PROCEEDINGS

OF THE

DUBLIN UNIVERSITY

ZOOLOGICAL & BOTANICAL ASSOCIATION.

VOLUME I.

With Thirty-one Lithographic Plates.

DUBLIN:
PRINTED AT THE UNIVERSITY PRESS,
BY M. H. GILL.
1859.

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PROCEEDINGS

OF THE

DUBLIN UNIVERSITY

Zoological & Botanical Association.

VOLUME I.—PART I.

JULY, 1858.

With Nine Plates.

DUBLIN:

PRINTED AT THE UNIVERSITY PRESS,

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LONDON:] [WILLIAMS & NORGATE.

PROCEEDINGS

OF THE

DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

FRIDAY EVENING, NOVEMBER 20, 1857.

Rev. Professor Haughton, F.T.C.D., Vice-President, in the Chair.

The Chairman having congratulated the Association upon their past progress, and expressed his sanguine hopes of their future success and permanence, founded upon the fact that this Association secured its members at their entrance into life, and bound them to its service by all the kindly recollections which every true son must bear through life to his Alma Mater,—passed a brief eulogy on their late deeply lamented President, Dr. Ball, and then reviewed rapidly the papers read before the Association during the past season, and published in the fourth volume of the "Natural History Review."

Among the more valuable of the papers mentioned were Dr. Harvey's description and figures of new British Algæ; Mr. Haliday's valuable additions to various branches of entomological science, including descriptions of a new genus and species of Diapridæ, and some valuable hints for observers as to the lacunæ yet remaining unfilled in the ranks of the native Diptera; Mr. Archer's interesting list of Desmidiaceæ from the neighbourhood of Dublin; Mr. Warren's list of the Natatores of Killala; and Mr. Greene's Acalephæ of the Dublin coast. Among the more popular of the papers, Mr. Haughton specially noticed Dr. Harvey's account of the Cannibals of the Feejee Islands, and Professor Smith's Botanical Rambles in the Pyrenees. The mention of this latter paper reminded Mr. Haughton that they, in common with the world of naturalists, had to mourn the death of its talented author, as well as that of their well-known late President, Dr. Ball, both removed within the past year from the scene of their labours, by a fate which, judged of by human reason

only, must be considered premature. He was happy to inform them that a memoir of their late President, written by Mr. R. Patterson, of Belfast, would be shortly placed in their hands. At the close of the preceding session Dr. Harvey had commented upon the loss sustained by them in the death of their late President. On this melancholy subject there could be no difference of opinion; but though their fellow-labourers had passed from their mortal vision, let them not be banished from their kindly recollections, and let the example they had set of zeal in the pursuit of science ever animate their successors and followers. During the meeting of the British Association in Dublin, this Association had been well and efficiently represented in Section D by Mr. E. Percival Wright's highly interesting and valuable description of the blind Lipura of the Mitchelstown Caves; by Mr. Greene, in his description of seven new naked-eyed Acalephæ of the Dublin coast; by the Rev. Eugene O'Meara's paper on the Diatomaceæ occurring in chalk; and, lastly, by Dr. Kinahan's elaborate and most valuable analysis of certain genera of terrestrial Isopoda. The foregoing papers formed a list, in Mr. Haughton's opinion, which would be highly creditable to the members of any society, and afforded good grounds of hope for the future fame of many of their junior members and associates. Among these papers there was only one which touched on Palæontology, a defect for which Mr. Haughton confessed himself somewhat to blame, and which he hoped would be rectified in future years. With regard to their prospects of papers for the coming winter, the Association might reckon with confidence on the entomological stores of Mr. Haliday, the botanical reserves of Dr. Harvey, the accumulated wealth of the College Museum, zoological and geological, in displaying which before them they might reckon on the zeal of the present Director of the Museum and himself. These would, undoubtedly, form the staple of their contributions, not to be called for unless other papers were wanting, but sufficient to fill up all gaps, and render every meeting of the Association interesting and instructive. At the conclusion of his address, Professor Haughton laid before the meeting the arrangements of the Board of Trinity College, by virtue of which Zoology and Botany were raised to the rank of the studies of the University, and incorporated with Physics, Chemistry, and Geology in one Moderatorship, to be called the Moderatorship in Experimental and Natural Science. The Moderatorship in Experimental Science was founded in 1851, and after the experience of seven years had been found to work so well that the authorities of the College had

decided on giving the same encouragement to the study of the natural sciences among the students of the University. The following is the course of study prescribed for the year 1858, in the several branches of Physics, Chemistry, Geology, Zoology, and Botany :—

MODERATORSHIPS IN EXPERIMENTAL AND NATURAL SCIENCES.

The following has been appointed for the Examination as a permanent Course of study; in addition to which special practical studies will be indicated from year to year. Half of the total marks in each subject will be devoted to the special studies :—

1. Physics.—Pouillet, Elements de Physique et de Meteorologie. Lloyd, Elementary Treatise on the Wave-Theory of Light.

2. Chemistry and Mineralogy.—Regnault, Cours de Chimie. Dana, System of Mineralogy. Rose, Elements de Crystallographie (traduit de l'Allemand par M. Victor Regnault).

3. Geology.—Lyell, Manual of Elementary Geology. D'Orbigny, Cours Elementaire de Paléontologie et de Geologie Stratigraphique (Partie Troisième).

4. Zoology.—Dallas, Outlines of Natural History. Woodward, Manual of the Mollusca.

5. Botany.—Henfrey, Elementary Course of Botany, Structural, Physiological, and Systematic.

SPECIAL STUDIES FOR 1858.

Physics.—Meteorology, especially that of Ireland, as illustrated by Dr. Lloyd's Report to the Royal Irish Academy.

Organic Chemistry.—The following parts of Miller's Elements of Chemistry, vol. iii. :—Chaps. i., ii., iii. Chap. iv., sect. i., and sect. ii. from paragraph 1059 to paragraph 1064. Chap. v., sect. i. Chap. vii., sect. i., from paragraph 1203 to paragraph 1216. Chap. ix., from paragraph 1317 to paragraph 1329. Chap. x., sects. i. and ii. Chap. xiv., sects. i., ii., and iii.

Geology.—Theories of Cleavage, Joints, Foliation, and Metamorphism of Rocks. The Palæozoic Crustaceans.

Zoology.—British Testaceous Mollusca; with especial reference to the development and anatomy of the types of the following Genera :—Anomia; Purpura; Chiton; Helix; Terebratula; Akera.

One-fifth of the special marks will be reserved for collections of British Testaceous Mollusca, collected and named by the Candidate during the preceding year.

Botany.—In Systematic Botany the Examination will be confined to the following Orders; which the Candidate will be required to illustrate by reference to the commoner native plants belonging to each:—

Ranunculaceæ,
Papaveraceæ,
Cruciferæ,
Caryophylleæ,
Geraniaceæ,
Rosaceæ,
Compositæ,
Rubiaceæ,
Borragineæ,
Labiatæ,
Scrophylarineæ,
Polygoneæ,
Euphorbiaceæ,

1. Characteristics of Order. Its structure and properties.
2. British Genera and Species.
3. Specimens will be produced at the Examination, which are to be correctly named and classed by the Candidate.
4. The Candidate will have to give a written description of one or two selected plants, to test his familiarity with botanical terms.

Lastly, one-fifth of the special marks will be reserved for collections of native plants, fairly dried, and which have been collected, examined, and correctly named, by the Candidate, during the preceding year. This collection not to be restricted to plants of the above Orders, but to comprise the greatest number of species which the Candidate can obtain. The name of Genus and Species, and of the natural Order to which it belongs, to be affixed to each specimen.

At the conclusion of his address Mr. Haughton reminded the members, many of whom were undergraduates, of the advantages now opened to them by the College lectures on Zoology, Geology, Chemistry, and Physics, and of the high reward now for the first time offered to the study of Zoology and Botany in the University of Dublin. The title of Gold Medallist of the University of Dublin was one which he hoped would always be a high distinction for a young man to attain to; and he felt confident that among the young naturalists he had the pleasure of addressing, there were some who, if honored with such distinction for their zoological and botanical knowledge, would eventually prove themselves as worthy of that title as the best mathematicians and scholars this University had ever produced.

The Secretary read a paper, entitled—

NOTE OF THE OCCURRENCE OF THE HYPEROODON BUTZKOPF (BOTTLE-NOSED WHALE). BY ROBERT PATTERSON, M.R.I.A.

On the 22nd September, 1857, a whale of this species was captured on the southern shore of Belfast Bay, in one of the channels between Bel-

fast and Holywood. I had the opportunity of seeing it on the ensuing day; and afterwards, by the kind co-operation of Mr. Richard Allen, Assistant Engineer to the Harbour Commissioners, ascertained its dimensions.

Mr. Thompson has recorded ("Natural History of Ireland," vol. iv.) the occurrence of this species of whale in the same Bay on two former occasions. The first was taken at Ballyholme, near the entrance to Belfast Bay, on the 16th September, 1839; the second at Cultra, on the 29th October, 1845. That taken on the 22nd September, 1857, was the third in the space of eight years. All three were killed on the county of Down shore of the Bay, and at nearly the same season of the year.

The measurements of the Cultra specimen of 1845 are republished here, that they may be compared with those of the more recent capture. The former was a male; the latter, a female. The dimensions are very similar. The stomachs of both contained the beaks of cuttle-fishes. Four teeth were found in the Cultra specimen, the skull of which is preserved in the Belfast Museum; two only were detected by Professor Dickie in that of the other. The weight of the Hyperoodon of 1857 was $2\frac{1}{2}$ tons; the quantity of oil produced was 90 gallons.

Measurements of the Hyperoodon taken in 1857 *and of that in* 1845.

	1857. Ft.	In.	1845. Ft.	In.
Length, measured in a straight line from snout to tail,	20	5	20	4
Ditto, measured along the dorsal curve,	22	6	23	4
Greatest height,	4	3	4	6
Ditto, girth,	11	0	11	6
Breadth of head, on a line from eye to eye,	2	9	3	0
Length of rostrum,	1	2	0	11
Depth of jaw at point,	0	$3\frac{1}{2}$	0	4
Length from point of snout to eye,	3	6	3	1
Blow-hole from point of snout following dorsal curve,	3	2	3	9
Ditto, in length (crescentic form),	0	6	0	6
Pectoral fins, from base of snout,	5	5	5	0
Ditto, space between them,	1	$8\frac{1}{2}$	1	7
Ditto, in length, from base at upper side to point,	2	1	2	2
Ditto, in breadth, greatest,	0	$8\frac{1}{2}$	0	7
Dorsal fin distant from caudal fin, estimated from a straight line drawn from snout to tail	7	1	8	0
Dorsal fin, length at base,	1	6	1	7
Ditto, length from base to point (points backwards),	1	0	1	0
Caudal fin, greatest length,	1	9	1	11
Ditto, ditto, breadth,	5	10	5	6
Ditto, ditto, thickness,	0	$4\frac{1}{2}$	0	3
Aperture anterior to vent in length,	1	$5\frac{1}{2}$	1	0
Ditto, ditto, of vent in length,	0	6	0	6

It may be proper to remark, that these measurements should be re-

garded only as *approximately* correct. Perhaps no two individuals, measuring the same specimen at different times, would exactly agree in their record.

The Secretary also read a paper—

ON THE TEETH OF THE HYPEROODON. BY DR. DICKIE.

On my arrival in town some weeks after the capture of the Hyperoodon, I accompanied Mr. Patterson to the chemical works of Mr. Ritchie, where the bones of the animal were lying. We examined the jaws very carefully, but found only two teeth, one on each side of the lower jaw, near the symphysis. Each is a hollow cone, open and jagged at the base, and ending somewhat abruptly in a very sharp point. I prepared a longitudinal section of one of the teeth, and found a small quantity of osteo-dentine at the base, with a layer of cement inclosing the central dentine. The cement extended all over the tooth, but was very thin at the apex, this thinning taking place abruptly a little way below the tip. Enamel is altogether wanting, in which respect the teeth of Hyperoodon differ from those of the Dolphin, which have a layer of enamel near the end.

Professor Owen, in his "Odontography," alludes to tubercles on the roof of the mouth which are supposed to represent the baleen of the Balænidæ; he had not examined any specimen of these tubercles. Unfortunately, in the example which came under my notice, all the softer parts had been removed from the upper and lower jaws, except those which correspond to the gum, and embedded in the putrid, though still very tough, remains in which we found the two teeth alluded to.

After which the members proceeded to ballot, and the following gentlemen were elected as officers for 1857-58:—

President.—Alexander H. Haliday, A. M., M. R. I. A., F. L. S., &c.

Vice-Presidents.—Professor W. H. Harvey, M. D., M. R. I. A., F. L. S., &c., and Rev. Professor S. Haughton, A. M., F. T. C. D., M. R. I. A., &c.

Honorary Members.—The Rev. the Provost, the Rev. the Vice-Provost, the Senior Fellows.

Treasurer.—The Rev. Thaddeus O'Mahony, A. B.

Librarian.—W. B. Brownrigg, Science Scholar, T. C. D.

Honorary Secretaries.—Joseph Reay Greene, Professor of Natural History, Queen's College, Cork; and E. Percival Wright, A.B., M.R.I.A., Director of the University Museum.

Botanical Committee.—W. H. Harvey, M. D., Professor of Botany, V. P., Chairman; William Archer; John Bain, Curator of the College Botanic Gardens; Rev. Eugene O'Meara, A. B. (Council); H. C. Beauchamp, M. B., M.R.I.A.; E. Percival Wright, A. B., Secretary.

Zoological Committee.—Rev. S. Haughton, A. M., Professor of Geology, V. P., Chairman; Alexander Carte, A. M., M. B., &c.; Alfred Furlong, M. R. I. A.; Robert Harrison, M. D., Lecturer on Zoology, &c.; J. R. Kinahan, A. B., M. B., &c. (Council); J. Reay Greene, Secretary.

Council.—The President, the Vice-Presidents, the Treasurer, the Honorary Secretaries, Rev. Eugene O'Meara, Botanical Committee; J. R. Kinahan, Zoological Committee; Professor Harrison, M. D.; Professor Ingram, LL. D.; Professor Stokes, M. D.

FRIDAY EVENING, DECEMBER 18, 1857.

Professor W. H. Harvey, M. D., M. R. I. A., F. L. S., Vice-President, in the Chair.

The Minutes of the previous Meeting having been read, were approved of, and signed by the Chairman.

The Secretary laid on the table the following—

MEMOIR OF THE LATE ROBERT BALL, LL. D., M.R.I.A., PRESIDENT OF THE ASSOCIATION. BY ROBERT PATTERSON, M.R.I.A., ETC.

Robert Ball was the son of Bob Stawel Ball, of an ancient and respectable family, who came from Bampton, in Devonshire, and settled in Youghal in the year 1651. He was born at Cove (now Queenstown), county of Cork, on the 1st of April, 1802. From childhood he manifested a strong spirit of inquiry. A note, written by himself, says:—"I was often quizzed for my infantine expression of 'What's that?' 'What would it do to a person?' and rated for breaking musical toys to ascertain the mode in which the sound was produced." In animals of all kinds he took especial delight. On one occasion his teacher, observing that he was not paying attention to his lessons, inquired into

the cause, and found he held in his hand a live lizzard, which he took every opportunity of looking at, and playing with, under the table.

Among his pets was a kite, which had been brought to him with a broken leg. He made a wooden one, and this answered so well that his feathered favourite hopped about on it long afterwards at Youghal.

He was remarkable from his earliest childhood for his truthfulness. Once only he was punished by his father, in consequence of his being suspected of breaking a valued rose-tree. He positively denied the act, though he bore the punishment quietly; the following day the true culprit was discovered.

When nine years old he was sent to the Rev. Dr. Stewart's school, at Clonakilty, county of Cork. That his observant faculties were then active may be inferred from a passage in one of his letters to his friend, the late William Thompson, Esq., of Belfast, dated March 3, 1840:—"I have told you before that I found two shells (*Physa*), when nine years old, near Clonakilty, which I deposited in my little cabinet at vacation time."

Another instance of the same characteristic, which occurred when he was a year older, is narrated in a letter to the same friend, dated December, 1839:—"When a boy I remember watching a turtle resting on the surface of the water in the harbour of Cove; it went down on coming near it."

Perhaps, however, the most striking instance of his early powers of observation is that which he himself afterwards communicated to the Dublin University Zoological and Botanical Association:—

"I recollect, when I was but a child, the many delightful days I spent in examining animals on the shore, and I am conscious of having at that time seen many rare species, not a few of which have since been brought forward as recent discoveries. I may instance one,—the *Cydippe pomiformis*, which I distinctly recollect to have seen when I was not five years old. I found it in a pool, and brought it to my father as the lens of a haddock's eye, which had come to life. I quite remember its cilia and iridescence, and how deeply I was absorbed by its beauty."—(Nov. 16, 1855.)

He was afterwards transferred to the school of Mr. James White, at Ballitore, county of Kildare. This gentleman had tastes in some respects congenial to his own, and was therefore disposed to encourage

the natural history pursuits of his pupil. The friendship that sprang up between them did not cease with the school-days of Robert Ball, but continued in after life. There is now before me a letter of Mr. White's to him, dated "1st Mo. 19, 1835," stating that he had sent him by a carrier some living specimens of a lamprey (*Petromyzon*), the species of which appeared doubtful. Mr. White also asks where he shall find a description of the urchin (*Echinus*), "that hollows for itself a hemispherical lodgment in stone," adding, "I have sought it in vain in Cuvier, Blumenbach, &c." The schoolmaster who was directing his attention to such inquiries showed an appreciation of zoological science far in advance of what was usually met with at that period.

Of those who were the companions of Robert Ball at Mr. White's school, few now remain; but among those few is Dr. Longfield, one of the Commissioners of the Incumbered Estates Court. That gentleman, in answer to an inquiry respecting the appearance and habits of his school-fellow, has most kindly furnished the following note:—

"He did not remain long at that school after I entered it. That circumstance, combined with the length of time (nearly half a century) which has since elapsed, makes me unable to give much information about his pursuits and habits there. I remember, however, that he was about my own age, was very slight and tall for his years. He was a pleasant companion, from the good temper and fairness with which he played tops, balls, marbles, and all other childish games. He used also to entertain us with stories of cranes, seals, and other animals. He was the only one of our class of *little* boys who had ever seen a seal, and he was never tired of telling stories about these animals, nor we of listening to them." These are "the trivial, fond records" of early life, the recollections preserved by relatives and friends; yet the biographer would be justly blamable if, because of their being trivial, they should be blotted out. They shadow forth, even in their triviality, the future man; they demonstrate the existence in him of tastes and habits which were rare at that time, but which, happily, are so no longer.

The ability which Ball displayed at Ballitore recommended him to his teachers, and the genuine kindliness of his disposition made him a favourite with his school-fellows. He is described as having been gentle and docile, fond of making experiments on birds, frogs, &c., retreating sometimes to his own room for that purpose, and when interrupted by the boys, driving them away with his bolster! He was blessed with

high spirits and great bodily vigour. It delighted him to use a large bow and arrow; the bow was one that no other boy at the school could bend.

One cause of complaint, however, existed against him, and not without reason. The worthy lady who at that time took especial charge of the boarders' clothes, and who is yet living, could not infuse into young Ball her own innate love of neatness in regard to dress. His clothes were occasionally torn, and often soiled or dirtied, while he was intent on obtaining some specimen, which to other eyes seemed worthless. A limestone quarry near Mr. White's residence was rich in fossils, and these lured him in his play-hours to efforts which were frequently damaging to his habiliments, and not at all conducive to habits of personal tidiness.

