay, Taylor, and Wilson? I may venture to add that another station verging on Turk has been discovered of the much-sought *Trichomanes*; its continued existence, therefore, is safely secured. At O'Sullivan's Cascade the *Hymenophyllum Tunbridgense* grows most luxuriantly; the *Wilsoni* exceedingly scarce, and the rare and beautiful *Sticta macrophylla* appears frequent at the Kenmare side of Killarney. Many are the doubts and varied the opinions of botanists touching the *Arbutus*, the pride of Killarney's lakes. Although now growing spontaneously, particularly on limestone and on a reddish talcose slate, yet I am inclined to think it not strictly native, but introduced from Spain by the monks. In the fourth century monastic institutions were first formed in Ireland, and in the sixth this island had attained such fame for piety and learning, that numbers came from Spain and Italy for the object of leading a more strictly religious life, and acquiring the knowledge which had so distinguished it. Thus we find Saint Finnian, the leper, eminent for his extraordinary learning, knowledge of Holy Writ, and great sanctity, founded the abbeys of Innisfallen, Aghadoe, and Ardfinnian in Tipperary. Innisfallen became a place of great wealth; numerous and valuable presents were contributed, and the stranger monks introduced from their own countries whatever would prove useful, either medicinally, culinary, or ornamentally.

Hence some of our rare plants are met with in the vicinity of such religious buildings. The *Arbutus* grows luxuriantly when planted in Ireland; yet nowhere does it attain the size as in the neighbourhood of Killarney. The extreme western position, the wild and humid atmosphere, with the continued vegetation that exists throughout the year, unchecked by frosts, materially favours its propagation. Its beautiful berries arriving at maturity, greedily fed on by birds, we may well conjecture the seeds can be conveyed by them to most inaccessible places, where they vegetate in situations almost destitute of soil. In the island opposite O'Sullivan's Cascade, Mr. Mackay measured the stem of an *Arbutus*, which equalled in girth the bulk of the beautiful Yew-tree inclosed within the abbey walls of Mucruss. This exuberance of growth exceeds by far that of its native countries, even where it is so luxuriant, as in Candia. In the reign of Elizabeth, Philip, king of Spain, sent to that queen a splendid collection of orange trees. The vessel was wrecked on the coast of Glamorganshire, in the Bristol channel; and as Lord of the Manor, one of the Mansels of the Margam estate became possessed of the freight. The trees were planted in the gardens of Margam, at the foot of the lofty Mynydd Mawr, and thus was formed the finest and most magnificent orangery in the kingdom. The rare *Pisum maritimum*, its only locality the shores of Castlemain bay, owes its introduction to the wreck of a vessel which stranded on the shallows of Inch. Cork terminated our botanical tour, and although not in so successful a manner as our sanguine expectations led us to anticipate, yet the novelty of our movements, and the exceeding kindness of our friends, rendered it altogether one of great gratification and pleasure. However, views have been formed of the general features of the interesting country through which we have passed, that have led to most reasonable and satisfactory conjectures as to what may yet be effected in parts of those unfrequented and still unexplored wilds. Near Cork, towards the range of the neat village of Douglas, we visited the noted bog of Ballyphehane, the interesting ground of many of Mr. Drummond's rarest plants, their habitats now fast disappearing before the plough and the harrow. There we saw the *Pinguicula grandiflora* in abundance (but I fear ere this extinct), the *lusitanica* and *vulgaris* nowhere appeared. At Sunday's Well we noticed the station of the *Sedum dasyphyllum*, and near the city jail brought to light the long and much-doubted *Linaria minor*. Accompanied by my friend Alexander, the detector of the *Senecio squalidus*, we traced it on the walls and houses in the old parts or the city, and it is astonishing how so distinct and abundant a plant could have escaped the attention of former botanists, and of that of the active Drummond."

LEEDS PHILOSOPHICAL AND LITERARY SOCIETY.

The Annual Report of this Society has just been forwarded to us at the close of its *twentieth* session. "The ordinary funds of the Society are in a satisfactory state. For the first time for many years

the receipts have exceeded the expenditure." And this is even after having defrayed the cost of printing Transactions, which have not yet had time to make any return. £1020. 9*s*. has been raised by subscription to effect alterations and improvements in the Museum, which have been completed, and now display to advantage a collection of very considerable value and extent.

GEOLOGICAL SOCIETY.

Fossil Trees.—The President's Address contains the following account of a communication of Mr. Hawkshaw, read June 5, 1839.