At the age of sixteen he left Ballitore and returned home to Youghal. During the next few years his bodily frame was gradually developing itself by active outdoor occupations, and his observant powers were in constant exercise. Not, however, content with merely *observing*, he *recorded* much that he saw, and sought to classify and arrange the multifarious objects which a sea-side residence brought under his notice.

His occupations were very diversified, including drawing, wood-turning, classical reading with a tutor, and physical science, so far as it could be carried on in the observatory of Dr. Dartnel. He read much, and as his memory was retentive, it is probable that the miscellaneous books which then fell into his hands contributed largely to the varied characters of the information he possessed.

It was during the years now spent at Youghal that a large amount of his extensive zoological knowledge was acquired. He fought his way to it alone and unaided, and through difficulties which would have deterred one who was less in earnest. An early friend of his, and one whose friendship throughout life has been "without variableness or shadow of turning," Richard Dowden (Richard), of Cork, has kindly supplied some memoranda, from which the following passage is extracted:—

"Dr. Ball was a self-made naturalist; he enjoyed no opportunities of an assisting nature; he had no one of any position in his science to applaud or sustain his exertions; indeed, on the contrary, the only person who gave attention to science, in Dr. Ball's contiguity, was interested in natural philosophy, and rather contemned 'the preparing of skeletons

on the sea-shore, and such' (as the natural philosopher called them) 'useless and slovenly operations.' But Dr. Ball worked on; he did not depend on sympathy for his encouragement, and the only help he sought for was aid in determining a species, or establishing a habitat, or an animal's habit. This kind of inquiry in a country town, thirty miles from a very moderately supplied natural history library, had its difficulties and its disappointments. Dr. Ball, though he left us in the very vigour of his life, began his natural history progress at a time when a literature fitted to help him did not exist in the extent which may now be easily commanded. Descriptions were carelessly and obscurely given; writers often contradicted each other, and put the inquirer into confusion; any of the less common objects were scarcely known, and 'Shaw's Miscellany of Natural History, in twenty-four duodecimos,' was considered the cyclopædia of marvels, where everything beyond the most every-day objects in natural history was to be found. There were other books in great metropolitan libraries, but when postage was high, when railroads were unknown, and when travelling after knowledge was rare, the resources of a provincial investigator were rather limited. I record these facts because they may indicate to young men how much of our progressive power is our own. No doubt every facility should be prized and taken advantage of; but when we find zeal and perseverance thus making a noble triumph over most discouraging wants, it is obvious that earnestness is the first power leading to success, and that, without it, no abundance of materials can make any man a really well-informed and useful naturalist."

At all periods of his life Dr. Ball devoted much of his energy to institutions having reference to the well-being of others. Accordingly, as he approached the age of twenty-one, we find him taking part in the management of the Loan Fund in Youghal, the Savings Bank, the Fever Hospital, and the Library and Reading Room.

Great distress unhappily prevailed about this time among the starving poor, and large collections made for their relief were confided to him. For his prudent conduct as Secretary and Treasurer to this fund, he afterwards received the marked thanks of his fellow-townsmen.

In the year 1824, a few months after coming of age, he was appointed a local magistrate, and, in the active discharge of his duties as such, encountered the risk of assassination, from which he more than once narrowly escaped.

He was afterwards introduced to the Duke of Devonshire by Mr Abercromby. Both were interested in his welfare, and he sought their aid to procure some metropolitan employment, which would enable him to pursue the study of medicine without expense to his father. His request was kindly met, but with an expressed desire that he should abandon his studies, and enter the Government service.

Furnished with a letter to Lord Melbourne, then Chief Secretary, he went to Dublin in 1827, and was appointed to the third clerkship in the Constabulary and Yeomanry Office. The duties were onerous, but were entered on with zeal and determination. To his father he writes:—"I have determined not to embark in any other study at present besides that of making myself acquainted with the duties of my office." In another letter he says:—"I have been hard at work for ten days from 10 o'clock until after 7 o'clock." And in 1828 he writes:—"I am at present too hardly worked to attend to any very serious studies."

On the 6th of January, 1829, he writes thus:—"New Year's day, though a holiday, I devoted to finishing off all business connected with the last year. When done, I made a comparison between the quantity of duty performed by me since I came into office, and a similar period of my predecessor's (viz., 13 months). My correspondence occupies 1281 pages; his, 491. Letters have increased seven-fold, and other business in proportion. I merely mention this to prove that our labours are something more than nominal."

His subsequent letters to his father show that he did not find scope for his energies in the routine duties of the office, and that he longed for a change. 1829. "Should any opportunity be afforded you, I wish you would let it be understood how gladly I should accept any more personally active employment, holding out brighter prospects, though without even so much of present emolument; as, in the changes in Government regulations about to be made, I may be thrown out, when too late to turn with hope of success to any other pursuit. My former occupations and acquirements would be of much advantage to me in other ways, but are of no use to me at present."

The following is in a more animated style, caused, doubtless, by the pleasure of having spent an entire day in the open air, engaged in agreeable excitement in company with one of his most valued friends:—"Yesterday was the King's birth-day, and instead of going to the review, I went with W. Todhunter to Howth, on a cruise against the seals. We

had a grand battle, and succeeded in securing one fellow of about four cwt. It was very exciting; we went armed with grains and guns; we saw three seals; the first got off clear; the second we struck with our harpoon, but, though tolerably deeply wounded, he got off, leaving us only a little blubber. The last fellow Mr. M. and I struck; I buried my harpoon to the shaft in the shoulder, in about eight feet of water. He took our boat out of the cave with amazing rapidity, and, after hauling us about for some time, was obliged to put up his head, when we succeeded in dispatching him, but not until we had fired four shots, though our harpoons were so bent, and the shafts so broken, that we had to go to the lighthouse to get them repaired. When they were done, the swell had so increased that it became impossible to approach the rocks; we were then caught in a squall, and shipped a few seas, but got safely into a creek in Howth, and came home in the evening with our prize. On examination, my harpoon had penetrated the ribs, lungs, and heart; so much for gymnastic vigour. The creature measured 7 feet 2 inches in length." It is now in the Museum of Trinity College, Dublin.

The next five years (1829 to 1834) contain few events to record, but his letters to his father show a constant desire to escape from the thraldom of the office desk to some more active employment. He still clung to the idea of entering College and going to a profession. At one time he thought of applying to be made a stipendary magistrate; at another, he looked with a longing eye towards India. Anything demanding vigorous intellectual effort would have been hailed with pleasure, as much superior (to use his own words) to "a state bordering on inanity, caused by a long course of stupid work."

A few extracts from his letters tell all that need be told. In one respect they are remarkable—for the extreme deference which they uniformly evince to his father's opinions and wishes.

February 25, 1830. "There are in course of appointment a number of stipendary and resident police magistrates throughout the country; and from my knowledge of some of those already appointed, I am led to think I would not be an unfit candidate."

The two following are of the same year:—

"We are kept closely employed from a little after 10 until 7 each day, and I understand we have no chance of any intermission of this continual application. There are some other circumstances equally unpleasing, but as I am not allowed to make any attempt to relieve myself of them, I must only submit."

"I cannot refrain from expressing a desire that you would consult with ——— as to my engaging in some professional pursuits; for, not to mention the unpleasantness of my present situation, its precarious tenure would be sufficient to make me desire some future source to look to, independently of my anxiety to advance my mental powers (which at present appear to be retrograding, and which, without some ultimate object, I have not sufficient energy to cultivate). I am inclined to think that some important changes are contemplated, which will be much to my disadvantage. I cannot help putting you in possession of my wishes, which, should you still consider futile, I will endeavour to suppress."

1831. The letters of this year contain frequent reference to hard work:—"I was employed until 3 o'clock Wednesday, A.M., in consequence of a Return called for in Parliament. I have been for weeks together working twelve hours a day."

In December he was made Assistant Librarian and Keeper of Records:—"This, I hope, will be more instructive than my present occupation; my duty being to read, index, and make minutes of the several papers submitted to Government; and will afford opportunity for acquiring a very considerable knowledge of the State. Being an improver and inventor of the index, has probably put me in for this." 1832. "I have not yet made up my mind about the College affair; it would cost me over £100 to enter as a Fellow-commoner and to take rooms in College. As I cannot muster that sum, this course cannot be taken, and it would take me several months' preparation to enter as a Pensioner." "I have credit in the new office as a clever machinist, having suggested a copying machine on a construction, I believe, entirely new; I obtained leave to have two of them made."

"As I have received no reward for extra labour, I have determined not to undertake more than my neighbours; I shall then have more time to myself, which I may dispose of usefully in acquiring a profession. J. W. is just about to sail for India as a surgeon to an Indiaman; this, though no great speculation, yet as possessing manly enterprise, and affording room for acquisition of knowledge, would be to me far preferable to drudging away life at a desk, for merely the means of existence."

In this year a consolidation of the different branches of the Chief Secretary's Office took place, and to his surprise he found himself at the bottom of the new office, having eleven placed between him and a certain

amount of salary, where only *one* had been before. This was a grievous injury, and he waited on Sir William Gosset, Under Secretary, who acknowledged the hardship, but said that a compensation for immediate injury was given by the better ultimate prospect of £800 per annum. Thus he was again dissuaded from seeking a professional education.

Neither office-work nor official vexations could quite chill his efforts. The mind would be at work; and a letter addressed to the very Rev. the Dean of St. Patrick's contains the expression of opinions, which, though generally received now, were, a quarter of a century ago, regarded as questionable.

"I have often thought how much the cause of true religion would be strengthened by the support of science, in such cases as it is applicable to it, leaving the portions of Revelation that are beyond human reasoning to themselves. And much have I felt how it has suffered by attempts to make *demonstrably* true science bow to the *letter*, not the *spirit* of Scripture; a practice which I believe has often made the youthful philosopher an infidel, for, satisfied that his teacher is wrong in some instances, he is too apt to presume that he is wrong in all."

A letter to a relative (1833) says, in speaking of Kirby and Spence's "Entomology:"—"The two first volumes may be read with interest even by that *diseased creature*, a novel-reader, provided the malady be not of long standing; the other two are more serious affairs, but will amply repay the labour of studying them, and leave the mind charged with a quantity of matter capable of affording enjoyment for the longest life." The letter graphically compares the "out-and-out novel-reader" to a dram-drinker, and dwells on the injurious mental effects of reading devoted too exclusively to common works of fiction. In 1832 he became a member of the Geological Society of Dublin. In June, 1834, he enjoyed a holiday excursion with Mr. Thompson to Arran, visiting, before his return to town, Killarney, Cork, and Youghal. Many observations then made by these brother naturalists and friends were duly recorded by Mr. Thompson, and eventually published.

While, however, his Castle duties went on daily, he was gradually becoming known outside of the "office." His retiring habits did not prevent his information and abilities from being recognised by those who were able to estimate them aright. Such men were soon converted into personal friends, who were glad to draw him into their scientific

and literary circles, and offer to him those graceful hospitalities for which the Irish metropolis has been justly celebrated. His life may henceforward be regarded under two aspects,—the official and the scientific. Let the reader "look on this picture and on this:" they are widely different, yet they each convey to us a true representation, not of the external condition, but of that which is unseen, and which constitutes the real life of man.

The letters to his father during 1835, 1836, 1837, are numerous, and many of them contain complaints of Castle work. His duty there would appear to have been particularly arduous or unpleasant, for he states that he had offered a sum of money as an inducement to any of the other clerks in the office to exchange with him, and they had all refused. Nor was he more successful in his application to the Under-Secretary, for that gentleman said the duty was so well done he must refuse to make any change. The most real and tangible hardship, so far as is apparent from the letters, arose from a stranger having been appointed, in 1835, to the head clerkship of the office,—thus extinguishing the hope which Ball had entertained of ultimate advancement. Amid all this occupation Natural History still made her way to him, and soothed many a weary hour. His zoological knowledge was becoming more generally recognised, and for months not a day passed during which specimens were not submitted to him for examination. He did not, however, allow "the voice of the charmer" to interfere with what was prescribed by that sterner monitor, public duty. In one letter he uses the remarkable words (under date January 19, 1837):—"Whatever may be my inertness and inattention to private affairs, I can most conscientiously declare that I have been the *most* zealous public servant I know, and have rendered really very important services, and never neglected any duty intrusted to me, or involved the Government in difficulty."

Disappointed in his hopes of advancement, and dissatisfied at the remuneration paid for his labours, he looked with complacency on every project that promised an escape from desk-work, and an energetic, independent career of usefulness. It is not strange, therefore, that at times there flitted before him a vision of New Zealand, and that for years after this period his thoughts turned towards its proffered freedom. In one letter (9th February, 1839), in speaking of the colonization and improvement of that country, he says:—"I am physically and men-

tally particularly well suited for the work; and though banishment from the many friends I possess would be most painful, yet the high nature of the service to be attempted would console me."

The intervening years from 1834 to 1840 were eventful and important both in his social and scientific career. On the 12th January, 1835, his friend William Thompson, Esq., of Belfast, wrote to him in the following terms:—"As you have not at present sufficient leisure to impart (in print) your accumulated knowledge of the Natural History of this country, I mean to forward for publication all you communicate to me, in your own name, and mark it off with inverted commas as your production, doing, at the same time, as I would be done by, in correcting any verbal matters that in your haste did not claim a second thought." Such was the simple commencement of that correspondence which did so much to elucidate the Fauna of Ireland, and has preserved hundreds of observations made by Dr. Ball, which would otherwise, in all probability, have perished with him.

It was in this year, 1835, that I first became acquainted with Ball. I was introduced to him by a note from Thompson, which now lies before me. From this period until his untimely death our correspondence continued, progressing from the topics which belong to literature and science, until it included those whose province is the domestic hearth, and which flourish only in the atmosphere of a happy home.

In the early part of this spring he became a member of the Royal Irish Academy, and was elected on the Council of the Zoological Society. He paid a visit, with Mr. Thompson, to Ireland's Eye, and mentions that he got "one hundred and fifty specimens of plants, and upwards of fifty species of algæ." He speaks in high terms—which all who have used it can corroborate—of a varnish specially adapted for natural history specimens, and a mode of preserving fish "which really is superlative." In that summer the British Association for Science held its meeting in Dublin. Ball took, of course, an active part in what was going on:—in the business of the Natural History Section; in the arrangements at the Zoological Gardens for the visit of the Association; and in acts of attention and hospitality to many of its members, with whom he then formed a personal acquaintance. At this meeting he was requested to investigate the mode in which the *Echinus lividus* excavates the rocks on which it is found.

The year 1835 was memorable in another respect. In it he accomplished a visit to the islands of Arran, lying off the west coast of Ireland, at the entrance of Galway Bay. His companion was the Very Rev. Henry R. Dawson, Dean of St. Patrick's, whose splendid collection of antiquities now graces the Museum of the Royal Irish Academy. The excursion occupied only nine days. Immediately after his return Mr. Ball committed all the little incidents of the tour to writing, in the form of a journal addressed to one of his sisters. Nearly a quarter of a century has since passed by, and Time has been busy in the interval, changing to the visitor the mode of locomotion, and much that was peculiar in the physical and mental characteristics of the inhabitants. Some interest attaches to the narrative, as conveying the impressions formed by two observant and intelligent travellers; but the extracts now given have been selected for a different reason. They convey the most truthful, the most unstudied evidence of the mind of him by whom they were written. They show his quickness of observation, and his range of zoological knowledge; his quiet enjoyment of the ludicrous, and his wish practically to inculcate anything useful. In the peculiar and somewhat antiquated style of expression, those who were intimate with him will recognise phrases that to him were habitual. The Dean appears throughout in the most amiable light, putting up good-humouredly with the rude accommodation which the locality afforded, and desirous on all occasions of forwarding the pursuits of his companion.

The travellers started from Dublin by the night-mail on Monday, the 8th of June, and reached Galway next morning. The Journal, which is termed by its writer, "Account of a Travel into Arran and county of Galway," informs us that they sought a "native boat," and started for Arran "in a miserable hooker, laden with salt and women, taking as a sea-store two lobsters." It fell calm, so that they had to remain on board during the night, but "had the use of the quarter-deck conjointly with an old woman, who never had a cap, bonnet, shoes, or stockings; and a sailor, fisher, smuggler, who never had his feet cased in aught but pomputies, with a Gospel tied about his neck to protect him from peril at sea and dangers by land, and for which he had paid his priest half-a-crown." The peculiar article of dress just mentioned as worn on the feet of the sailor is thus explained:—

"The pomputie is the only peculiarity in the dress of the men. It is a sort of shoe made of a single bit of raw hide, drawn up by two

strings, and is really a good thing for travelling over rocks. The women's dress is very peculiar almost all through the county of Galway and places thereunto adjacent; it is simple, and looks well. The great majority wear only a jacket and petticoat of a red crimson, subdued, coloured woollen stuff; their hair Madonna style, twisted up at the poll; feet bare; a few of the richer wear shoes, and stockings of a kind of powder-blue colour, and cloaks to match. These harmonize very well with the red garments, and give a picturesque effect."

"We arrived at 5 o'clock A. M. in the island of Arran, and found a fleet of boats just going to fish. The women, in their reds, coming down to the shore with tubs, &c., for the salt we had on board, had a fine effect. The morning clear and fresh, the sea as transparent and smooth as glass, and nothing to break the silence save the noise of the sweeps (large oars) of the boats going out, and the Irish jargon of the women announcing how many pounds (they are too ignorant to count larger weights) of salt they had got, to their friends on shore; the men were all at sea.

"The island consists of a barren and in most cases a naked rock. Each house has, in consequence, one advantage over any elsewhere: it is, that the floor is invariably a single flag; as, indeed, are many of the fields, which, strange to say, are walled-in with great care. It cannot be for the trifling herbage that springs from cracks or fissures, generally many feet asunder; it should rather be ascribed to the desire man has of asserting his right of property, the more strongly as the matter in question is least worthy of contention. I must now describe our hotel: it was a cottage of three rooms and a set-off, with a courtyard in front. We became the tenants of the principal room, from which an officer of the Waterguard was ejected without ceremony. This room contained two beds, built into the wall after the fashion of the berths of a ship; a dresser, with a teapot of awful dimensions, and two or three glasses and plates upon it; a table and two chairs of deal, beautifully perforated by that most ingenious chap, the *Teredo navalis*. The ornamental part consisted of a chaplet or necklace of sea-fowls' eggs. This hotel is like an expanding portmanteau, and accommodates inmates *ad infinitum;* as the landlady told us she had seventeen, besides herself and six children, in it a few nights before; and while we were there, there was a considerable influx of visitors, who were at once taken care of, but did not encroach on our territory.

"The O'Flaherty we met advancing. He led us to his house, and offered sundry edibles, which we declined; and he accompanied us to Dunengess,* the mighty fortress of a race of which no record remains. It is in magnitude almost a Colosseum, and when perfect was an ellipse, the transverse diameter of which was ninety-one feet. A portion of it has, with the cliff on which it stood, long since fallen into the sea. The wall is curiously constructed, being, in fact, a triple wall in contact, so that if the outer were battered down, a perpendicular face would still present itself; and so of the next, giving a great opportunity to the defenders to punish the besieging foe. It is built of large, naturally-squared stones; and but two entrances remain: they are very small, about 5 feet 6 inches high. The wall is 15 to 18 feet thick, and may have been 40 high. It is surrounded at some distance by two other walls, outside which is a species of stockade composed of long, sharp-pointed stones, set with their points inclining outwards. Even at the present day it is no easy matter to get through them. In the interior of the building the rock forms a natural table of gigantic proportions, and in the cliff which intersects the building the sea-fowl breed. The magnitude of the whole, considered conjointly with the spirit and capabilities of the present wretched inhabitants of the island, make it the more puzzling to guess who or what people raised so vast a fabric. There are many other buildings of great magnitude which we saw in the island, apparently constructed as places of defence. What they who built them had to lose on so barren a rock, or they who attacked to gain, is beyond my ken.