We have received an interesting communication from Mr. Hawkshaw respecting a remarkable disclosure made in the Bolton Railway, six miles north of Manchester, of five fossil trees in a position vertical to the plane of the strata in which they stand. The roots are imbedded in a soft argillaceous shale immediately under a thin bed of coal. Near the base of one tree, and beneath the coal, more than a bushel of hard clay nodules was found, each inclosing a cone of *Lepidostrobus variabilis.* The bark of the trees was converted to coal, from one quarter to three quarters of an inch thick; the substance which has replaced the interior of the trees is shale; the circumference of the largest of them is 15½ feet at the base, 7½ at the top, and its height 11 feet. One tree has spreading roots, four feet in circumference, solid and strong. By the care of Mr. Hawkshaw these trees have been preserved, and a covering is erected over them. The attendant phænomena seem to show that they grew upon the strata that lie immediately beneath their roots*.

Feb. 26.—A paper was first read, entitled "Further observations on the Fossil Trees found on the Manchester and Bolton railway;" by John Hawkshaw, Esq., F.G.S.

Since Mr. Hawkshaw's former communication, another fossil tree has been found on the opposite side of the railway. It is about three feet in height, and three feet in circumference, and stands on the same thin stratum of coal as those first discovered, and perpendicularly to the surface of the bed. Mr. Hawkshaw is, therefore, strengthened in his belief, that the trees grew in the position in which they are found.

After this notice of the recent discovery, he proceeds to describe the effects produced in hot and moist climates on felled or prostrated solid dicotyledonous trees. The tropical forests with which he is acquainted from personal examination, are situated in Venezuela on the shore of the Carribean sea, and between the 8th and 10th degrees of north latitude, and the 65th and 70th of west longitude. In these forests a few months are sufficient to destroy the interior of the largest tree, little more being left than an outer shell, consisting chiefly of the bark. Mr. Hawkshaw noticed this peculiarity more frequently in dicotyledonous trees, having a proper bark,

* See the abstract of this paper in L. & E. Phil. Mag. vol. xv. p. 539.

than in monocotyledonous vegetation, excluding necessarily those always hollow; and he does not remember to have seen a single instance of a palm similarly acted upon. Sometimes the portion of the dicotyledonous tree remaining on the ground, presented very much the appearance of the founder's mould, when the pattern has been withdrawn from the sand, and before the metal has been run in; and by this kind of decay, a cavity is formed from which a fac simile of the tree might be cast. In other cases, prostrated trunks having the appearance of being solid, have yielded to the pressure of his feet, and proved to be only hollow tubes. Dangerous accidents have also occurred from temporary bridges constructed of dicotyledonous trees having given way beneath the passenger, though there was no outward indication of decay. The bark of these trees had changed but little, though nothing of the interior remained but dust, and a few remnants which crumbled beneath the slightest touch.

The low and flat tracts in which this destructive operation goes on most rapidly, are those in which, from the deep rich soil and excessive moisture, all below the tall forest trees and larger palms is occupied by canes, bamboos, and minor palms. Such tracts would be most easily submerged; and in Mr. Hawkshaw's opinion they might hereafter present a seam of coal, which would afford but few distinct traces of palms and forest trees. These phænomena, he says, may explain in part, why so few distinct forms remain of the numberless forest trees, which must have formed a portion of the vegetable kingdom, at the time of the accumulation of our coal deposits.

Mr. Hawkshaw does not attempt to explain the process by which dicotyledonous trees are rendered hollow in tropical forests. He expresses doubts respecting the probable nature of the Calamites of the coal measures, and offers no explanation of the means by which they have been preserved in so great abundance. If the coal be considered as the debris of a forest, he says, it is difficult to account for not finding more trunks of trees than have been discovered in our coal basins; and he observes, it is only perhaps by allowing the original of our coal seams to have been a combination of vegetable matter, analogous to peat, that the difficulty can be solved. In this case, he is of opinion, but a few isolated trees might be expected to be found, and that the remains of vegetable forms most frequently discovered, would only be confirmative of the antiseptic qualities of their original nature, as previously advanced by Professor Lindley, and not of the number or importance of their particular genera at the time of their deposit.

In conclusion, Mr. Hawkshaw says, that whatever opinion may be drawn from what is conjectural in his paper, it will be obvious, that though fossil remains may be found filled with a mechanical deposit, and containing traces of other vegetables, yet that this condition does not prove, that the plants were originally hollow, nor even render it the most likely hypothesis, as they may have been hard wood-trees, the centre of which had been removed by natural processes.