"After leaving this building I went to where Thompson and I found the *Astragalus hypoglottis:* it was not; and a fear came over me that we should suffer in fame, as Sir C. Giesecke has done, in finding a plant that could never again be discovered. However, I at last made it out in considerable quantities, collected it, and sent it to the College Garden, where it now grows stoutly. From this we visited the breeding-places of birds (the *Alca torda*, *Uria troile*, and *Larus argentatus*), and saw

* In the sheet published for the use of the British Association visitors in 1857, this is spelled Dun Aengus, and it is stated that this name "is derived from Aengus (chief of the Firbolg Clann Huamor), who, with Concovar, his brother, was granted these islands by Meave, Queen of Connaught, shortly before the general Christian era."

them in vast numbers in the act of incubation. We saw where a powerful anchor and chain-cable lay at the foot of the rocks, marking the place that a stout ship had struck on a few months before. The O'Flaherty and many others saw her from the cliff above; she drove right on the rocks, and in a few moments nothing was to be seen but fragments floating in the waves. With the power of an hundred men, they dragged the smaller anchor up the cliff; the larger is so fast tangled with its cable in the rocks, that it must stay as a mark of the wreck until it rusts away its solitary existence. The O'Flaherty here showed us a curious phenomenon: it came on to rain heavily, and he told us to sit on the edge of the cliff, and we should not get wet. We did so, and found that the rain was thrown over our heads in an arch of about five feet high; we did not get a drop.

"We then went our way for the Seven Churches, ruins of a small size, well built, and far surpassing the present erections in the island. On our way we gathered sundry curious plants: the maiden-hair (*Adiantum capillus-Veneris*), of which capillaire is made, and which the Arranites use as a medicinal tea."

The O'Flaherty, with the proverbial hospitality and kindness of the old Irish gentleman, had expected they would stay at his house, and was much disappointed by their refusal.

"We got to the hotel about 10 o'clock P. M., and, having eaten dinner, I forget of what, we went to bed, but not until I had put up my plants, and commissioned fellows to work for me in procuring eggs, birds for Garden, and specimens of the *Echinus lividus*. Not having lain down for two nights, save a sort of loll on the hooker's little deck, which a fellow prepared for us by washing or rather softening the filth on it with a wet swab, I had a glorious sleep for six hours. Getting up, the amiable Dean, seeing it a fine, calm day, insisted on my taking advantage of it by dredging for shells. The O'Flaherty joined us, and having procured the boat of the Waterguard, we set off towards Straw Island, passing over, in the first instance, vast fields of *Zostera marina*, which you may see so often puffed in the papers as *Alva marina*, superior to hair, &c., for beds. I endeavoured to teach the natives the use of it, for it is really useful as a material for bedding; but I doubt my lesson was thrown away, the answer, 'we never uses it,' being quite conclusive. I saw a woman salting gurnard with the heads on, while cod and other fish with edible heads were decapitated, and the heads

cast away. I endeavoured to show her how she was wasting a large portion of salt in preserving what was useless: she replied, 'we always leaves the heads on gurnits;' and this she repeated so often as to make it seem hopeless that she would not continue the old practice. Having passed the Zostera, we continued dredging; caught sundry Crustacea, and got a few shells and Algæ, but nothing rare.

"We landed on Straw Island, where we found the Matthiola in great profusion. It is the parent of the stock-gillyflower of the gardens; it is all purple, and possesses much more odour, I think, than the 'tame' plants. We found here the eggs of the tern (*Sterna hirundo*), and I shot the beautiful *Hæmatopus ostralegus*, or oyster-opening plover.

"The Dean got at the cottage a curious little article that is sometimes hung about the necks of children, particularly, we learned, in the county Clare; it is called a plough-tackle, and consists of a ring of iron, having little trinkets, shaped like the various parts of a plough, of the same metal, on it. We saw a hooker, which had come from Connemara, leaving the island, being unable to find a purchaser for its cargo of turf at ten shillings, though the article is a chief necessary. The people seemed in great apprehension of an inroad from the starving people of Clare, who threatened an invasion, not to take away the potatoes gratis, but by force, paying one pound a barrel; showing a curious mixture of justice and robbery: justice, as a pound was more than fair value; robbery, as force was concerned.

"Leaving this island, we now reached the middle one; it being late, we hurried along, but saw several interesting matters: three druidical altars, consisting of a large flag, supported by two others; these stood on fields of flagstones, within a short distance of each other. It is strange that three islands so very near each other should seem to have been inhabited by people who have left such marks of their having been distinct races, as the buildings evince. We observed here, as indeed all through, the extraordinary love the people seemed to bear to the O'Flaherty.

"We saw on the island the Astragalus and Adiantum, and on the shore the *Trochus crassus*. It was here last year I found Bangia, a purple Alga, growing both in fresh and salt water. We were much delighted with a rich display of luminous creatures, of a species I never saw before. It was about 11 o'clock P. M., and they appeared around us in vast profusion; but when I let down my dredge into the Zostera it was really

splendid: a mass of light quite illuminated the space under the boat. Individually the creatures were best likened to spangles of silver, the hole in the centre and slit representing the little worm, and the flattened disc its luminosity. I brought up abundance of them in the dredge, but they were too frail and minute for preservation, and I had no microscope to examine them with.

"On getting up this morning I found a levee in attendance, having coins, &c., for the Dean, and birds' eggs, Echini, and rocks, for me. The Dean got nothing good; I got *choughs*, and upwards of a hundred eggs of sea-fowl, but, most valuable, a quantity of the *Echinus lividus* of Lamarck. This creature burrows in the limestone rocks, making a teacup-like cavity, in which it holds with great pertinacity; it is besides well to look at, having large spines, and being of a rich purple colour. Having set a fellow to clean out the specimens, we proceeded to the shore, the Dean again bent on furthering my pursuits, searching under stones, &c., for all manner of creeping things. He soon found a species of Holothuria which I have not as yet made out. I found the *Syngnathus ophidion*, new, I believe, to Ireland; and a few Algæ, which will add to your collection. I caught the *Cetonia aurata* (?) and another Cetonia.

"We here found a poor fisherman with a single lobster-pot and a rod; he had just caught the largest lobster I ever saw, which he would have sold for a sixpence. He told us he was too poor to be able to attend to or have more than one lobster-pot; and I am sure he would not take a present of another, having always had only one. It would take more than a generation to effect any improvement in such a people.

"Seeing a building on the high ground, we asked our guide what it was; he could give us no other answer than, 'we calls it the look-out.' However, as it seemed too good a structure to be of recent date, we climbed our way to it, and were rewarded. It proved to be a well-executed little building of cut stone, 11 ft. long inside, by 6 ft. 8 in. in breadth, having a curious door 5 ft. 6 in. high, and 1 ft. 4 in. wide at top, expanding to 2 feet at the bottom; the height of the side walls only 5 ft. 2 in.; it had a very steep roof. The door was so narrow that no ordinary man could get in, except sideways. The savages are pulling down the little edifice from mere wantonness. It was not, perhaps, a Christian church, as its direction is contrary to that given in

such places of worship. Near it are some of the ancient bee-hive houses, specimens of which are met with throughout Ireland; but in other places, under ground; here, the rock being at the surface prevented concealment. The stones in these houses were all laid horizontally. Here there is the base of a Round Tower, thrown down by the people to build their cabins, though nearly as good stones were all around them naturally on the surface of the ground. Here is also a holy well, at which was a woman praying, and our guide would only approach it with his head uncovered, though he spoke but lightly of his priest, &c. It appeared that the well belonged to his patron saint. Below this, according to his account, was a monastery, which once contained 700 monks. They were all put to death, and their habitation razed, by a rover. Further down on the shore is a remnant of a Norman-like fortress of considerable extent,—according to the guide, built by Cromwell.

"I believe I did as much in natural history as was practicable, but could have found employment for a week with ease. Having made a scamper to the shore, I gathered more Algæ, and found the *Marginella lævis*, purchased a pair of pomputies and more choughs. We took leave of our friends, and, mounted on the backs of stout natives, were embarked on board our boat, never, perhaps, again to visit Arran."

This was not the case. In 1840 its productions were again explored by a party of naturalists, of which Ball himself was one.

They had a prosperous voyage to Galway of five and a half hours. While there they crossed the river to look at the weirs. "Seeing some fine trout in the pond, of various kinds, I determined on getting them, and succeeded in procuring three, the largest weighing 9 lbs. I sent them off by the coach, with orders to H. R. to show them to Thompson, for Yarrell's work; or, if I were not in Dublin, to pickle the heads."

"We stayed up for a gentleman who was to have produced sundry curiosities; he did not come, and I employed myself in writing four letters. I was there at work until long after 2 o'clock, packing up my treasures to send them by the mail to Dublin, was up again a little after 3 o'clock; and having got a bowl of milk with a little whiskey, we started for Connemara."

They arrived at Flinn's half-way house.

"While fresh horses and car were preparing, we chatted with his

daughters, two tall and, strange to say, elegant-looking girls, with beautiful figures, never deformed by the cruel foolery of stays, or corsets, or cinctures. The one was knitting real Connemara stockings, while the other, barefooted, was spinning the material for them. Their hair was put up with great taste, precisely after the fashion of Canova's Venus, and their graceful movements and gentle manners were in strict accordance. Yet they were only peasant girls in the very centre of Connemara. The only fault I found in them was one in which they resembled fine ladies: it was the abhorrence expressed in their countenances when I seized a magnificent specimen of a nomad spider, which dropped from the smoked roof of their cabin. They expressed their feelings in Irish, and I caught the word *Prumpillaun*,* and said, 'Here are some,' producing a box of beetles. They were certain that I had consequently understood all they said, and seemed in dire confusion."

"We stopped at an ancient hill fort, and having made out the covered way which led into it, endeavoured to open it from the top. After considerable labour, we failed in making a practicable breach; and a number of country boys having assembled around us, we determined on astonishing the natives. I was dressed in my white cloak and cap, and with sundry gesticulations cast into the hole three Promethean matches, which I ignited by biting with my teeth. I then contrived to slip in father's musical watch, and we had a tune from the bowels of the earth. After certain mysterious allusions we walked off in silent dignity, leaving the spectators looking on with the strongest expressions of wonder in their countenances!"

"On our way to this cottage (the Corrib Hotel) several fine Sphingidæ passed us. They were large, and of a bright brown colour, but were too smart for me, though, at the risk of my neck, I jumped off the car and gave chase."

Next morning they started for Corrig, driving along Lough Corrib: —"Arriving near Corrig, we went to see the Pigeon Hole, a cavern, the descent to which is by many steps. Through it runs a pure river; it was shown to us by a woman of perhaps seventy or eighty years of age. She added much to the wildness of the scene, being a shrivelled hag of considerable activity; in this visit she did not cut as picturesque an appearance as when first I saw her, last year. It was late at night,

* A black beetle.

and she had her gray hair hanging dishevelled on her back, her body almost naked, more concealed by smut and smoke than by clothing. As she stood on a dark black rock at the end of the cavern in the foam of the subterrene cataract, I thought her more like the witches of romance than anything I had ever seen, as she waved her blazing wisps of straw around her head, rendering the dark depths of the caves partially visible. In the river running through this cave are trout, which the people call holy fish. To try the effect of the echo, I fired a pistol, at which the hag fell flat in squeamish nervousness. A fool, who wanders in that region, and had come into the cave, said, 'Try a shot at the trout.' I proceeded to load, and had scarcely commenced when a dark cloud came over the sun, that had just been shining brightly, and prevented our seeing the fish that had, an instant before, been very conspicuous. I fired at random, and instantly the sun shone out again, and there was the fish with his head to the stream quite unscathed. This curious coincidence, I am sure, must have added to the faith of the country people who were looking on, and who would probably have less compunction in committing a murder than in killing one of these fish."

From this the travellers made their way to Tuam, and thence to Dublin, experiencing no greater annoyance than a miserable dinner, and the inconvenience of six in a coach, including an old woman with a *hen* under her arm!

In 1836 Mr. Ball attended the meeting of the British Association at Bristol, and there met for the first time Amelia Gresley Hellicar; to this lady, the daughter of Thomas Hellicar, Esq., merchant, of Bristol, he was afterwards married. In the spring of 1837 he had an attack of scarlatina, which left behind it so great a weakness of the eyes as to oblige him to abandon all business, and give them total rest. This he did by going for a month to his father's house in Youghal. Later in the year he spent some time with scientific friends at Paris; and, after taking part in the Liverpool meeting of the Association, proceeded to Bristol. There his marriage took place on the 21st September of that year.

A letter to his father, dated in 1837, mentions that he had been appointed one of the Secretaries of the Zoological Society of Ireland. From that time forward, during all the vicissitudes of the next twenty years, he never slackened nor wavered in his efforts for its welfare, and

for the diffusion by its means of zoological knowledge. In connexion with this Society, he delivered, in 1839, a public lecture upon Fishes and Fisheries ("Saunders' News-Letter," 24th May), dwelling particularly on the importance of fishermen being specially educated for their calling, and suggesting a mode by which, in his opinion, that education might be given. The lecture was well received; led to an extensive correspondence with Members of Parliament and other influential persons; and was in part republished in various quarters. At a later period the subject came under the notice of the Commissioners of National Education for Ireland; and they justly concluded that it would be of importance that the children of fishermen should acquire a knowledge of the fishes of our coasts, the modes by which they are taken, and the implements employed in their capture. Acting on this conviction, they were pleased to pay Mr. Ball the high compliment of applying to him, by letter dated 30th June, 1846, to furnish, for the use of their schools, a small volume on Fishing; stating at the same time that it should be written in a simple and intelligible style, suited to the capacities of children from ten to fourteen years of age, and suggesting particular points that might with advantage be introduced.

He most cordially undertook to perform the honourable task thus assigned to him; and, that nothing might be wanting on his part to execute it in the most effective manner, he determined to become an eyewitness of such methods of fishing as he had not already seen. For this purpose he went to the Pilchard Fishery at Cornwall; and was exposed there from daybreak to midnight in one of the boats, during a heavy swell, the day being calm and intensely hot. It unfortunately happened that his head was but badly protected by a light cap. Dizziness, sharp pains in the head, and serious functional derangement, followed, and affected him long afterwards. From this cause, combined with the pressure of public business, the "Fishery Book" was never completed. Returns to a series of questions were, however, procured from 198 Coastguard stations round the Irish coast; and as these, along with much additional matter, have been carefully preserved, it is to be hoped that the information which they contain may yet be made available for the purpose for which it was collected.

In 1840 he had the gratification of making a tour to Galway and Arran, with his friends, Professor Edward Forbes, Mr. W. Thompson, and Mr. Hyndman. References to this tour occur in the publications

of both the first-named gentlemen. Among the letters relating to it I find one from Mr. Ball to his wife, dated Roundwood, July 24, 1840. It appeared to have been written in red ink, which by fading had lost something of its original brightness. But on reading the letter, I find it is one in every respect very characteristic of its author, for it is written in the colouring matter ejected from the Aplysia, or sea-hare, and contains, for Mrs. Ball's satisfaction, a sketch of the animal, likewise executed in the material which it had so unconsciously supplied.

The following extract from a letter dated 29th March indicates some of the subjects which then occupied his thoughts:—

To Robert Patterson, Esq.

"I am not an early riser, except under strong inducement. I feel usually so little refreshed by sleep that I find equal difficulty in getting up or going to bed." "I was only once free from the difficulty of getting up early: it was when a transient prospect opened of following out my own views of life; and I then, for four months, consumed but six hours a day in sleep, dressing, &c. My work all went for nothing, and I fell back to old habits again. During this time, when I was in earnest with life, I read twelve hours a day, and fulfilled my duties in various public offices; took sufficient exercise-time at meals, for the remaining six; and I think never was so long free from indisposition of any kind. Thus, you see, I have in myself a good example; but I lack the spur of some special object.

"New Zealand is again upon me, and two friends have been just with me on the subject. It would be painful to transport myself from cultivated minds for ever; and the eat-and-be-fed life you describe would not be according to my taste. But that proposed in New Zealand is not quite of this character. My great speculation there would be the improvement of the natives; a less profitable but more worthy object than the rearing of sheep."

Later in the year (July, 1840), Mr. Ball and I were fellow-lodgers at Plymouth, during the meeting of the British Association at that town. On one occasion we had the pleasure of visiting the Fish-market there—always a place of some interest to the naturalist—accompanied by our friends, the Rev. Dr. Robinson, of Armagh, and Thomas F. Bergin, Esq., of Dublin. We went on board the San Josef, were con-

ducted round the dockyards, and witnessed the mechanical wonders there displayed.* We took an opportunity during our stay of having to row up the "Tamar;" dined at a quiet little place on its banks; and descended that noble river when the rich hues of a summer evening lighted the vessels of war that, laid up 'in ordinary,' were the peaceful occupants of its waters.

Our week at Plymouth was a joyous one. Before its close the following note was written by Mr. Ball to his wife. It is interesting as showing a frame of mind different from that which the previous letters portray, and also as affording an instance of his fertility of resource:—

"*August* 1, 1841.

"I started yesterday, at 8 o'clock, in an omnibus, containing Owen, Gray, Richardson, Fellowes, Taylor, Woods, Lankester, Winterbottom, Patterson, Ball, and two others, who got in amongst us by accident. After a journey of eighteen miles, passing through Tavistock, we reached mines of copper, tin, and lead, where the Marquis of Northampton and one hundred and fifty people were assembled. After viewing the pumping, washing, stamping, and other operations of the miners, we had a very plentiful dinner, and returned. I scarcely ever had a more pleasing day; great stores of information rolling out from the mass of fun, in the most curious, but useful manner. When it was proposed

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* Though familiar with the graphic lines of my townsman, Samuel Ferguson, Esq., entitled, "The Forging of the Anchor," I had never realized the full power of their rhythm until this day, when, after witnessing the whole process so vividly described, Dr. Robinson, on our leaving the forge, repeated part of the verse:—

"And I see the good ship riding
All in a perilous road,
The low reef roaring on her lee;
The roll of ocean poured
From stem to stern, sea after sea,—
The mainmast by the board!
The bulwarks down—the rudder gone—
The boats stove at the chains;
But courage still, brave mariners!—
The bower yet remains."

Then, indeed, I learned how precious and enduring is the radiance which the words of the poet shed over the things of earth.

that Section D should go on a separate scamper from the others, I excited a good deal of fun by painting in green on my white pocket-handkerchief the letter D, which, fastened on a stick, was borne ahead, and kept our party together. I did it on the moment by the agency of a smooth stone and some grass, and it looked as well and as bright as if specially ordered for the occasion."

One of his letters, written in the ensuing year, glances at the variety of subjects that occupied his busy brain. Those who have known anything of the minute and searching interrogatories of his friend, Mr. Thompson, while collecting information on any subject, will understand what he referred to by the term "cross-examination."

"*April* 5, 1842.

"I have now a great deal of zoological matters on hand, this being the close of our year,—the arrangements of the lectures, evening meetings, and a treaty of alliance with the Dublin Society; besides which Thompson's cross-examinations have to be attended to; and my brains are not clear from sheep-stealing, infanticides, and other delicate subjects, which occupy my attention at the Castle."

His clerkship in the office of the Under-Secretary he continued to hold for ten years longer. There is little in that long term of official life that is pleasant to dwell upon. To him the duties appear to have been at all times distasteful, and fraught with an exhausting and depressing influence. In a letter to his friend, Mr. Dowden, he says:—"My soul-subduing slavery of Castle work leaves me sometimes without *vis* for anything good." With regard to official rank, station in society as connected therewith, income derivable therefrom, and prospect of future advancement, he was emphatically a disappointed man. Expectations had been held out to him that had not been realized, and he was gradually led to look with a jaundiced eye on all that belonged to the routine of official duty. It was in vain that some of his friends tried to argue against this feeling; to urge that "man is born to trouble as the sparks fly upward;" that each station in life has its own anxieties; and that his brought with them countervailing advantages. The uniform reply was, in substance, however varied might be the words, "The heart knoweth its own bitterness."

The vigorous and healthy constitution he originally enjoyed could not but be affected by close confinement, over-exertion, and desponding spirits. From the good effects that even a few days' relaxation always afforded there can be no doubt that a more prolonged absence from "toil and trouble" would have been, at any time during the last years of his office life, productive of beneficial results. In the autumn and winter of 1846, the "famine year," there was a great and unavoidable increase of office work. It came upon Ball at a time when he was physically but ill fitted to bear the additional burthen; and, after continuing his efforts longer than he ought to have done, he became utterly prostrated, and was ordered by his physicians to cease altogether for some weeks from anything requiring mental effort.

There are services which are trying, responsible, and laborious, yet which have something cheering and pleasant at the close, as the murky sky is sometimes gladdened by the tints of the sunset. The close came at last, but brought to Ball no graceful recognition of official services performed, nor that provision for the evening of life that he had anticipated. In 1852 a reduction took place in the Chief Secretary's office, and Mr. Ball was placed on the retired list, on the ground that he "devoted much attention to scientific pursuits; and that it was not expedient that public servants should be thus occupied." He felt much hurt at the rebuke implied in these words, for his duties had not been neglected,—they had, according to his convictions, been faithfully and honestly fulfilled. At the end of twenty-five years' public service, his retiring allowance was now fixed at £162 per annum.

A few years prior to his being superannuated at the Castle, he had, in 1844, entered on a public appointment of a very different kind,—that of Director of the Museum in Trinity College, Dublin. This office was taken with the full approval of his superiors, Lord Eliot and Mr. Pennefather. It exercised an important influence on his future life, supplying not merely regular occupation, but occupation most congenial to his tastes and acquirements. It tasked his energies for years; but in none of his letters is it ever coupled with complaint. Of it he could say with sincerity,—"My good will is to it."

It is so rarely that Mr. Ball speaks of his own acquirements or of his private collection, that a few passages from the letter, addressed to the Board of Trinity College, in which he proposes for the Directorship, may be read with interest:—

"I have since I can remember paid much attention to the Zoology and Botany of my native isle, so much so that I have added very considerably to the Fauna and Flora of this country, and formed a native zoological collection of greater extent than any other existing. It contains many of the original specimens described as new to our island. I would propose to the College the formation of a native zoological collection as a distinct portion of their Museum, to embrace the whole range of animal life, as a matter which the advancement of science seems to require, which would reflect credit on the College, and the want of which in the kingdom is considered no small reproach in the eyes of strangers. If the matter be deemed worthy of attention, I offer, on being appointed Zoological Curator or Director, at a moderate salary, to hand over to the College *all* my Collection of Natural History, the native portion of which, as before stated, is very considerable, containing several unique specimens of birds, fishes, &c., and a series of others not to be found elsewhere, with skeletons and anatomical details, in the best possible state of preservation. The Conchological portion, including foreign shells, extends to about 2000 species, and contains specimens of nearly all the native genera, several species not to be found in the Museums of Paris or London, and is a more instructive collection than any other I am aware of existing in this kingdom."

Prior to the Museum being placed under the superintendence of Dr. Ball, the collection of minerals formed by far the most valuable, well arranged, and attractive portion. The harp known as that of Brian Boroimhe's, and the weapons brought home by Captain Cook, are among the details which those who, twenty years ago, visited the Museum will probably recollect; nor will they forget a huge, ungraceful, badly stuffed giraffe, which occupied a very prominent position. But the Museum, as it then existed, contained nothing that could properly be termed a zoological collection: not even in any one department did it exhibit that collocation of species which would instruct the student as to names; nor had it representatives of the leading groups so as to convey some general ideas of classification. A perusal of the three "Reports" respecting the University Museum (1845, 1847, 1848) will show how comprehensive were the views with which the new Director entered on his duties, and with what singular modesty all reference to changes, as *his* doings, were avoided. He refers, most properly, to several specimens which, from being "original," have thereby a peculiar value in the eyes of the natu-

ralist. To have avoided all mention of these, because they were first made known by himself, would have been unworthy of the truthfulness of his character.

The Museum, in its present state, is one of which the University of Dublin may be justly proud. It is much to be wished that the zealous Director who has succeeded Dr. Ball would draw up a Report of the present state of the Collection in all its departments. It would be an unimpeachable record of the character and abilities of his predecessor.

In 1850 the Board of Trinity College testified what they were pleased to term "their sense of his distinguished merits," by conferring on him the honorary degree of LL. D.

From the time that he entered fairly on the duties of his new office, Dr. Ball looked forward to making the Museum directly the means of instruction; and in the first "Report" announced his intention (when the arrangements were further advanced) "to form a class of Practical and Philosophical Zoology." "In the meantime," it added, "he will be happy to afford to students all the information in his power to aid them in any zoological pursuits they may engage in." This scheme was never carried out as originally contemplated; but, a few years afterwards, a new organization was formed, under his auspices, which succeeded in drawing together some ardent and youthful naturalists, whose zeal required not to be stimulated, but merely to be guided aright. He became the personal friend of each of its members and their much-respected President. To this reference will be made hereafter.

In 1851, on the formation of the Queen's University in Ireland, he was honoured with a request from Lord Clarendon and the Senate that he would undertake the office of Secretary. He made this known to the Provost and Board of Trinity College, and, after consulting them on the subject, he, with their full approval, accepted the highly flattering proposal.

Of the nature of the varied and responsible duties in connexion with this appointment, no one not a member of the Senate, is competent to speak. Their opinion on the subject was afterwards expressed under circumstances that gave a peculiar solemnity to the act.

In the autumn of 1854 he was requested to act as Secretary to the Joint Committee of Lectures. That Committee was appointed under the Department of Science and Art, and consisted of eight members,

four on the part of Government, and four on the part of the Royal Dublin Society. The matters which came under its control were of a twofold nature,—first, Lectures common to the Royal Dublin Society and to the Museum of Irish Industry; and, secondly, Provincial Lectures and Examinations throughout Ireland. The subjects were classed under the three general heads of Natural History, Chemistry, and Natural Philosophy, each of these being divided into departments. Dr. Ball took a warm interest in the success of these lectures, seeing in them a powerful means of diffusing over Ireland some elementary knowledge of several important branches of physical science. No salary was originally attached to the office of Secretary, for the very sufficient reason that no one could predict what possible amount of duty he might be called to fulfil. On his death, however, his faithful and able services were acknowledged, and some compensation for them transmitted to his widow.

In 1855 he was employed as Assistant Examiner for Ireland to the Civil Service Commission, and continued up to the period of his death to fulfil, with acknowledged ability and impartiality, the duty confided to him. It involved the necessity of answering great numbers of letters from the several candidates and their friends, and many from gentlemen personally known to himself, who sought to interest him on behalf of some particular candidate in whose success they felt interested. All information that he, as a public man, could give was imparted promptly and courteously. Beyond this he was utterly unapproachable: he feared not frowns, and he sought not favours.

In his letters to me he mentions from time to time the addition to his income from these several sources. To him the increase brought comparative affluence, and this happily at a time when the educational expenses of his children were necessarily on the increase. His habits had never been extravagant; but, with a wife and youthful family dependent upon him, there existed strong reasons for a consistent and judicious economy. While those men of science, from the sister country and from the Continent, who called upon him, experienced his unostentatious hospitality and kindness, he was never tempted to pass beyond the limit that prudence prescribed. Hence, though he felt for many years that his income was a restricted one, he never experienced the miseries attendant upon debt. There was no man, therefore, whom he feared or felt ashamed to meet; nor was his self-respect ever impaired by those unworthy subterfuges which are resorted to by those who are possessed of less self-

denial. This is a rock on which the man of literature or science too oft makes shipwreck of his freedom of thought and his integrity of action. The avoidance of it seems deserving, therefore, of special mention.

It was acting in perfect conformity to these principles that, instead of having at his house the entertainments known as evening parties, he had reunions on a larger scale, when the attractions were solely of an intellectual character. At these conversaziones tea and coffee constituted the only refreshment; and thus, for an outlay utterly insignificant, he would receive an assemblage of perhaps 150 persons of the highest intellectual and social eminence which the learned or fashionable circles of the city could furnish. The arrangements were always excellent, and each conversazione had its own peculiar novelties to furnish food for comment or inquiry. To be invited was considered as an acknowledgment of intellectual gifts of some kind or other; and this circumstance, with the pleasures which the evening afforded, always made the invitations not only willingly accepted, but even to some extent desired and sought for. It was a pleasant and cheering spectacle to see him receiving as his guests noblemen and courtiers, the heads of the Church and of the Bar, of the Army and of the Medical Profession, of our Irish Universities, of the principal scientific societies in Dublin, and such strangers of literary eminence as might chance to be then in town.

He had occasionally an assemblage of a very different kind, which, if less brilliant, was not less animated,—a children's party. His little guests, on entering his rooms, soon felt at their ease, and turned in real earnest to enjoy themselves. But never did the "fun grow fast and furious" until Dr. Ball entered into their pastimes, and took part in all that was going forward; and so taking was the example, that some of his confreres, who elsewhere have sat as the learned Presidents of Sections, have on such occasions flung gravity aside, and joined heart and good-will in the uproarious merriment of the hour.

On one of these occasions Professor Edward Forbes, attired in a flowing wig and crimson dressing-gown, delivered a lecture, replete with genuine humour, on a new species of Chimpanzee, represented by Ball in a mask or head-piece and dress of bear-skins, prepared by himself, and adapted to the purpose. At the end, the Chimpanzee, after flinging off his paws and then his hindfeet, leaped among his auditors, and put them to flight, amid uproarious merriment.

Such things as these bear witness to the kindly and social dispo-

sitions of the man. Science guards from decay the smallest particles of gold added to her stores: they remain there for future generations; but the genial qualities which endear man to his fellows, and make him a participator of the happiness of children, belong to the present, not to the future, and when their possessor has passed away, live only in the memories of those with whom he was associated.

Much of Dr. Ball's mental activity was expended in connexion with various scientific societies. He acted as local Secretary for Dublin of the Botanical Society of Edinburgh, and the Ray Society, London. It was, however, in those properly belonging to Dublin that he was most valued, for there the respect which attached to his moral and social qualities made him a useful and influential member, irrespective of the special range of subjects for which a society had been founded. To this Professor Oldham alludes in a note addressed to myself. It was written after the Dublin Meeting of the Association in 1857, in reply to a request that he would favour me with some recollections of our mutual friend as connected with the Geological Society of Dublin:—

"I need not say to you how completely Ball's aid and help were felt here in the little every-day and every-hour intercourse of men mutually engaged in the same great object, rather than in any larger effort of his. Of his value as a friend, of his sincerity as an adviser, of his earnestness as a helper, of his conscientious uprightness as a workman, I need not say a syllable. These are all better known to yourself than to me, though not more highly appreciated."

The following are the notes for which I am indebted to the kindness of Professor Oldham. I rejoice that his brief visit to these countries permitted the application to be made to him; and I hope that when these pages meet his eye, under the scorching heat of an Indian sun, he may be assured that many a heart will respond to what he has written, and thank him for it.

"Robert Ball was an early member of the Geological Society of Dublin, having joined its ranks in 1835, about two years after its first formation. From that time until his death he continued uninterruptedly connected with the Society, and was an active and zealous member. In 1837 he was elected a member of Council, on which he continued to serve for years. In 1843 he passed into the rank of Vice-President of the Society, and in 1852 he became President. He was throughout a steady and active supporter of the Society, and one of the most regular attend-

ants at its meetings. He was a useful aid in obtaining for the Society the use of the rooms which for many years it occupied in the Custom-House, Dublin, when its own funds were not sufficiently flourishing to enable it to rent rooms for its own occupation. Subsequently he was one of the principal supporters, if not the originator, of the proposition which was afterwards carried out, that the Society should offer its collection to the University of Dublin, which had for some years previously been taking a most praiseworthy interest in the Natural Sciences. As a fellow-worker with him for many years, I can testify to the untiring zeal with which he entered into every plan for the advancement of the Society, and to the truly disinterested and active aid he afforded in carrying them out. During the many years I was Secretary, and afterwards President, of the Society, Ball was one of the great supporters of the institution, and through good report and evil report he never failed in his confidence in its final success, or wavered in his steady adhesion to its ranks. The Journal of the Society contains a few contributions by him, bearing principally on the light thrown on geological questions by natural history research among living animals; and it was but a just and proper acknowledgment of these long-continued services which the Society gave expression to in his election to the Chair."

"In the internal management of the Society his friendly and social intercourse with most of the members was of great avail. It was chiefly by his persuasion that the Council adopted the plan of meeting at breakfast, a plan attended with the most beneficial results, and still continued with great success. Dr. Ball's purely geological work was not much; but on this, as on every other subject with which he was acquainted, we all felt, and acted on the feeling, that we should in no case apply to him without being certain of obtaining from him every information that he himself possessed: and this was always given with the most perfect frankness and the most friendly earnestness."

The Geological Society of Dublin was founded in 1831; the Natural History Society seven years afterwards. Of the latter I find no mention in any of Dr. Ball's papers that came into my hands; and for the following particulars referring to it I am indebted to the kindness of its excellent Honorary Secretary, William Andrews, Esq. This gentleman informs me, that the first meeting of the Dublin Natural History Society was held on the 19th March, 1838. At its third meeting, in April of the same year, Dr. Ball and W. Thompson, Esq., were elected Honorary

Members. Dr. Ball afterwards became an Ordinary Member, and as such was placed on the Council. He does not appear, however, to have read papers or taken any active part in the management, and his name was afterwards removed. In the session of 1841–42 Mr. Andrews was elected one of the Secretaries in the room of Mr. Clarke, who retired on his ordination. Mr. Andrews was desirous of introducing certain changes tending to elevate the character of the Society, and he was also anxious that the names of Dr. Scouler and Dr. Ball should be placed on the Council. Both were rejected. From that time Dr. Ball never interested himself in the proceedings of the Society.

The Statistical Society was established in 1847: Dr. Ball was one of its Council from that period until his death; but did not read any papers, nor take any active part in its proceedings.

Of our own Association he was emphatically *the* founder, and by every means in his power endeavoured to aid its advancement. It was originally restricted to Zoology, but afterwards extended its range, and became known as the Dublin University Zoological and Botanical Association. In his Address as President (November 16, 1855) he states that the Association was founded in January, 1853, with the gracious approval of the Provost and Board of Trinity College. In that Address, after lamenting the death of several fellow-workers, he directs the attention of the members to branches of inquiry with which he had to some extent been occupied. Among them are local and Irish names of species, and remains of extinct mammalia found in bogs; dredging; excursions; observations of periodical phenomena; collection and preservation of specimens; uses of museums; comparative anatomy; reasons for studying zoology, and the practical applications of zoological knowledge.

When a President can speak from his own knowledge and experience on topics such as these, and addresses a society of young and energetic spirits, satisfactory results are sure to follow. The seed falls on good soil, and will bring forth fruit abundantly. Such is the respect in which he was held by the students who then gathered around him, such the influence of his example, that it may with truth be said, that he yet continues to teach, and that our meeting-rooms, in No. 5, Trinity College, are still redolent of his presence.

Through the kindness of Edward Clibborn, Esq., of the Royal Irish Academy, I am enabled to give the following particulars:—

Dr. Ball became a member of the Academy in the spring of 1835, and was elected a member of the Council, in the Department of Science, in March, 1838. On the 15th March, 1845, he was chosen Treasurer, and continued to hold that office up to the period of his death.

The value of his services was felt in all that was going forward, and in the suggestions and remarks that he threw out on the various subjects that came under the notice of the Academy. Among his communications may be mentioned those—

"On the Species of Seals, Phocidæ, inhabiting the Irish Seas." "Transactions," vol. xviii., p. 80.

"On the Remains of Oxen found in the Bogs of Ireland." "Proceedings," vol. xv., p. 253.

"On a Species of Loligo found on the Shore of Dublin Bay." Nov. 30, 1839.

"On a Species of Sturgeon (*Accipenser Thompsoni*)." "Proceedings," vol. xxv., p. 21.

"On the Cephalopoda of the Irish Seas." "Proceedings," vol. xxxii., p. 192.

"Notes on Acetabuliferous Cephalopoda, including two new species of Rossia." January 10, 1842.

"On the Fœtus of the Spined Dogfish (*Acanthias vulgaris*)." April 27, 1846.

"Notice of the Structure and Position of the Nostrils of the *Apteryx Australis*." May 25, 1846.

"On the Fossil Remains of Bears found in the Bogs of Ireland." Dec. 10, 1849.

"Remarks on the Periods of the Bones of the Irish Elk, and other Animal Remains." Nov. 29, 1851.

His papers or communications were not limited to zoology, but extended at times to those which belonged to antiquarian research. (*Vide* "Proceedings," January 8, 1844; February 12, 1844; January 13, 1845; December 11, 1854.)

Dr. Ball was elected a Life Member of the Royal Dublin Society in 1834; but did not regularly take any active part in its proceedings. In 1854 he became a Member of Council. His co-operation, at all times, was highly valued.

I had on many occasions during the last few years urged Dr. Ball to give up one, at least, of his public appointments, and to retire from the

Council of all Societies save one or two. I argued that such a course would conduce greatly to his own personal comfort, and would give him leisure to work, with greater effect, in a narrower circle. But he replied, that his being associated with so many bodies was in itself productive at times of good results; that it rendered mutual co-operation more easy, and prevented the jarring of separate interests. The arrangements made between the Royal Dublin Society and the Zoological (adverted to hereafter) may, perhaps, afford proof that the opinion of my lamented friend was not unfounded.

Of all the Dublin Societies of which Dr. Ball was a member, the Royal Zoological Society, founded in 1830, was that with which he was most pre-eminently associated. It was there that he acted, for more than twenty years, as an Honorary Secretary, devoting to it "a large portion of valuable time, and the energies of a strong and cultivated understanding."

He had able and influential coadjutors in the officers and Committee. Gradually, as they saw that he laboured with singleness of purpose for the interests of the Garden, and became assured by experience that his plans were both judicious and comprehensive, they sanctioned his proposed measures, and devolved on him their responsibility.

Seldom were they disappointed in the results: the work was not only done, but done well, and in a way peculiar to himself. Every part of the Garden bears witness to his ingenuity, and to his anxiety to accomplish his object with the least possible expenditure. No less obvious is the desire to make the collection not a mere show for visitors to gaze at, but a school in which the elements of zoology might advantageously be studied.