A paper was then read, "On the characters of the fossil trees lately discovered near Manchester, on the line of the Manchester and Bolton railway; and on the formation of Coal by gradual subsidence;" by John Eddowes Bowman, Esq., F.L.S. communicated by the President.

The paper commences with a few preliminary remarks on the theory of repeated subsidences of the land during the carboniferous æra; and on the drift theory, the author being of opinion that the former receives much support from the phænomena presented by the fossil trees found near Manchester, and that it affords in return great assistance in explaining the peculiarities of their position. Mr. Bowman does not deny that plants may have been carried into the water from neighbouring lands, as in the instances of fern-fronds and other remains scattered through the sandstones and shales; but he conceives it is difficult to understand whence the vast masses of vegetables necessary to form thick seams of coal could have been derived, if drifted; and how they could have been sunk to the bottom, without being intermixed with the earthy sediment which was slowly deposited upon them. He is of opinion also, that without a superincumbent layer of mud or sand, to retain the hydrogen during the process of bituminization, ordinary caking coal could not have been formed. Another difficulty, connected with the drift theory, Mr. Bowman says, is the uniformity of the distribution of the vegetable matter, throughout such great areas as those occupied by the seams of coal, extending in the instance of the lower main seam of the great northern coal field, over at least 200 square miles; and in that of a thin seam below the gannister, or rabbit coal, in a linear direction of thirty-five miles from Whaley Bridge to Blackburn. On the contrary, he believes, that it is much more rational to suppose, that the coal has been formed from plants, which grew on the areas now occupied by the seams,—that each successive race of vegetation was gradually submerged beneath the level of the water, and covered up by sediment, which accumulated till it formed another dry surface for the growth of another series of trees and plants,—and that these submergences and accumulations took place as many times as there are seams of coal. He also explains the thinning out of the seams and other strata of the coal measures, by irregularities in the mode or extent of the depressions.

Mr. Bowman then proceeds to the examination of the phænomena presented by the fossil trees discovered on the line of the Manchester and Bolton railway, and described by Mr. Hawkshaw in the preceding communication: it will be necessary to notice therefore only those points which did not claim that gentleman's more particular attention. Mr. Hawkshaw describes generally the markings on the internal casts of the trees; but as it is difficult to convey a correct notion of their waved and anastomosing characters either verbally or by reduced drawings, Mr. Bowman applied paper to the surface of the stems and carefully traced the grooves or furrows by following them exactly with an instrument. The only indications of scars, which he could find after a long and close search, were at

one point near the base of the largest tree, and though indistinct, his practised eye recognised them to be those of a Sigillaria. He detected also in some parts, on the ribs of the same tree, the fine wavy lines so often visible on decorticated specimens of that family. In describing the second tree, he alludes to a deep wedge-shaped rift on the south-east side, which had been coated with coal, and is strongly marked with wavy lines, like those on the surface of the alburnum of a gnarled oak. On the fifth tree, he discovered a longitudinal concavity on the north side, and he states that it resembles the impression which would be left in a dicotyledonous tree, by the pressure of a parasitic plant. The characters of the roots are also detailed at considerable length, particularly their mode of bifurcation, and position with respect to the horizon.

From a careful consideration of the phænomena presented by the fossils, Mr. Bowman is convinced that they stand where they originally flourished; that they were not succulent, but dicotyledonous, hard-wooded forest trees; and that their gigantic roots were manifestly adapted for taking firm hold of the soil, and in conjunction with the swollen base of the trunks to support a solid tree of large dimensions with a spreading top.

Towards the close of 1838, in forming the railway tunnel at Claycross, five miles south of Chesterfield, a number of fossil trees were found, standing at right angles to the plane of the strata. The tunnel passes through the middle portion of the Derbyshire coal measures, which there dip about 8° to a little north of east. The bases of the trees rested upon a seam of coal fifteen inches thick. The exterior of the stems consisted of a thin film of bright coal, furrowed and marked like the *Sigillaria reniformis;* and the interior consisted of a fine-grained sandstone. Mr. Conway, who supplied Mr. Bowman with an account of the discovery, infers, from the information which he obtained, that there must have been at least forty trees found, and judging by the area excavated, he is of opinion that they could not have stood more than three or four feet apart. There were no traces of roots, the stems disappearing at the point of contact with the coal. Several specimens of *Stigmaria ficoides* were also noticed by Mr. Conway, lying horizontally and about three feet in length.