The members of the Council of this Society refer affectionately to Ball as one to whom they were indebted for much that has been of service,—as the establishment, in 1844, of the weekly breakfast at the Gardens, at which many of their plans are discussed, and the business of the Society transacted, while at the same time a kindly and social intercourse is maintained among the members who, for the time being, have the guidance of its affairs. To his efforts they owed, in a great degree, the splendid present of the Giraffe in 1847, from the Zoological Society in the Regent's Park, London. To his untiring labours and rigid economy they mainly attribute the preservation of the collection in the Garden, during the dread visitation of the famine in 1846 and 1847.

There are two circumstances connected with this Society, which deserve a special mention, though necessarily brief: first, the establishment of the zoological lectures; and secondly, the penny admission to the Gardens for the working classes.

The lectures commenced in the year 1838, and were eminently successful. For some years many of the most distinguished individuals in Dublin took part in them; much interest was manifested in the subjects brought forward; and a large accession to the funds of the Society accrued. Dr. Ball himself gave a hearty co-operation, and delivered five lectures, which appeared in Saunders' Newsletter; one of those was that referred to (*ante*, p. 27); the others were on "Sloths," on "Birds," on "Electrical Fishes;" and in the winter of 1840, a resume of those previously delivered during that season. Some of those lectures he prepared with great care, and rendered them highly philosophical, though popular, expositions of the subjects discussed.

The penny admission on Sunday after 2 o'clock was first instituted in 1840. In 1855 the same privilege was extended to visitors to the Garden after 6 o'clock in the summer evenings. The Reports of the Council give us the exact number of penny admissions in each successive year, and is the best proof of their importance. From the fifteen years, from 1840 to 1855, the average annual attendance was 75,450! Who can estimate the amount of harmless pleasure that has thus been diffused among the humbler classes of a populous city; or the information imparted, and the craving for further knowledge inspired; or the intemperance averted; or the blessed influences called into activity, when the members of a toiling family partake of a pleasure which tends to elevate and to refine?

It was a great source of satisfaction to Dr. Ball that the arrangement by which the Royal Zoological Society was to receive £500 a year from Government, to be paid through the Royal Dublin Society, was effected. It not only gave to the Zoological an assured stability, a certainty of income, but it was the public recognition of a principle as yet but imperfectly acknowledged, that the study of Zoology is worthy of support from the public funds of the nation.

The subject of Educational Zoology, and its intellectual and moral influences, was adverted to by Dr. Ball and others on several occasions in the courses of lectures delivered before this Society. It was one that he had much at heart, and which I find often mentioned in his letters.

He wished the rudiments of the study to be universally introduced into schools, and the science, in its higher grades, to form a regular part of the curriculum of our Colleges. His wishes were in part fulfilled, and he had, in more than one capacity, the high gratification of aiding in their advancement.

In connexion with this subject should be mentioned his views for the improvement of our fisheries. The first step, in his opinion, was to give a special education to the fishermen themselves. He considered that a knowledge on their part of the habits and economy of fishes, and of the creatures on which they feed, was indispensable; and he therefore urged that the aid of zoological science should be secured so as to make our fishermen thoroughly acquainted with their calling, and to render the fisheries themselves productive and profitable.

A passing reference has been made to the ingenuity apparent in the structures erected in the Zoological Gardens, and in many of its arrangements. The tent-like house for the splendid specimen of the Plesiosaurus, the plan of the building containing the aquatic vivaria, and the simple method employed for aërating the tanks, are obvious examples. Fertility of device was one of Dr. Ball's mental characteristics, and it was continually manifesting itself in a great diversity of forms. It was, in fact, a very Proteus in its aspect. At one time it was a plan to prevent the evaporation of spirits from glass vessels; at another, that of securing to his capacious fernery a regular supply of moisture. To-day it was the making of a naturalist's dredge, so efficient that it was used by Edward Forbes* in the Ægean; to-morrow it was the restoration of the Harp of Brian Boroimhe† by the collocation of its severed portions. Among his many inventions was the use of naptha as the medium for colours to be used for zoological diagrams. He found by this plan the drawings could be executed much more rapidly, and that they possessed an increased brilliancy of colour. In 1849 he communicated this to Mr. Tuffen West, the eminent artist, who chanced at that time to be resident for a few weeks in Dublin. That gentleman tried the plan, and has

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* A letter to a friend from the late Professor Forbes, written when engaged with Captain Graves in the Ægean, says, in speaking of the results he attained, "Tell Ball that but for his dredge this could not have been accomplished." It is described in Harvey's excellent "Sea-side Book."

† A description of this harp was printed by Dr. Ball.

given the highest attestation in his power of its merits, by using it in the execution of most of the natural history diagrams for the Queen's Colleges of Galway, Cork, and Belfast.

As an example of Dr. Ball's readiness of resource, the following circumstance may be worthy of record:—

The writer of the present memoir had undertaken, at the request of the Commissioners of National Education in Ireland, to deliver, at Marlborough-street, in November, 1845, a short course of zoological lectures to the male and female teachers then attending their classes. He had occasion to speak of the sea-jellies, sea-nettles, or jelly-fishes, as they are termed; and, recollecting that many of his auditors were from the interior of the country, and had probably never seen one of these animals, he felt some doubt as to how he could convey to them an idea of their jelly-like appearance. In summer the shore of the bay would have supplied thousands of illustrative specimens, but they were not available in November. What was to be done? He told his difficulty to his friend Ball, at whose house he was then staying, and he at once replied, "I'll make you a jelly-fish!" and a capital one he did make. From Mrs. Ball's store-room he brought something which, when boiled, furnished a transparent gelatinous substance. Whilst it was boiling he cut from the purplish linen covering of one of the children's school-books four pieces which represented the peculiar markings of the most common species (*Aurelia aurita*), poured out the gelatine into a saucer, placed the purplish cuttings in their proper relative positions ere his cookery had "set;" and thus in an hour he produced an impromptu jelly-fish, which answered admirably well the purpose for which it was intended.

He afterwards, by a mixture of gutta-percha and treacle, succeeded in making casts of the more common star-fishes, and these, when coloured after nature, formed excellent representations of the originals. As such, a series of them would have been very useful for school museums, especially as they had a certain degree of flexibility, and might be handled without being injured or broken.

Any one who has been for some years taking an active part in the management of public societies of any kind will call to mind occasions when some question of moment divided the opinions of its members, and gave rise to animated discussions. When such questions sprung up, Dr. Ball never shrunk from the advocacy of his opinions, no matter

what obloquy might attach to them, or how few might be the number of his adherents. In all such cases, "when the battle's lost and won," it is best to let its heat and its excitements pass away. But, unfortunately for Ball's peace of mind, it was not in his nature altogether to do so. He was keenly sensitive to any remark that he regarded as untrue or unkind. To most men these "paper bullets of the brain" would have caused no annoyance; with him it was different. The shaft might be a light one; but if it struck him at all, the barb was difficult to extract, and left a scar behind.

For the last three years of his life his letters to me were much less frequent than formerly. He was, in fact, too much engaged to write anything that he could well avoid. His usual period of recreation was from 1852 abandoned, and, in point of fact, never did he slave so hard as when he was freed from the necessity of attendance in the Secretary's office. During his Castle-life there were six weeks of holiday, which the regulations of the office sanctioned, and which he spent in visits to Youghal and other excursions. The bow which had for many months been kept in a state of tension was then unstrung, and regained in a great degree its natural elasticity; but after his appointment to the College Museum a great change took place. These precious holidays were set apart for Museum work, and the health-giving period of relaxation was abridged or abandoned. When other public appointments were subsequently added, he strove zealously to perform their duties, and most efficiently he did so; but he attained his end by giving up leisure, recreation, and bodily exercise. Nature enforced, as in all such cases, a heavy penalty for the neglect of those observances prescribed by the laws of health.

It was in vain that friends in the country wrote and pressed him to come to them on a visit, holding out such attractions as their different localities offered. He thanked them, accepted their invitations; but deferred his going until "a more convenient season." That season never came. The deaths of several eminent naturalists during the last few years, some of whom were among his most valued friends, were at times much in his thoughts, and were spoken of in pathetic terms.

At the beginning of February, 1857, I was his guest for a few days, and thought he was looking particularly well, though complaining of sleepless nights. We were present at the conversazione given on the 4th of February by the President of the Royal Irish Academy. We went

together, one forenoon, to call on Dr. Harvey at his rooms in College. In the ante-chamber the portraits of Forbes, Thompson, and other naturalists were on the walls. As we passed along, Dr. Ball stopped, pointed to the portraits of his deceased friends, and simply said, "Who next?" Before the ensuing month was ended, the question had been solved.

He had been apparently in his usual health, when, on the morning of Friday, the 27th of March, he was suddenly seized with symptoms of an alarming kind. The illness, after assuming phases which for some hours renewed the hopes of his family, terminated fatally on the evening of Monday, the 30th. A post-mortem examination, held in conformity with his own express instructions, showed that the immediate cause of death was rupture of the aorta.

The funeral took place on Friday morning, the 3rd of April, in the cemetery of Mount Jerome. The Royal Irish Academy, in its corporate capacity, took part in the mournful procession, the mace, enveloped in crape, being borne before the President.

The members of the Royal Dublin Society and of the Dublin University Zoological and Botanical Association were specially invited to attend by notices sent out by their respective Secretaries.

In the brief interval between his death and his funeral many warm-hearted friends had been pondering in what way they could best testify their regard for him who had been removed from among them; but to the Board of Trinity College must be conceded the honour of being the first to adopt a line of conduct which would mark their respect to the dead, yet not wound the delicacy of the living.

On the same day that his remains were consigned to the grave the Board met, passed a resolution granting to his widow an annuity for life, and had this communicated to her in the kindest and most considerate manner.

On the ensuing morning the Council of the Zoological Society assembled as usual at the "Gardens," and adopted a course which testified their conviction of the loss they had sustained by Dr. Ball's death, and their solicitous regard for the feelings of the survivors. They determined on establishing a "Memorial Fund" expressly for the benefit of his children, and communicated this decision to Mrs. Ball, accompanied by expressions of their deep sympathy for her bereavement.

Among the Minutes passed by different bodies with which Dr. Ball

had been connected, and which testified in various ways the estimation in which he had been held, none was more grateful to his family than the following from the Senate of the Queen's University, and which was transmitted in the kindest manner by the Lord Chancellor Brady, Vice-Chancellor of the University:—

"At this, their first meeting since the melancholy event of the death of their late Secretary, Dr. Robert Ball, the members of the Senate of the Queen's University desire to record upon the Minutes of their Transactions their deep sense of the loss which the University has sustained in being deprived of the services of a gentleman who was, both in his public and private character, so highly valued and esteemed.

"In the discharge of his duties to the Senate and to the Queen's Colleges, of which it is the head, Dr. Ball displayed the most anxious and zealous solicitude for the interest and welfare of those institutions, and the most patient attention to every detail of business intrusted to his management, while he brought to the exercise of all the functions of his office, and faithfully devoted to the service of the University, the energies of a powerful, well-ordered mind, richly stored with scientific and literary acquirements.

"The Members of the Senate further desire to convey to the widow and family of Dr. Ball this expression of their opinion of his merits and of their regret for his loss, together with their sincere condolence with her and them in the severe affliction with which they have been visited; and they request the Vice-Chancellor will transmit to Mrs. Ball a copy of this Minute."

On the 2nd of April, 1857, the Royal Dublin Society passed the following resolution:—

"Resolved,—That the late lamented death of our esteemed member of Council, Robert Ball, LL. D., is an event calling for the marked sympathy of the Society; that the Members take the present opportunity of recording their regret at his loss and their respect for his memory, as well on account of private worth as of his varied acquirements, and the great zeal and assiduity he displayed in the numerous scientific occupations in which he was engaged, particularly evidenced by his successful superintendence for many years of the Royal Zoological Society."

The following resolution was passed at a meeting of the Geological

Society of Dublin on the 8th of April, 1857, amid the deep regrets of the Society for their lost associate, and their warm sympathies for his family and friends :—

"The Geological Society of Dublin desire to express their sense of the great loss they have sustained, in common with many other of the scientific societies of Dublin, in the death of Dr. Ball, their former Secretary, Vice-President, and President. They wish at the same time to record their high estimation of his ability and attainments as a man of science, and his character as a gentleman, and of the great services he had formerly rendered to the Society."

The Royal Irish Academy, the Dublin Natural History Society, and the University Zoological and Botanical Association, adjourned their meetings in testimony of their regret for his loss, and of their respect for his memory.

Dr. Ball had been nominated President of the Natural History Section of the British Association for the Dublin Meeting, August, 1857. The members of that Section (D) commenced their proceedings by passing a resolution akin to these already given, and concluding with the words, "that this tribute of marked respect to his memory is due not merely on account of his great merit as a naturalist and promoter of science, but much more to his personal character, as a kindly, high-minded, and honourable man."

After giving, as has been done, these testimonies to the character and attainments of Dr. Ball, it is considered unnecessary to republish the obituary notices that appeared in the local journals, or in the "Athenæum," the "Literary Gazette," and other periodicals in Great Britain.

Dr. Ball was most willing at all times to communicate his information to those who sought it; and this, combined with his equable temper and amiability of disposition, rendered it a pleasure to hold intercourse with him on points of zoological research or observation. His papers on the Hedge-hog and the Frog, published in the "Irish Penny Journal" in 1840 and 1841, evince his desire to disseminate a knowledge of what is true regarding the structure and habits of animals respecting which many erroneous opinions are yet current. His contributions to some of our standard zoological works are acknowledged by their authors, Professor Bell, Mr. William Yarrell, and Professor Ed-

ward Forbes. But it was in the long series of papers published by his friend, the late William Thompson, Esq., that Dr. Ball's extensive knowledge of the Irish Fauna was particularly manifested. These papers, with additions, were afterwards collected by Mr. Thompson, and in part prepared for publication, under the title of "The Natural History of Ireland." Three volumes, treating of the Birds, were published during the lifetime of their lamented author; the fourth volume, which appeared in 1856, was a posthumous publication. Throughout its pages, the name of Dr. Ball is of continual recurrence; and he not only gave his valuable aid to its revision as it passed through the press, but contributed additional information, which is appended as foot-notes.

"Cast thy bread upon the waters," would seem to have been Dr. Ball's motto, so desirous was he at all times to impart the knowledge which he by ceaseless diligence had acquired. He not only freely gave from his accumulated stores, but he inspired others with an impulse for the further diffusion and advancement of science. That impulse yet survives, and will assuredly produce good results, though they may not be manifested until "after many days."

The community in which he lived lost by his death a worthy citizen; yet his name will long be remembered beyond the circle that included his personal relatives and friends.

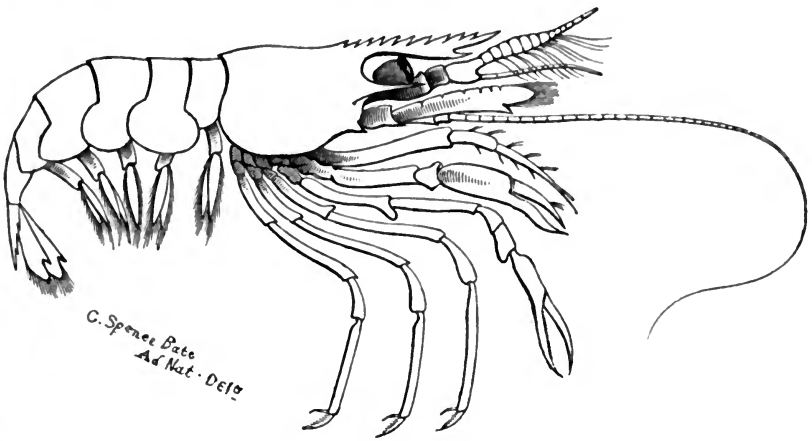
The hard-working mechanic and the toil-worn clerk shall in future years visit, with their families, the Zoological Gardens, as they do now. When enjoying amid its attractions the innocent prattle of their children, such men will naturally ask, "To whom do we mainly owe the existence of this Garden, and the penny admission, which makes it available to us?" Let some simple inscription, some unostentatious tablet, answer the inquirer, and tell to him and to his children that the name of their benefactor was Robert Ball.

Professor Kinahan communicated the following

DESCRIPTION OF A NEW BRITISH HIPPOLYTE (HIPPOLYTE GORDONIANA, *n. s.*).
BY C. SPENCE BATE, F. L. S.

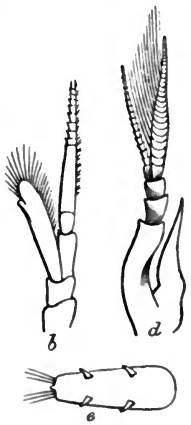
Hippolyte rostro decem dentibus ornato marginem superiorem, et ad marginem inferiorem uno dente. Spinâ longe ad marginem inferiorem

orbitæ. Chelæ pedarum primi et secundi parum digitos longos et graciles instructæ. *Dactyla pereipoda* posteriorum dentibus ornatis.



Rostrum armed with ten teeth above, and one below; a long spine at the lower margin of the orbit; first and second pair of hands with fingers long and slender; the last joint of each leg fringed with teeth; and one stout hair curved in a contrary arch, springing from the posterior extremity of the penultimate joint.

This species was sent me by the Rev. G. Gordon, from Moray Frith, among other Macroura, including *P. Jeffreysii*. The basal joint of the internal antennæ is developed on the inner side into a squamiform tooth which reaches beyond the first articulation. External antennæ with the tooth at apex of squamiform scale, remote from upper extremity. Central plate of tail (telson) terminates in a minute and central point. Three stout hairs on each side. Lateral margin with two stout, articulated, short spines.



e, telson.
b, external antenna.
d, internal antenna.

The long and elegantly formed hands, and large size of second pair of feet, separate it from the other known British species.

I have named it after its discoverer, the Rev. G. Gordon, of Elgin.

The thanks of the members were voted to Mr. C. Spence Bate for his paper.

Mr. Edwin Burchall read the following paper—

ON ADDITIONS TO THE IRISH LEPIDOPTERA.

Although I feel that the materials at my command for drawing up a supplement to the Rev. Mr. Greene's valuable list of Irish Lepidoptera are very meagre, yet, as three years have elapsed without any one better qualified than myself undertaking the task, I venture to record a few additional species which have come under my observation. To Mr. Alexander G. More, of Bembridge, I have to express my obligation for a very complete record of his captures during a residence of several months at Ardrahan, which has enabled me to add no less than eleven species to our list:—

Polyommatus ægon, near Galway. June.
Erebia Cassiope, near Westport. July.
Trochilium tipuliformis, Gardens, Dublin.
Lithosia miniata, Galway. A. G. More.
Setina irrorella, Galway; abundant. June.
Liparis auriflua; generally distributed.
Endromis versicolor, Powerscourt.
Clostera curtula, Tullamore and Clonmel.
Fumea nitidella, abundant at Howth. June.
Acronycta aceris, larvæ at Malahide.
Nonagria despecta, Galway. A. G. More.
Xylophasia sublustris, Galway; abundant at Sugar. June.
Miana expolita, Galway, abundant. Discovered at Darlington in 1855, and not previously recorded as found elsewhere.
Agrotis aquilina, Killarney, at Sugar.
Agrotis corticea, Galway. A. G. More.
Aplecta nebulosa, Galway. End of June, at Sugar.
Aplecta herbida, Galway. End of June, at Sugar.
Hadena lutulenta, Galway. A. G. More; at Sugar.
Hadena dentina, Galway. A. G. More; at Sugar.
Noctua umbrosa, Galway. A. G. More; at Sugar.
Philopyra pyramidea, Galway. A. G. More; at Sugar.

Tæniocampa gracilis, Killarney.
Dasycampa rubiginea, Dublin. January and November.
Aspilates citraria, Powerscourt, among fern.
Aspilates gilvaria, Galway. A. G. More.
Cabera strigillaria, Powerscourt.
Bapta temeraria, Galway. A. G. More.
Macaria lituraria, Powerscourt.
Dosithea reversaria, Galway. A. G. More.
Emmelesia ericetaria, Galway and Powerscourt.
Eupithecia expallidata, Powerscourt.
,, *pygmæata*, Howth.
Asopia flammealis, Galway.
Botys fuscalis, Galway.
,, *pandalis*, Galway.
Hypena crassalis, Carrick-on-Suir. Dr. Carte.
Polypogon tarsicrinalis, Galway. A. G. More.
Nola cucullalis, Powerscourt.

It will be observed that the majority of the species are from Galway. This locality was not selected for investigation from any belief that it was likely to be peculiarly productive; on the contrary, the district between Galway and Gort, in which most of the insects were captured, is very scantily wooded, and presents a most unpromising aspect to the collector. But the fact that out of 102 species of Lepidoptera captured in the county of Galway during the past summer, 19 species (all of them conspicuous insects) are new to the Irish list, is conclusive evidence of its present very imperfect condition. In my opinion the island is, to a great extent, a *terra incognita*, and our list of Lepidoptera quite as long as it deserves to be for the amount of labour bestowed on the subject.

Our list of butterflies is remarkable, both from containing species which might have been expected to fail in Ireland—such as *Cratægi*, *Betulæ*, and the two *Colias*,—but still more so from the absence of about six others—*Adippe*, *Polychloros*, *C. album*, *Selene*, *Euphrosyne*, and *Alveolus*—which might have been confidently expected to occur from their almost universal diffusion in England, and to the powerful flight of at least three of which the channel would scarcely be a barrier.

I suspect all six only want looking for. It will be time enough to lament the poverty of our Fauna when every nook and corner of the is-

land is ransacked, by day and by night, as is the case, with the most surprising results, in England, year after year.

I wish to draw attention especially to the south-western district, which is almost entirely unexplored by the lepidopterist. Who will go up and possess its treasures?

When the late Professor Edward Forbes suggested the grand idea of the former connexion of Ireland and Spain by means of an ancient continent stretching far out into the Atlantic, his theory was based mainly on botanical grounds; for, after stating that the west and south-west of Ireland is characterized by botanical peculiarities, dependent on the presence of about twelve species of plants, and that the nearest point of Europe where these plants are native is the north of Spain, he adds, "there is no evidence of any local assemblage of animals corresponding to this Flora."

The recent discovery of *Anthrocera minos* in the district, and apparently confined to it, proves that there are also traces of a peculiar Fauna, and leads me to anticipate that a diligent collector in the south-west would reap a rich harvest of novelties among the Lepidoptera.

When in Galway this summer, Minos was, as usual, in great profusion. It differs materially in its habits from the other native species of the genus, concealing its oval, earth-coloured cocoon (of which I have the pleasure of exhibiting specimens) among the roots of the herbage, or attached to a stone at the surface of the ground; but from the nature of the localities in which alone the insect is found in abundance,—viz., fields in which rock was the rule, grass the exception,—the cocoon is extremely difficult to find.

Mr. E. Burchall exhibited a box of specimens illustrative of his paper.

Professor J. Reay Greene, Honorary Secretary, then read a resumé of the present state of our knowledge of the Cœlenterata.

He commenced by alluding to the different changes which had taken place in the arrangement of the numerous forms included in the sub-kingdom, Radiata, of Cuvier. These changes might briefly be summed up as follows:—

1st. The withdrawal of the Infusoria (Polygastrica), and their association with the Rhizopods and Sponges into a distinct sub-kingdom, —Protozoa.

2nd. The removal of the Rotifers and Entozoa to the Annulose sub-kingdom.

3rd. The separation of the Polyzoa from the Zoophytes, and the recognition of the true molluscan affinities of the former.

After the Radiata of Cuvier had been thus diminished, there still remained an extensive assemblage of forms, which might, for convenience, be defined as the "Radiata of moderns." This sub-kingdom included three classes, viz., Zoophyta, Acalepha, and Echinodermata. The author then noticed the various points of structure in which the Echinodermata differ from the other Radiata; and showed that the two remaining classes agree in several distinct and characteristic anatomical peculiarities, which justify the propriety of separating them from the Echinodermata,* and uniting them into a sub-kingdom by themselves. For this extensive group Messrs. Frey and Leuckart have proposed the term *Cœlenterata*. All the forms so designated possess in common this anatomical character—namely, that the alimentary canal communicates freely with the general cavity of the body. In many of the Cœlenterata the peculiar bodies known as "thread cells" are developed; and from the almost universal presence of these organs the term Nematophora had been proposed for the same group by Professor Huxley, who, some time since, from independent researches of his own, chiefly carried on in the seas of the southern hemisphere, had arrived at conclusions precisely similar to those of Frey and Leuckart. The author then described in some detail the leading structural peculiarities by which the Cœlenterata, as a whole, were distinguished, and maintained that they formed a distinctly circumscribed and most natural sub-kingdom, comparable in this respect with either the Mollusca or Vertebrata. So far it had been shown that the Cœlenterata included the forms usually known as Zoophytes and Acalephs, but it must not be supposed that these are the names of the two classes into which this sub-kingdom ought to be divided. Two obvious modifications of structure serve to separate it into as many distinct divisions. In the first of these, termed Hydrozoa, the wall of the digestive canal is in close contiguity with that of the general

* The separation of the Cœlenterata from the Echinodermata is a consideration altogether independent of the more difficult question,—What is the true position of the latter? For a solution of this most important problem Science is much indebted to the able researches of Professor Huxley.

cavity of the body, and the reproductive organs are external. In the second division, known as Actinozoa, the wall of the alimentary canal is usually separated by a wide interval from the common parietes, and the reproductive organs are lodged in the interior of the cavity so formed. Now, each of the old classes, Zoophyta and Acalephæ, contain forms belonging to both of the above divisions, so that it is desirable to abolish the terms in question as founded upon crude and superficial considerations. The author illustrated this part of his subject by demonstrating the anatomical distinctions between the Ciliograde and naked-eyed Medusæ. The relations subsisting between these several groups may, perhaps, be best indicated by reference to the accompanying table:—

RADIATA (*of moderns*).	CŒLENTERATA.
1. Zoophyta.	
1. Hydroida, ...	Hydrozoa.
2. Asteroida, ...	Actinozoa.
3. Helianthoida, ...	Ditto.
2. Acalephæ.	
1. Discophora, ...	Hydrozoa.
2. Siphonophora, ...	Ditto.
3. Ctenophora, ...	Actinozoa.
3. Echinodermata.	

Hitherto the structural characters alone of the Cœlenterata have been alluded to; the development of these animals has yet to be taken into consideration. The author then gave a condensed summary of the leading results which have recently been obtained by those naturalists who have directed their attention to the investigation of the life history of the Cœlenterata; the researches of Sars, Siebold, Van Beneden, Dujardin, Gegenbaur, Kölliker, Huxley, Strethill, —— Wright, &c., being more especially particularized. He explained the nature of these valuable investigations, and the numerous and important advantages to science which had already accrued therefrom; the interesting questions to which they gave rise; and the relations, previously unsuspected, which they had shown to exist between forms often widely separated from one another. He also pointed out the gaps which yet remained to be filled

up, to which he requested the attention of the members present, hoping that they might be induced to undertake the solution of some of the numerous questions connected with this much neglected branch of inquiry; and concluded by enforcing the importance of development, not merely for the determination of the homology of parts, but also for ascertaining the relative positions of the numerous forms of which the animal world is made up.

An extensive series of diagrams was exhibited in illustration of the several statements made by the author.

Robert M'Donnell, M. D., M. R. I. A., Lecturer on Anatomy and Physiology in the Carmichael School of Medicine, Dublin, read the following paper—

ON THE ELECTRICAL NATURE OF THE POWER POSSESSED BY THE ACTINIA OF OUR SHORES.

Among the many important researches of modern physiologists, few are more interesting than those connected with animal electricity. The sagacity and perseverance of Professor Matteucci and of M. Nobili, and others among their countrymen, have brought to light several important facts on this subject, more particularly as regards the electrical currents generated by organic matter. It is not, however, to electricity artificially generated by piles, made of either organic or inorganic matter, that it is intended to invite attention in the present communication, but to the electrical power possessed by some animals, and which is capable of being exercised by them under voluntary influence. It is true the animals hitherto ascertained to be so endowed are not numerous: the Torpedo, the Gymnotus, and the Silurus, are the best known, and from them the most unequivocal evidence of electrical power has been obtained. The *Trichiurus electricus*, and the *Tetraodon electricus*, besides some other inhabitants of the tropical seas, are said to be able to give shocks, but their electrical power has not yet been proved by direct experiment.

Certain insects likewise have been supposed to possess some power resembling animal electricity, and we are told that the *Sepia hexapodia*, and also the *Alcyonium bursa*, a native of the German Ocean, produce a degree of numbness in the naked hand when brought in contact with them, and for some seconds a sensation resembling an electric shock. It does not appear, however, that any proof has been hitherto offered that electricity is the agent by which these effects are produced.

Suppose that, into a vessel containing some Actinia well expanded, and apparently on the look-out for food, some of the tadpoles of the common frog be introduced, these little creatures do not, like many fresh-water fishes of about the same dimensions, immediately die; on the contrary, the salt water seems to stimulate them to activity, they become very lively, and swim about with vivacity. One of them may not unfrequently be observed to make its way among the tentacles of an Actinia and get away again quite uninjured; it may even for a time nestle among the tentacles with as much impunity as if it were only in contact with a piece of sea-weed. But should the tadpole have the misfortune to fall in with a more voracious Actinia, the reception it meets with is very different: sometimes by an incautious lash of its tail it may touch even a single tentacle, by which it is at once laid hold of, and in the violent efforts which it forthwith makes to break loose often merely brings itself within the reach of other tentacles, by which it is seized and overpowered. Occasionally, however, after having been thus seized, the tadpole, by its superior activity, succeeds in effecting its escape, and when it does so, it seems for a time singularly excited; it twists, and writhes, and wriggles through the water, so as to leave no doubt that some very remarkable influence has been exerted upon it.

These observations are, no doubt, familiar to all who have studied the habits of these animals; for, although the tadpole seems more susceptible of the peculiar stimulus which the Actinia can communicate than most of those creatures which are ordinarily cast in its way, yet the same occurrences take place with the smaller Crustacea, &c., which are abundant in sea-water. Indeed, no very close attention is necessary to perceive that, while on some occasions these little creatures may creep to and fro over the surface, and among the tentacles of the Actinia, at other times they are seized and killed with the greatest promptitude.

It remained to be determined what is the exact nature of the power which the Actinia has been thus found to have under its control. If it seized its victim by a simply mechanical effort, why should the tadpole be so agitated for some time after having escaped from its grasp?

No peculiarly viscid secretion could be detected on the tentacles, nor could any decided reaction be discerned on their surface differing from the feebly alkaline condition of the sea water in which they were placed; moreover, the power of the Actinia seemed often to be exerted with too much promptness to be compatible with the notion of the formation of a poisonous or stinging fluid over its surface.

On the hypothesis that it is an electrical power with which the Actiniæ are endowed, it is obvious that the existence of animal electricity in them ought to be experimentally demonstrable by its physiological effects, inasmuch as these phenomena are the most striking which animal electricity is capable of producing in common with other electricities derived from different sources.

The following experiments, in which the frog's limb was used as a galvanometer (the limb of this animal being, as is well known, an instrument of extreme delicacy for this purpose), seem satisfactorily to establish the fact, that the common Actiniæ of our shores are gifted with electrical power.

1st. Having prepared the lower limb of a lively frog after the mode described by Matteucci, by stripping off the skin, dissecting out the sciatic nerve from among the muscles of the thigh, and then cutting off the thigh a little above the knee, so as to leave the nerve uninjured and as long as possible, the limb was laid on a small piece of glass, so that the nerve hung down over its edge. The pendant nerve was lowered into the water and gently brought in contact with the tentacles of an expanded Actinia. From the first, or the second, or even several, possibly no effect may result. But, arriving at last at one more vigorous than his neighbours, smart muscular contractions follow as it grasps the nerve in its tentacles, and the toes are thrown into active movement.

2nd. The next experiment, although of precisely the same nature as that just detailed, renders the effect produced on the muscles of the frog's limb more striking. A large and lively frog is killed, the skin is stripped off, and the viscera being removed, the body is cut off about the middle: slipping a knife behind the lumbar plexus of nerves, the pelvis and contiguous soft parts are cut away, so that the lumbar vertebræ remain connected with the lower extremities merely by the two nervous cords passing to each limb. Thus prepared, the limbs are laid on a thin piece of board, so that the vertebræ hang over its edge dangling by the undivided nerves.

The piece of board is placed floating on the surface of the water in which are the Actinia, and is slowly pushed over within reach of an active one. Immediately that the Actinia seizes the morsel thus offered to it, contractions are observed to commence in the thigh, extend to the calf, and soon the toes are in movement.

3rd. In order to set aside the supposition that these muscular contractions might be the result of chemical or mechanical irritation applied to the extremities of the nerves, it became necessary to devise a modification of the foregoing experiments: for although many irritants —such as turpentine, croton-oil, ammonia, friction with a nettle-leaf, &c. &c.—were applied to the nerves without producing any effect like that obtained from the Actinia, it seemed still possible that the contractions might be due to some other agent than electricity.

The following experiment seems to remove all doubt:—A piece of copper wire, a few inches long, was coated with sealing-wax, except about half an inch at each end. The ends were rubbed clean with sand-paper: one of them was thrust into the lower part of the spinal canal of a frog, prepared as in the last experiment; while the other, which was to be offered to an Actinia, was passed into a portion of the frog's intestine, put on like a glove,—for the Actinia does not seize vigorously metallic substances.

The limbs of the frog, with the nerves and vertebræ attached, are laid on a piece of board, while the copper wire, which is curved, arches over the edge of it, so that the end covered with frog's intestine can be readily brought within reach of the Actinia. Having waited for a few moments until the muscular contractions excited by thrusting the wire into the spinal-canal have ceased (and they are in general very transient), the board is placed floating on the water, and the frog's intestine offered to an Actinia. Muscular contractions ensue, perhaps not so promptly, certainly not so vigorously, as in the former experiments; but, nevertheless, easily to be recognised, and unmistakable. They commence in the thighs, and, as in the former case, extend to the calves, and then the toes move actively. This last experiment has been modified in a variety of ways; but the same result has been generally obtained. Perhaps the best modification of it is, to use a piece of copper wire, having one end coiled so as to form a disk, which is covered with chamois leather; while the other is sharp-pointed to enter the spinal canal of the frog. The whole, except the surface of the disk, which is to be given to the Actinia, and the point for the spinal canal, are covered with sealing-wax, and the frog's limbs extended upon a thin piece of board. With this arrangement, precisely the same effects were produced as already described.

It is a remarkable fact, and deserves especial notice, that in all these

experiments the muscular contractions, when once strongly excited, whether by direct contact or through the medium of wire, do *not* at once subside when the limbs are withdrawn from the influence of the Actinia. Not unfrequently, after the limb is taken away out of reach of the Actinia in the first experiments, or removed from the wire in the last, strong muscular contractions continue to take place for from three to five minutes.

All the varieties of Actinia which have hitherto been made the subject of experiment have given similar evidence of electric power, but by no means in an equal degree. The large varieties are found, in proportion to their size, much feebler than those of less dimensions, and any attempt to succeed in the experiment with the copper wire has failed with them.

A somewhat similar observation has been made by Dr. John Davy regarding the Torpedo, for he tells us* "that he has seen strong vivacious fish, which made great muscular exertions in the water, almost or entirely destitute of electrical action."

It is obvious that, in creatures of such moderate dimensions as Actiniæ, of so peculiar a form, and of such feeble power, much difficulty is to be expected in demonstrating the other experimental effects which animal electricity is capable of producing in common with other electricities, viz., magnetic deflection, magnetizing-needles, spark, heating power, chemical action; and it must be admitted, that all experiments hitherto undertaken on this subject have been attended with negative results.

I hope, and indeed expect, when further opportunities are afforded of examining these creatures in health and vigour in their native pools, to obtain more satisfactory results on these points, when I shall look forward to the pleasure of making a further communication on the subject.

Dr. E. Percival Wright mentioned that the species operated with were *Actinia mesembrianthemum*, *Bunodes crassicornis*, and *Anthea cereus*.

Rev. Joseph Greene, M. A., exhibited specimens of the very rare *Deilephila galii*, in the most beautiful state of preservation, taken near Deal; also a hybrid moth, bred from *Smerinthus populi* and *S. ocellatus*.

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* "Philosophical Transactions," p. 548. 1834.

The Rev. Professor Haughton, V. P., exhibited unique specimens from the University Museum, of *Euomphalus cristatus*, and a new species which he called Reginæ. He presented the Association with copies of Plates I. and II., which had been drawn by Mr. Campbell, of the Engineering School. The following is a description of these Plates:—

PLATE I.

Fig. 1. Under side of unique specimen of *Euomphalus cristatus* (Phillips), preserved in the Museum of Trinity College; locality not certain, but believed to be Strokestown, county of Roscommon. The figure shows the tubular character of the crests, which are closed below; their upper surface is not known.

Fig. 2. Natural cast of same, taken from the upper surface of the limestone slab. The original, exclusive of the spines, is eight inches (nearly) in diameter.

PLATE II.

Fig. 1. A specimen of *Euomphalus acutus* (Sowerby); somewhat distorted by cleavage, probably from Little Island, county of Cork: this specimen belongs to the Museum of the Royal Dublin Society. It is remarkable for the semicircular sinuosity observable on the lines of growth in passing the keel of each whorl, which must have corresponded with a notch in the outer lip. There is, however, no *sinus*, as observable on Fig. 2.

Fig. 2. *Euomphalus Reginæ* (mihi), found in the lower limestone at Sheffield, Queen's County. Specimen unique, in Museum of Trinity College.

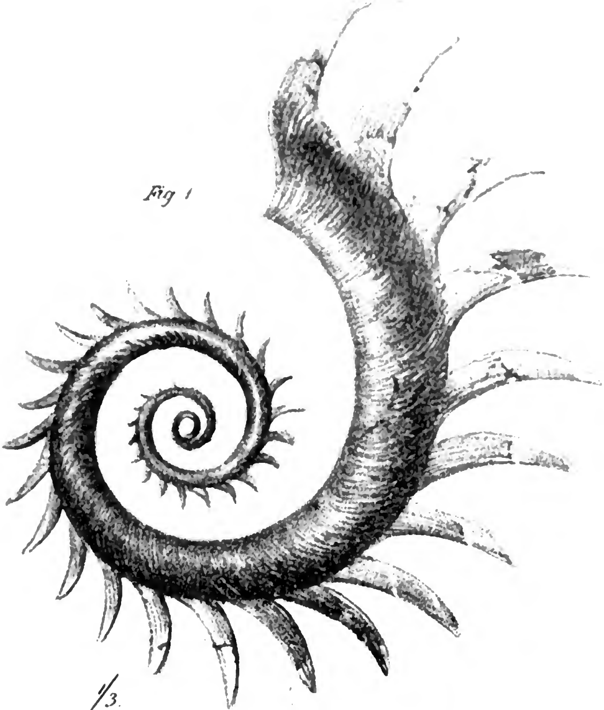
E. Reginæ.—Testâ conicâ; spiræ angulo 70°; anfractibus 6–8, transversim eleganter striatis, sinu lato carinatis, suprà tabulatis; aperturâ subquadratâ scissurâ, altâ superne denotatâ.