With reference to fossil trees in general, and especially to those near Manchester, Mr. Bowman proceeds to show still further; 1st, that they were solid, hard-wooded, timber trees, in opposition to the common opinion that they were soft or hollow; 2nd, that they originally grew and died where they have been found, and consequently were not drifted from distant lands; and, 3rd, that they became hollow, by the decay of their wood, from natural causes, similar to those still in operation in tropical climates, and were afterwards filled with inorganic matter, precipitated from water.

1. In stating his reasons for believing that the coal measures' casts were solid timber trees, Mr. Bowman alludes to the rifting of the bark of modern forest trees, in consequence of the expansion caused by the annual addition of a layer of wood between the bark and the alburnum; and to the thickening or swelling of the base of the trunk

and main roots, and the apparent lifting up of the latter out of the soil, in old trees, by the greater annual increase of the upper part or that nearest to light and heat. These phænomena in vegetation were illustrated by a diagram, which exhibited the form of the base of the stem and the root of a sapling, and of a full-grown tree. The author, in applying these characters to the fossils of the Manchester and Bolton railway, alludes to the irregular, longitudinal and discontinuous or anastomosing furrows on their surface, to the swelling out at the base of their stems, and to the divergence as well as the angle of dip or downward direction of their roots. These characters, he says, are not observable in soft monocotyledonous trees, their stems never expanding laterally, and being as thick when only a few years old and a foot high, as when they attain the height of 60 or 100 feet. Their roots also, instead of being massive and forking, generally present a dense assemblage of straight succulent fibres, like those of an onion or hyacinth. Analogy, therefore, as far as outward shape and habit are concerned, he adds, is strongly in favour of the fossils having been solid timber trees.

Mr. Bowman then combats the view, generally entertained, that fossil stems with perpendicular furrows, as in the Sigillaria, were succulent or hollow plants*. He states, that good specimens of decorticated Sigillariæ exhibit fine straight, and curled or gnarled striæ, similar to those on the alburnum of many modern forest trees; and that this character, in conjunction with others, renders it almost certain, that the fossils had a separate back,—a feature which is considered in vegetable physiology to be a proof of a woody structure. He also alludes to the existence in many of the decorticated parts of their fossil trees of little prominences like those in barked timber; likewise to the scars left by the disarticulation of leaves; and he accounts for the general absence of the latter on large and old trunks, by their having been obliterated, in consequence of irregular expansion from the deposition of new layers of wood: he notices moreover the absence in small Sigillariæ of the irregular furrows observed on large specimens, and due in his opinion to the unequal expansion by the addition of new layers of wood. In support of these proofs of the original solid nature of the trees, Mr. Bowman exhibited polished slices mounted upon glass of portions of a similar fossil tree discovered in sinking a shaft 300 or 400 yards N.W. of those found on the line of the railway. The slices were made from a portion which exhibited within the carbonized bark, a patch browner, heavier, and more compact than the rest. In these slices, made under Mr. R. Brown's direction, that gentleman discovered in the transverse section, the uniformity of vascularity which is evidence of coniferous structure; and in the longitudinal section parallel to the medullary rays, the ex-

* Specimens of recent dicotyledonous wood from New Zealand, lent to the author by Mr. R. Brown, were exhibited on the table of the Meeting Room. They displayed both upon the bark and the naked wood, longitudinal ribs and intermediate furrows as regular as those on Sigillariæ; and therefore prove that these characters are not incompatible with a dicotyledonous structure.

istence of these rays. The slices therefore exhibit proofs of dicotyledonous structure, and considerable probability of that structure being coniferous. The important evidence however of coniferous structure deducible from discs in sections parallel to the rays, was not obtained, the vessels having apparently undergone some alteration.

2. With respect to the second point, that the trees grew and died on the spots where they are now found, and that they were not drifted from distant lands, Mr. Bowman says, the arguments in favour of the formation of beds of coal by a series of subsidences of the surface on which the vegetables that produced the coal grew, naturally lead to the inference that the trees associated with the coal also flourished on the same spots. In opposition to the opinion that trees would naturally float in an upright position in consequence of the greater specific gravity of the base and roots, he asserts, that the trees would maintain that position only as long as they floated, and that they would fall and lie prostrate when grounded on shoals or cast ashore. He agrees with Mr. Hawkshaw in the opinion, that it is more difficult to account for a number of great trunks being deposited in the position of the fossils in the Manchester railway, than to imagine that they grew on the surface of the bed on which they now stand. Their position on a bed of coal is another proof, Mr. Bowman conceives, that the trees were not drifted, for if they had been transported by currents of water they might equally have been imbedded in the alternating shales or sandstones. If beds of coal are the accumulated remains of many generations of a luxuriant vegetation, the rich compost thus formed, Mr. Bowman argues, would be well suited for the growth of trees. Again, the angle at which the roots of the fossil trees, particularly of that distinguished by him as No. 2, dip towards the bed of coal, is considered by the author evidence of the trees being in their original position, because, had they been drifted, the roots would have been bent upwards, by the downward pressure of the trunk, when the water had left them. The appearance of the roots being cut off, where in contact with the coal, he is of opinion, may be explained by the fermentative process having dissolved the vegetable texture below the surface. The stems and upper portions of the roots standing above the coal, he explains by reference to similar phænomena in peat marshes, in which the bases of the trunks of ancient forest trees stand with the roots exposed, owing to the shrinking of the surrounding peat.

3. In discussing the third point, that the trees became hollow from the decay of their wood, and were filled with sedimentary matter after their immersion, Mr. Bowman refers to the facts recorded in the preceding paper by Mr. Hawkshaw (see *ante*, p. 386.); and in confirmation of them states, that Mr. Schomburgk during his four years' travels in Surinam repeatedly observed similar phænomena. Mr. Bowman then proceeds to explain the processes by which he conceives the fossil trees were gradually submerged—their upper branches torn off—their interior removed by natural decay,—their bark converted into coal,—their central cavities filled with sediment; and the whole buried beneath the stratum of shale or sandstone in

which the trees were discovered. He afterwards applies the phænomena which he believes these processes produced to the condition and position of the trees and the arrangement of the surrounding sedimentary matter. The author then enters into the inquiries, 1st, the time which the trees may have required to attain their dimensions; and consequently the minimum of years requisite for the accumulation of the vegetable matter; and, 2ndly, what thickness of vegetable matter was necessary to form the stratum of coal nine inches thick, over which the trees stand. Mr. Schomburgk is of opinion that a dicotyledonous tree which would require in temperate climates one hundred years to attain a certain diameter, would arrive at the same dimensions within the tropics in sixty or eighty years. The largest of the fossil trees forming the immediate subject of the paper is equal in circumference to an oak of 130 years growth in this climate, or about 100 for a climate equal in temperature to that of the tropics. Allowing therefore that some time elapsed after the commencement of vegetation on the surface of the then dry land before the trees began to grow, Mr. Bowman infers, that 100 years must be the minimum of time which would be required for the production of the vegetable matter out of which the nine inches of coal were produced. With respect to the depth of the stratum of vegetable matter from which it was formed, Mr. Bowman takes for his data, the thickness of the bed of coal, nine inches; the distance between the top of the seam and the bottom of the trunk under the arch formed by the roots, fifteen inches; and for the distance to the surface of the ground, four inches, or in all twenty-eight inches; whereby he infers that the thickness of the solid coal is equal to about one-third that of the vegetable matter out of which it was produced.

June 10.—A paper was read on the polished and striated surfaces of the rocks which form the beds of Glaciers in the Alps, by Professor Agassiz.

This paper was accompanied by a series of plates intended to represent the effect of glaciers upon the rocks over which they move.

These effects, consisting of surfaces highly polished, and covered with fine scratches, either in straight lines or curvilinear, according to the direction of the movement of the glacier, are constantly found, not only at the lower extremity, where they are exposed by the melting of the glaciers, but also, wherever the subjacent rock is examined, by descending through deep crevices in the ice. Grains of quartz and other fragments of fallen rocks, which compose the moraines that accompany the glaciers, have afforded the material which, moved by the action of the ice, has produced the polish and scratches on the sides and bottom of the Alpine valleys through which the glaciers are continually, but slowly descending. It is impossible to attribute these effects to causes anterior to the formation of the glacier, as they are constantly present and parallel to the direction of the movement of the ice. They cannot be considered as the effects of an avalanche, for they are often at right angles to the direction in which an avalanche would descend; they are constantly sharp and fresh beneath existing glaciers, but less distinct on surfaces which