Breadth to Height = 150 : 100.

This shell resembles in its general character *E. acutus*, but differs from it in two particulars; *first*, in having a better marked keel, which is formed by the flat upper surface of the whorl making a well-marked angle of 105° with the side; *secondly*, by the

PLATE I

Fig 1



1/3.

Fig 2

W. C. ad nat. del.

Lith.d by W. Whitty C.E. Dublin


BRITISH MUSEUM
NATURAL HISTORY

PLATE V

Fig. 1.

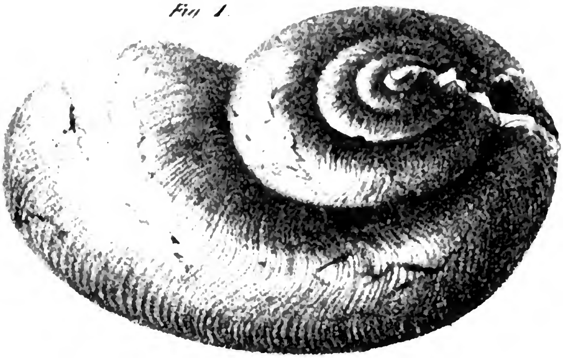


Fig. 2.

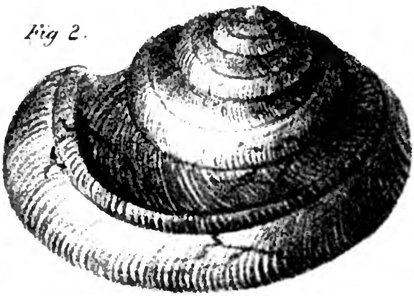


Fig. 3

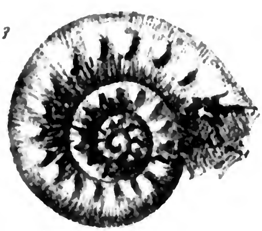
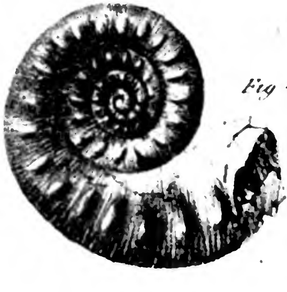


Fig. 4.



W. C. ad nat. del.

Lith^d by D^r Whelly C. E. Dublin.

Pleurotomaria-like sinus band, which bevils off the angle of the keel; this sinus is 1½ lines broad. The striæ on the surface of the shell form a reversed angle, well marked, as is shown in the figure.

Figs. 3 & 4. Under and upper surface of two specimens of *Euomphalus pugilis* (Sowerby), showing the ornamental knobs, 20 to the whorl, characteristic of this species, which seems to be identical with *Euomphalus tuberculatus* (De Koninck). This fossil is rare, although locally abundant in some parts of the lower limestone of the county of Kildare.

Mr. Bain, Curator of the College Botanic Gardens, sent for exhibition a magnificent specimen of *Ouvirandra fenestralis*, which had flowered very freely in the course of the autumn.

The following Resolution, sent down from the Council, was proposed for adoption by Dr. E. Percival Wright, and seconded by the Rev. Joseph Greene, A.M.:—

"That in consideration of our late President's deep interest in this Association, and as a token of respect to his memory, his son, R. Ball, Esq., T.C.D., be elected a Life Member without the payment of the usual composition."

The following gentlemen, being approved of by the Council, were elected:—

Corresponding Members.—Professor Agassiz; J. S. Bowerbank, F.R.S.; P. H. Gosse, F.R.S.; Dr. Asa Gray; Rev. T. Higgins; Rev. T. Hincks; Dr. E. Lankester, F.R.S.; Dr. Leidy; Professor Redfern,

Associate Members.—G. V. Du Noyer, M.R.I.A., Geological Survey, Ireland; David Moore, M.R.I.A., A.L.S., Curator of the Royal Dublin Society's Botanic Gardens.

The Meeting then adjourned to January 15, 1858.

FRIDAY EVENING, JANUARY 15, 1858.

Professor W. H. Harvey, M.D., F.L.S., Vice-President, in the Chair.

The Minutes of last General Meeting having been read, were approved of, and signed by the Chairman.

Letters were read from P. H. Gosse, F. R. S., Professor Redfern, Dr. Lankester, Rev. T. Hincks, acknowledging their election as Corresponding Members; and from Mr. G. V. Du Noyer and Mr. D. Moore, as Associate Members; and thanking the Association for this mark of distinction.

The Rev. Eugene O'Meara read the following—

CATALOGUE OF DIATOMACEÆ COLLECTED IN POWERSCOURT, COUNTY OF WICKLOW.

The excursion of the Association of July 1857, may still be in the recollection of the Members. We assembled to an early breakfast, at the residences of our then Senior Vice-President (now our esteemed President), and of one of our Honorary Secretaries. Having done justice to the hospitality provided for us, we prepared for a drive of some ten or twelve miles ere the proper business of the day could begin. Headed by Professor Harvey, who took the lead of the botanists; Mr. Haliday, who reigned supreme among the entomologists; and Mr. Du Noyer, who kindly commanded the army of geologists,—we drove along the pretty mountain road that leads to the village of Enniskerry. The morning was all that could be desired: a clear blue sky above us faded off in the horizon into a pale white mist, that gave promise of a glorious day. Dublin Bay glittered beneath our feet, sparkling with the rays of a July sun. In about an hour we drove through the Scalp, one of the geological attractions of the county of Dublin, and in half an hour more we entered the demesne of Lord Powerscourt. It would be foreign from my present purpose, even were I able, to tell of all the plants and insects that were collected in the course of the day. Dr. Harvey and Mr. Bain collected quantities of the pretty *Hymenophylum Wilsoni*. Dr. E. Percival Wright, and others, captured fine specimens of *Cossonus Tardii*, &c. It is to be wished that, on the occasion of this summer's excursions, the Members would return to the Hon. Secretaries a list of the various plants, &c., they may observe, and that then the Secretaries would form these materials into what, I cannot doubt, would be a most interesting paper. My own gatherings of Diatomaceæ were the most productive I have ever made; no less than sixty-six species figured by Smith having been found.

The following is a list of the species:—

Amphora ovalis.
,, minutissima.
Amphipleura pellucida.
Achnanthidium microcephalum.
,, lanceolatum.
Cocconeis pediculus.
Cyclotella Kutzingiana.
Campylodiscus costatus.
,, spiralis.
Cocconema lanceolatum.
,, cymbiforme.
,, parvum.
Cymatopleura elliptica.
,, apiculata.
,, solea.
Denticula tenuis.
Diatoma vulgare.
Epithemia granulata.
,, gibba.
,, turgida.
,, rupestris.
Fragillaria capucina.
Gonphonema dichotomum.
,, acuminatum.
,, intricatum.
Himantidium pectinale.
,, gracile.
,, undulatum.
,, soleirolii.
Melosira varians.
Meridion circulare.
Navicula ovalis.
,, crassinervia.
Navicula gibberula.
,, dicephala.
,, tumida.
,, rhomboides.
,, producta.
Nitzchia sigmoidea.
,, tenuis.
,, linearis.
,, minutissima.
Odontidium mesodon.
,, tabellaria.
,, parasiticum.
Pleurosigma attenuatum.
Pinnularia viridis.
,, major.
,, mesolepta.
,, radiosa.
,, oblonga.
,, tabellaria.
Surirella ovalis.
,, splendida.
,, pinnata.
,, biseriata.
,, angusta.
,, minuta.
Synedra radians.
,, lunaris.
Stauroneis gracilis.
,, phenicenteron.
,, anceps.
,, linearis.
Tabellaria floculosa.
,, fenestrata.

Professor Harvey made some verbal observations on a peculiar form of Fibro-cellular Tissue which he had recently observed in a confervoid Alga from the coast of Florida, and had just described and figured in the third Part of his "Nereis Boreali Americana."

He commenced by stating the rare occurrence among the Algæ of any variety of cellular tissue different from ordinary parenchyma. With the exception of the web of anastomosing fibrils, which exists within the cells of the genus Caulerpa, and a somewhat similar, but less developed, fibrous emanation from the inner face of the cell-wall in Dictyosphæria, he was not acquainted with any other instances in which fibres were developed within the cells of the Algæ. The Alga now exhibited to the Meeting was named *Blodgettia confervoides*, and he had referred it to the family Valoniaceæ. It externally resembled a branching Conferva or Cladophora so closely, that, before he had minutely examined it, he had actually distributed specimens to some of his correspondents, under the name of *Cladophora cæspitosa*. The structure of the cells of which it is composed, however, forbids its being associated with Cladophora, in which genus the frond consists of a branching string of membranous-walled cells, of the ordinary structure found among the Algæ. The frond in Blodgettia equally consists of a branching string of cells; but the structure of their cell-wall is highly compound. It is easy, by making transverse and longitudinal sections of the cell, to separate portions of the cell-wall, which, by a little careful manipulation, may then be shown to consist of several separate membranes developed one inside the other. The outer coats of the cell, to the number of two or more, may be separated as perfectly transparent, homogeneous films; but the innermost coat, which encloses the grumous endochrome is of thicker substance than the external films, and is traversed by numerous longitudinal fibrils, connected together in an irregular manner by anastomosing cross-veinlets. The membrane thus appears marked with a fibrous network, with oblong meshes, which are somewhat pointed at each extremity, and are longer or shorter, but averaging a length of four to five times their diameter. Besides the anastomosing veinlets, there are others which may be said to be *free*,—in the sense that the veinlets in a fern-frond are so called,—as they terminate in the centre of the areole formed by the anastomosis. To these free veinlets are attached moniliform strings of spherical cells, which Dr. Harvey was disposed to regard as spores. If such be their nature, they are probably retained in the cell until the decay of its walls. For a figure of this structure Dr. Harvey referred to the 45th Plate of "Ner. Bor. Amer.," Fig. C, which was shown to the Members present, and at the same time sections of the netted membrane were examined with one of the microscopes on the table.

Professor R. W. Smith exhibited some curious varieties of some of our native ferns.

Mr. Burchall exhibited a fine collection of *Alpine Lepidoptera*, and made observations on some of the rarer species.

Mr. Bailey exhibited some rare Coleoptera taken in the Crimea and Africa. The thanks of the Members were voted to Mr. Bailey for exhibiting these insects.

The Members then proceeded to ballot, Dr. Beauchamp being appointed Scrutineer, when the following were declared duly elected:—

1. T. M. Dolan, Sen. Soph. 2. A. H. Hamilton, Sen. Fresh. 3. Robert J. Montgomery, M. A., Assist. Sec., Royal Zoological Gardens. 4. J. H. Nicholson, M. A. 5. E. J. Swift, Jun. Fresh.

Charles Spence Bate, F. L. S., having been proposed at the last General Meeting, and approved of by the Council, was then elected a Corresponding Member. By the wish of the Members present, the usual ballot was dispensed with, and Mr. C. Spence Bate was elected by acclamation.

FRIDAY EVENING, FEBRUARY 19, 1858.

Professor W. H. Harvey, M. D., F. L. S., Vice-President, in the Chair.

Minutes of former Meeting having been read, were approved of, and signed by the Chairman.

Letters were read from C. Spence Bate, F. L. S., and J. S. Bowerbank, F. R. S., acknowledging their election as Corresponding Members of the Association, and conveying their best thanks to the Members for the honour conferred upon them.

Rev. Joseph Greene read a paper by Lieutenant Crozier, R. E., A. B., Corresponding Member, being—

A CATALOGUE OF LEPIDOPTERA CAPTURED BY HIM DURING THE PAST SUMMER NEAR CHATHAM.

In the few remarks I intend to make, I shall confine myself to the Rhopalocera, Sphinges, and Bombyces, as in the course of a single summer it is impossible to arrive at anything like a correct estimate of the number of species of the Noctuæ occurring in a locality.

Chatham is situated on the chalk, and therefore a very favourable locality for meeting with many local species, as the results of my collecting expeditions proved.

My principal hunting-grounds were some oak woods, called Chattington Roughs, belonging to the Earl of Darnley. The undergrowth is very thick, but the woods are traversed by wide paths, and in many places there are large clearings, caused by the undergrowth being cut down for hop-poles. These clearings abounded with Cratægi, Sibilla, W Album, and other species. The soil consists of a damp, tenacious clay, so as apparently to be quite unfit for the transformation of larva in it. This may account for the fact of my never having found any pupæ in the neighbourhood of Chatham, although I tried to be persevering in the search for them.

I shall now proceed to enumerate the species that I met with, omitting the very common ones which occur everywhere. The nomenclature adopted is that of Stainton's "Manual of British Butterflies and Moths," 1857.

Rhopalocera.

Papilio machaon.—A specimen was taken by Mr. Channy on the top of a chalk hill. Towards the close of the summer I saw it in fine condition. How could it have strayed so far from its haunts?

Gonepteryx rhamni.—Abundant.

Colias edusa.—I had the pleasure of seeing, but did not capture, this insect.

Colias hyale.—I took a fine pair in a clover field on the side of a precipitous chalk hill.

Aporia cratægi.—This fine insect is pretty abundant in the woods in the beginning of June, but from the strength and rapidity of their flight they are difficult to capture. (I took about twenty.)

Leucophasia sinapis.—This insect I did not take myself, but have seen specimens captured in the neighbourhood.

Arge galathea.—Very abundant, but local.

Hipparchia semele.—One or two specimens in the same field as *C. hyale.*

Limenitis Sibilla.—This beautiful species occurred in considerable numbers along the edges of a clearing, which was almost the only place I met with them. It is really delightful to watch their graceful easy flight, as they float about on the bright sunshine of a

summer's day. Does the larva ever feed on the sallow, as nearly all the specimens I captured were at rest on stunted bushes of that tree, and I could only find one small plant of honeysuckle in the immediate neighbourhood?

Apatura iris.—This magnificent species occurred in large numbers on the top of a hill, wooded with lofty oaks. I only succeeded in capturing three, as I did not possess an "Emperor" net, and was not aware at the time of the efficacy of putrid animal remains as a bait for his majesty. To obtain the specimen I did, I had to extemporize a net by fastening the one I carried in my hand to the end of a long sapling. This, however, formed a very unwieldy weapon, as the result showed.

Cynthia cardui.—Occurs generally. I did not meet with it.

Vanessa polychloros.—Abundant; but very hard to capture. I met with hybernating specimens in the spring, much more frequently, however, than the insect fresh from the pupa, in the autumn.

Argynnis Lathonia.—On the 23rd August, 1857, as I was walking along a grassy path in Chattington woods, not expecting to meet with anything new, suddenly something like a ray of golden light flitted past; I made a stroke at it with my net, and succeeded in getting it within its folds; and fancy my delight when, on taking it out, I found it to be a specimen of this beautiful species, in the most perfect condition. Later in the day I took another specimen, also fresh from the chrysalis.

A. selene.—Only one specimen.

A. Euphrosyne.—In great abundance.

Melitæa Athalia.—This extremely local species occurred in one or two spots. They seem to have a curious habit of changing their metropolis every year, as I was shown a spot which swarmed with them in 1856, but where only a few stragglers were to be seen when I visited it.

Thecla W album.—This rather scarce species abounded in the same clearing as *L. Sibilla*. I generally captured them at rest on the sallow bushes, or on the blossoms of the privet. I remarked they never appeared in any numbers until after 3 P. M.

T. quercus.—Very abundant on the same oaks as *A. iris*, on which it seems to attend.

Polyommatus argiolus.—Rather rare.

P. alsus.—Common, but local.
P. Corydon.—Very abundant on the chalk hills.
P. Adonis.—Moderately abundant.
P. agestis.—Rather rare.
Thymele alveolus.—Very common.
Thanaos tages.—Common in many places.
Pamphila linea.—Common.
P. sylvanus.—Very abundant.

Heterocera.

Sphincina.

Procris statices.—I met with a few specimens in one meadow.
Anthrocera trifolii.—Very abundant. Many curious varieties occurred, in some of which the colouring was quite different from the ordinary tint.
A. filipendulæ.—As common as it usually is.
Smerinthus populi.—Occurred at light.
Sphinx ligustri.—Common in the larva state. I only obtained one specimen of the perfect insect.
Macroglossa stellatarum.—Only saw one specimen, as I did not visit the haunts of the species.
Trochilium culiciformc.—One specimen.
T. tipuliforme.—Occurs sparingly.

Bombycina.

Hepialus hectus.—Common in the grassy lanes of one wood.
H. lupulinus.—Very common.
H. humuli.—I only met with one specimen (a female) of this very common species.
H. velleda.—Occurs in some plenty.
H. sylvinus.—I took one or two specimens of this, the prettiest of the Hepialidæ, as they were flying rapidly along the hedge.
Pterostoma palpina.—Three or four specimens occurred.
Diloba cæruleocephala.—Very abundant as larva.
Dasychira pudibunda.—Common as larva, and the perfect insect comes to light.

Stilpnotia salicis.—Excessively abundant on a row of poplars, on Chatham Lines.

Porthesia auriflua.—Very abundant.

Lithosia aureola.—Scarce. I took two specimens about the end of May or beginning of June, although the time usually given is much later.

L. griseola.—Scarce. One specimen by beating.

Cybosia mesomella.—Scarce. Two specimens by beating.

Œnistis quadra.—Scarce.

Miltochrista miniata.—Scarce. One specimen came to light.

Euthemonia russula.—Rather rare. Occurs in the clearings of the woods.

Nemeophila plantaginis.—Excessively abundant, but local. One afternoon in May I captured a great many after 5 P.M.; before that, I had only seen one or two.

Arctia villica.—Rather scarce.

Eriogaster lanestris.—I found one colony of the larva of this insect on blackthorn. They spin a very thick, tough web.

Clisiocampa castrensis.—I succeeded in breeding about 120 specimens of this local species. The larva I found on the muddy banks of the Medway, feeding on a Polygona (*Robertii* is, I believe, the species). When young they are gregarious, and live in a large web; after moulting they separate, and finally spin up amongst the roots of the grass, or between two leaves of the Polygona. It is very hard to find the cocoon, although the larva are so numerous and conspicuous.

C. castrensis seems to be very lazy in constructing its cocoon, as, on two or three occasions, several united their efforts to construct a large one, in which the Chrysalides were placed without any intervening web.

Odonestis potatoria.—Very plentiful as larva.

Cilix spinula.—Several specimens occurred.

Platypteryx lacertinaria.—Only one specimen.

Drepana hamula.—I obtained one specimen at a gas lamp.

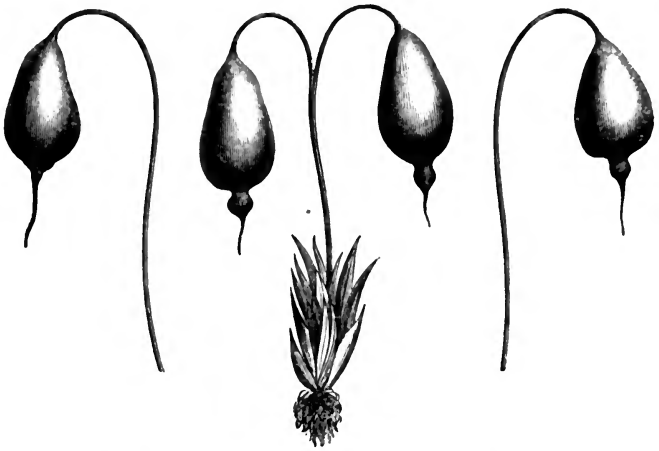
Mr. David Moore, M. R. I. A., A. L. S., Curator of the Royal Dublin Society's Botanic Gardens, read a paper—

ON THE OCCURRENCE OF A SINGULARLY METAMORPHOSED STATE OF BRYUM SANGUINEUM; AND ON THE DISCOVERY OF SOME ADDITIONAL SPECIES TO THE IRISH FLORA.