have for some time been left exposed to atmospheric action by the melting of the ice. In the valley of the Viesch, the direction of the scratches is from north to south, or towards the Rhone; the direction of those which accompany the glacier of the Rhone is from east to west; that of those beneath the glacier of the Aar is first from west to east, as far as the Hospice of the Grimsel; and then from south to north, from the Grimsel to the Handeck. If we would account for these scratches by the action of water, we must imagine currents of enormous depth filling these highest Alpine valleys, and descending in opposite directions from the narrow crest that lies between them. In the upper part of the valley of the Viesch, is a glacier, beneath which runs a rapid torrent, co-extensive in length with the great current, to which the above hypothesis would attribute the polish and scratches on the rocks of the valley. This small torrent corrodes the bottom of the valley into sinuous furrows and irregular holes, and polishes the sides of its bed; but the polish is of a different aspect from that produced by the action of the ice, and of the stones and sand which it carries with it. The polished surfaces beneath the ice are often salient and in high relief. The sides also of the valleys adjacent to the actual glaciers are frequently polished and scratched at great heights above the ice, in a manner identical with the surface beneath it, but different from the polish of the bed of the torrent.

The amount of polish and scratches varies with the nature of the rocks. In the valley of Zermatt and Riffelhorn, rocks of serpentine are most exquisitely polished; so also are the granites on the sides of the glacier of the Aar, where they have not been long exposed to the action of the air. Gneiss and limestone do not preserve their polish under similar exposure, but retain it while they are protected by ice or a covering of earth.

These facts seem to show, that the striated and polished condition of rocks beneath and on the sides of glaciers, is due to the action of the ice, and of the sand and fragments of stone forming the moraines which accompany it.

ROYAL BOTANIC SOCIETY AND GARDEN.

The first meeting for the season was held November 10, at which a *résumé* of the proceedings of the General Meetings of the last season was read by the Secretary, who prefaced his extracts from the papers which had been read by stating that the principal objects of the Society were the formation of a Botanical Garden for illustration and reference, and the diffusion of botanical information of a general character, rather than the illustration of abstruse points, which are successfully pursued by societies with which the Botanic Society does not desire to interfere. Of the eleven meetings held in the spring and summer three had been purely for business, and among other things, that of obtaining the Charter, and endeavouring to procure from the Government some reduction of the high rent, which is a great obstacle to the progress of the Institution. At the

third meeting an introductory address was read by Dr. Sigmond. After stating the objects of the Society, and the necessity there is for a garden within reach of those lovers of the works of Nature who are found for a great part of the year congregated within this vast metropolis, but who have hitherto been denied so great and healthful a luxury, the Doctor entered upon a historical review of the gardens of antiquity; he referred to both sacred and profane history to show, that whenever Man was painted in a situation of pure felicity and of virtue he was placed in one of these delightful spots: such were the gardens of Eden, of the Hesperides, of Adonis, of Alcinous. He then traced the history of gardens from Grecian and Roman authorities; and showed that our Saxon ancestors were repositories of botanical knowledge; he referred to the reigns of Henry the First, Henry the Third, Richard the Second, and Elizabeth, to show that the cultivation of flowers had always been carried on with singular avidity. The discovery of the New World, and the persecution which drove the Protestants from the Netherlands, gave a great impetus to botanical research in England. Charles the First created the place of Royal Herbalist. Gardens have been established in various parts of England, at Oxford, in 1632, at Chelsea, in 1673, &c.; but still a garden so near the metropolis as to serve as a school for the rising generation, and a source of recreation to all classes, has been long a desideratum.

[It is surely much to be wished that this Society should meet with due encouragement, as the greatly increasing number of those students in the medical schools and the colleges now established in the metropolis, and others, of whose studies and recreations Botany forms a part, makes a well-stocked garden in the immediate vicinity exceedingly desirable; and no spot could have been selected within the same distance so well adapted as the Inner Circle of the Regent's Park, or likely to retain its salubrious air so long unimpaired by surrounding buildings. A plan of the Garden is annexed to our present Number. Its attraction as a scene of healthy and delightful relaxation may well be made tributary to the interests of science in behalf of a numerous class whose opportunities of pursuing botanical studies at a greater distance from town must necessarily be much less frequent than a garden so readily accessible would afford.—R. T.]

MISCELLANEOUS.

A new species of the Australian genus Alcyone.—It is thus characterized: *Alcyone ruficollaris*; plumage glossy green; upper parts and sides blue; under parts rufous; chin of a lighter red; a semicollar of rufous feathers on the nape of the neck. Wings short; third and fourth quills longest. Tail short. Bill black at the base, shaded to dark brown at the tip. Legs reddish-yellow. Claws of all the toes longitudinally furrowed. Seven inches in length from the tip of the bill to the extremity of the tail.

Habitat, mangrove trees, Port Essington. It is active, and so