It is now a received axiom among botanists, that it is by studying the morphological changes which from time to time take place with phænogamic plants, that their true structure can be fully understood. This, no doubt, holds good also to a certain extent with cryptogamic plants, but, owing to the simplicity of their structure, it is rarely that opportunities are afforded for observing such changes of parts, with the exception of Ferns, some of which natural group do occasionally assume appearances differing greatly from their normal state. The Mosses are, however, so constant to their general forms, that they have been likened by some to watch-works among vegetables, in consequence of the regularity and fineness of their structure; any abnormal changes, therefore, found to occur among members of this tribe are the more worthy of being recorded.

In the present instance I have to bring under the notice of this Association a remarkable state of *Bryum sanguineum*, which is so altered in some of its parts as to render it unlike the typical state of the plant. In the normal form of this species the lids of the capsules are shortly apiculate, i. e. they have short points, whereas the changed states here exhibited have long rostrate beaks, nearly equalling the length of the capsules themselves. Besides, these beaks are swollen at their bases in such a manner as to appear as if considerable progress were made in the formation of a second capsule, articulating with the first; and in one specimen there is no lid whatever, but a gradual tapering of the apparent capsule from the base to the long-pointed apex. The whole plant is more or less altered, the leaves being narrower and more lanceolate than they usually are; and in one case two of the setæ were observed joined together nearly their whole length, when they separated towards their apices, each ending in a regular capsule. Mr. Wilson, to whom I sent specimens of this monstrosity, considers that the change arises from a morbid incorporation of the calyptra with the operculum when in an early state of inflorescence. This I also believe to be the principal cause, though it will not fully account for the plant which has no operculum. The specimens here presented were found growing in

a large patch of the species in its normal state on Howth, by Mr. D. Orr, in April, 1856.



The following species of Mosses, not hitherto recorded as Irish, have been discovered and identified since I furnished the last supplementary list in the "Journal of the Royal Dublin Society" (*vide* vol. i., 1857).

Sphagnum contortum (*Schultz*). Black-stemmed Bog Moss.

Habitat: Wicklow Mountains; Mr. J. H. Davies, of Thirsk, Yorkshire, who appears to have been the first to recognise this species in Ireland, and who lately sent specimens to me gathered in Wicklow. The plant, however, is not rare, since I find it in my herbarium, collected from bogs in the North of Ireland twenty years ago; and Mr. D. Orr has it from the Three-Rock Mountain, Co. Dublin, and also from Howth, as well as the variety γ. *obesum* from the latter place.

Grimmia Schultzii (*Bridel*). Schultz's Grimmia.

Habitat: on granite rocks near the Scalp, Co. Dublin, July, 1854; Mr. D. Orr. This plant we had for some years considered to be only *Grimmia tricophylla*, to which species it bears strong resemblance; but some doubt having arisen on the matter, specimens were submitted to Mr. Wilson, who at once pronounced it his *G. Schultzii*.

Orthotrichum Lyellii (*Hooker*). Mr. Lyell's Bristle Moss.

Habitat: on trees near Clonmel, and at Powerscourt. This interesting addition to our Flora was first discovered by me growing on trees by the side of the River Suir, near Clonmel, bearing fruit in July, 1856, and since barren at Powerscourt.

Bryum warneum (*Blandow*). Warren Thread-Moss.

Habitat: on muddy spots at the North Bull, near Dublin, 1857; Mr. D. Orr. This species is described at page 12, "Bryologia Britannica," among the addenda. At the time of the publication of that work only two habitats appear to have been known for this moss in Britain; one in Fifeshire, Scotland, and the other in Lancashire; the discovery of it in Ireland is, therefore, the more interesting.

Bryum inclinatum (*Br. and Sch.*). Small-mouthed Thread-Moss.

Habitat: this species came up in considerable quantities among heath mould brought from the Dublin Mountains, in one of the conservatories at the Botanic Garden in 1856, and has since been collected on a wall at Howth, by Mr. D.Orr. Probably not rare.

Bryum cernuum (*Hedw.*). Drooping Thread-Moss.

Habitat: on the wall which surrounds the viceregal demesne, Phœnix Park, 1856; Mr. D. Orr. And since, in other localities near Dublin.

Hypnum salebrosum (*Hoffman*). Smooth-stalked Streaky Feather Moss.

Habitat: on a grassy sand-bank by the side of the River Tolka, near the Botanic Garden, Glasnevin, 1857; Mr. D. Orr.

The following species have either been considered of rare occurrence in Ireland, or have had no certain localities mentioned in "Bryologia Britannica":—

Sphagnum rubellum (*Wilson*). Red Dwarf Bog Moss.

Habitat: near the base of Carntuel Mountain, Killarney, June, 1857, growing with *Jungermannia Woodsii* and *J. juniperina*.

Orthotrichum phyllanthum (*Br. and Schimper*).

Now found to be a most abundant species in Ireland, though always barren.

Orthotrichum tenellum (*Bruch*).

Lately found by Mr. D. Orr, on birch trees near the head of Ballinisscorney Glen, county of Dublin. The other habitats known for this plant are in the counties of Kerry and Galway.

Bryum torquescens (*Br. and Sch.*).

This beautiful moss has been found to grow in considerable abundance on the tops of walls near Abbotstown, county of Dublin, by Mr. D. Orr. Probably not rare in Ireland.

Hypnum glareosum (*Bruch*).

One of the commonest mosses near Dublin, though only one solitary habitat is given for it in "Flora Hibernica," at Lough Bray.

Mr. John Bain, Curator, College Botanic Gardens, exhibited a very beautiful variety of an *Athyrium* —— (*?*) discovered by a lady in the county of Wicklow.

Mr. D. Moore exhibited a series of *Hylurgus piniperda*, from the Botanic Gardens of the Royal Dublin Society, at which place they were very destructive to the pines.

The Members then proceeded to ballot, Dr. Daniel acting as Scrutineer, when J. T. Banks, M. D., was declared duly elected an Ordinary Member.

FRIDAY EVENING, MARCH 19, 1858.

Professor W. H. Harvey, M.D., F.L.S., Vice-President, in the Chair.

Minutes of former Meeting having been read, were approved of, and signed by the Chairman.

Professor J. Reay Greene read the following paper:—

ON THE GENUS LUCERNARIA.

The genus Lucernaria was founded by O. F. Muller for the reception of certain marine zoophytic forms supposed to be nearly related to Ac-

tinia. All the species which it includes are of a gelatinous consistence, and more or less campanulate in form, having the narrow extremity of the body attached to submarine objects by means of an adherent disc, while the opposite (or oral) aspect is surrounded by numerous short tentacula arranged in tufts round the margin of a saucer-like cavity, in the centre of which the mouth is situated.

Five species have been recorded as inhabiting the shores of Britain, viz.:—

1st. *L. auricula.*—This species is provided with eight tufts of tentacula, placed at equal distances from one another, and having a marginal tubercle between each pair. The adherent disc is situated at the extremity of a short peduncle. The colour is exceedingly variable.

2nd. *L. campanulata.*—The arrangement and number of the tentacular tufts is the same as in *L. auricula*, but the tentacula in each of them are more numerous, and the marginal tubercles are absent. The adherent disc is separated from the body by a cleft or stricture. The colour is greenish-brown.

3rd. *L. fascicularis*, which has the margin surrounded by eight tentacular tufts *arranged in pairs*. The peduncle is long and wrinkled, terminating in a narrow adherent base. The colour is dark-brown.

4th. *L. cyathiformis.*—In this well-marked species the body is goblet-shaped, and the tentacular tufts are placed round the *interior* of the margin over which they slightly project. In the four remaining British species they occupy the extremities of the produced marginal lobes. The peduncle is corrugated, and of equal length with the body. Its extremity is dilated into a flat adherent disc. Its colour is greenish or dusky brown.

5th. *L. inauriculata*, which differs from *L. fascicularis* in having the eight tentaculiferous lobes equidistant from each other; from *L. auricula*, in the absence of any ear-like appendage at the middle of the border of the connecting webs between these lobes; from *L. campanulata* in the absence of the "two series of foliaceous processes arranged on each side of a white line," extending from the sides of the mouth along the middle of each connecting web; and from *L. cyathiformis* in the tentacles being supported in clusters, at the extremity of lobes produced beyond the margin of the infundibular disc.

Some add a sixth British species, *L. quadricornis*, but this is usually considered to be a variety of *L. fascicularis*.

The five forms above briefly described have been always viewed in the light of distinct species, and I am not aware that any naturalist has ever questioned the propriety of so regarding them. But the examination of a form of this genus which I obtained in February of the present year, at Trabulgan, county of Cork, has led me to entertain a different opinion.

The Lucernaria to which I allude was one-third of an inch in length, and of a delicate pink tint similar to that seen in some specimens of *L. auricula*. In shape and general appearance it bore some resemblance to *L. fascicularis*, but the form of the body was fuller, and more cup-shaped. It was furnished, like that species, with a long peduncle, but the latter was destitute of corrugations, and dilated at its extremity into an adherent disc, in both characters differing from the peduncle of *L. fascicularis*. The margin was surrounded by eight tufts of tentaculæ arranged in pairs, but this arrangement was by no means so well marked as in the last-mentioned species—the tufts, at the first view, appearing to be almost equi-distant. Between each of the pairs a marginal tubercle occurred. In other respects the oral aspect was not unlike that of *L. campanulata*. Foliaceous processes proceeded from the mouth to the spaces between the arms as in that form. The stomach also was provided with peculiar worm-like cæcal appendages, in all respects similar to the same organs in *L. campanulata*. The writhing movement of detached portions of these appendages continued for a considerable time. (*Vide* Dr. Johnston's "Brit. Zoophytes," second edition, p. 249).

It is evident that the Lucernaria here described differs from any other British species, and at the same time exhibits characters which connect it with at least three of these. In colour, and in the possession of marginal tubercles, it corresponds with *L. auricula*, but it differs from that species in the form of its body, and the appearance of its oral aspect. In the first of these characters it is similar to *L. fascicularis*, but it differs from that form in its smooth peduncle and adherent disc, as also in its oral aspect. In this last point of view it is akin to *L. campanulata*, but from this it differs in possessing marginal tubercles, and in having the tentacular bulbs arranged in pairs. It might, then, be inferred that it was a distinct species; and if we admit the specific distinctions of *L. auricula*, *L. campanulata*, and *L. fascicularis*, we must also admit that of the form described. But it appears to me to be far more advisable to regard these as varieties of one and the

same species, which I propose to name *L. typica*. The specific differences between these three forms are by no means strongly marked. Some naturalists assert that they have seen examples of *L. auricula* in which the marginal tubercles are absent; and yet these are regarded as its chief distinguishing characteristics. Again, the variations to which the same species is liable, even in so limited a district as the British Isles, from changes of aspect, light, and temperature, are far from being fully recognised. This is true, especially in the case of Zoophytes, for it is well known that in some instances Dr. Johnston's descriptions of many of these last have been found insufficient, simply because they were those of the varieties of these species found on the shores of the eastern borders. The example of Lucernaria which I have obtained is probably young, since its length is not more than one-third of that which many Lucernaria attain, and is on this account well adapted to show the *general* characters of the species. I do not even, notwithstanding its peculiar characters, consider it a variety. It is merely an immature form of that one species which, under different circumstances, might become *L. auricula, L. campanulata, or L. fascicularis.* The last-mentioned species occurs in but two (or three) British localities. The peculiar form probably depends upon local causes. The *L. cyathiformis* is, however, a distinct form.

With regard to the position of the genus Lucernaria, the majority of writers seem to be in error. It is usual to place this genus in the neighbourhood of Actinia, and to state that the habits of the Lucernaria are intermediate between those of Medusæ and Sea-Anemones. Mr. Gosse considers that this genus is the link which connects the normal Actinia with the Medusæ. How any forms can do this, it is not easy to understand. The Medusæ and Actinia belong to separate and distinct divisions of the extensive sub-kingdom, Cœlenterata. These two classes are the Hydrozoa and the Actinozoa. That the Lucernaria is to be placed in the latter seems more than doubtful. Those who associate it with the Actinia do not appear to be at all familiar with its anatomy. More wisely, we think, has Mr. Huxley placed it among the Hydrozoa, and made it the type of an extensive family, containing the *Hydra tuba*, and such of the discoid Medusæ whose direct development from ova seems established, e. g., Eginopsis. Such appears to be its true position.

Dr. E. Percival Wright did not coincide with Professor J. Reay Greene's

reasons for supposing the identity of the three mentioned species of Lucernaria; nor did he think that by allowing their specific distinctness he acknowledged that of the young form described.

Dr. E. Percival Wright, Director of the University Museum, stated that for the last few months he had been engaged in arranging the collections made by Professor Harvey in Australia, Tasmania, New Zealand, and Fiji. It would, of course, be a work of some years before the whole of these collections could be classified and named; but Mr. Bowerbank had kindly undertaken the Sponges; Professor Kinahan the Crustacea; Professor J. Reay Greene the Echinoderms; Professor Wyville Thomson the Hydroid Zoophytes and the Polyzoa; while he intended to devote himself more especially to the Mollusca. From time to time papers on portions of these subjects would be submitted to the Association, and all new species would be illustrated by figures. The first contribution he had much pleasure in bringing before the Members this evening, namely, that of Professor Wyville Thomson—

ON NEW GENERA AND SPECIES OF POLYZOA FROM THE COLLECTION OF PROFESSOR W. H. HARVEY, TRINITY COLLEGE, DUBLIN (WITH FIVE PLATES).

Part I.

Dr. Harvey has kindly given me an opportunity of examining a quantity of Marine Polyzoa and Hydroid Zoophytes, principally the "refuse" of the magnificent series of Algæ lately collected by him on the southern and western coasts of Australia. Though occupying this undignified position, the collection of Zoophytes is an extremely valuable one, the largest probably, with one exception, that of the energetic "Rattlesnake" naturalists, which has ever been brought to Europe from the Australian seas.

This first communication consists of an enumeration of the species belonging to the first six families of the Cheilostomatous sub-order of Polyzoa.

I have few authorities to quote and to acknowledge. Mr. Busk's admirable Catalogue of the Polyzoa in the British Museum has been my guide throughout. I have almost entirely adopted his arrangement, with full concurrence in his views of grouping into families and genera. I take this opportunity of thanking him most sincerely for his volume,

and still more for his friendly MSS., assistance, and counsel. Some additional terms I have adopted from Dr. Allman's excellent "Memoir on the Fresh-water Polyzoa." As any accurate information with regard to the geographical distribution of these forms is of importance, I have incorporated with those collected by Dr. Harvey one or two smaller collections, sent to him with Algæ from various parts of the world. A series, lately procured by Dr. Joliffe in New Zealand, is very interesting.

I began an examination of foreign Polyzoa and Zoophytes in the hope of falling in with some clue to the affinities of some Palæozoic forms, and especially of the Graptolites. In this I have hitherto been disappointed. Although the Graptolites appear in some respects to approach the *Polyzoa ctenostomata*, they have still peculiarities which are apparently inconsistent with the structure and mode of growth of any living order.

In Dr. Harvey's collection the Cyclostomata and Ctenostomata are few in number. The Hydroid Zoophytes are very numerous, and most interesting. They are in progress of illustration.

The second part of this communication will conclude the Cheilostomata.

Class.—POLYZOA.

Order 1.—P. INFUNDIBULATA.
Sub-Order 1.—CHEILOSTOMATA.
Sect. 1.—Articulata.
Subsect. 1.—Uniserialaria.

Family 1.—Catenicellidæ (*Busk*).

Genus 1.—CATENICELLA (*Blainville*).

As usual in collections from the other side of the Equator, the Catenicellæ are prominent and abundant. Most of the species in the "Rattlesnake" collection are repeated, and seven undescribed forms occur. One new species belongs to the fenestrate division; the second differs so completely from every described form as scarcely to be referable to any of the formerly characterized groups, though occupying a position to a certain extent intermediate between the two first: four are vittate; and the seventh, though distinctly a Catenicella, and closely allied to *C. aurita* (*Busk*), simulates to a certain extent the structure of the remarkable genus Calpidium.

Some of the new forms throw some little additional light upon the structure and development of the cœnœcium. In *C. Harveyi* and in *C. alata*, the two membranes of which the cell wall is composed are remarkably distinct. In the former species particularly the outer layer seems scarcely to be in contact at any point with the inner, investing it like a loose horny sac. The large "avicularian processes" are open and cup-like, with ragged edges. In *C. alata* the two layers are also very distinct; but they are in contact over the greater part of the surface of the cell. In both species the upper spine or cup and the lower division of the lateral processes are formed of the outer membrane alone; while the true avicularian chambers, with the avicularia, are processes of the inner layer, the true wall of the cell. Chambers formed of the outer film are often entirely open or irregularly perforated with large apertures.

The outer membrane seems to have something to do with the development of the cell. It is very possible that during the process of the extension of the cœnœcium by gemmation, the outer layer may form a dilatation expanding and filling with formative blastema, and that within this sac the true cell wall and the organs of the polypide may be subsequently specialized. In *C. Harveyi*, at a bifurcation, the young secondary cell is entirely invested by this membrane during its early development, and it remains permanently entire over the calyptriform ovicell, in both these cases looking like the natural continuation and "finish" of the abortive cup of the superior lateral process.

In all cases where a secondary cell is the result of a further lateral development of a primary cell, the former originates in the avicularian chamber and process of the latter. In *C. geminata* one lateral process of each axial cell is always developed into a secondary cell; very probably the avicularian chamber, with its processes, whatever their direct teleological object, may be the aborted indications of a constant tendency towards development in this direction.

Notwithstanding the numerous additions to the genus, Mr. Busk's original subdivisions retain their natural integrity. *C. alata* fraternizes with the typical Fenestratæ. Busk's specimen of *C. aurita* must have been poor. A good example differs so much from the Fenestrate group, and so closely approaches *C. geminata*, which could not possibly be associated with them, that it has been deemed advisable to put the two species provisionally at the end of the list, thus indicating the tendency of *C. geminata* towards the structure of the next genus.

C. Harveyi stands alone a representative of the "Fasciatæ;" the position of the ovicell is very characteristic.

The new "Vittatæ" are all normal. In this group there are two modifications of the ovicell: in the greater number it is galeriform and superior, encroaching on the cavity of the cell above it, which is sessile, by a broad base on the ovicelligerous one. Two, *C. taurina* and *C. perforata*, have a globular vesicle sessile on the older cell of a geminate pair.

a.—CATENICELLÆ FENESTRATÆ (*Busk*).

1.—*C. lorica* (*Busk*).

A single fragment; Bass's Strait; Dr. Harvey.

2. *C. ventricosa* (*Busk*).

Abundant, Bass's Strait, Van Diemen's Land; Dr. Harvey. Port Fairy; James Dawson, Esq.

3.—*C. hastata* (*Busk*).

Bass's Strait; Dr. Harvey. New Zealand, abundant; Dr. Joliffe.

4.—*C. cribraria* (*Busk*).

One or two close short tufts, Bass's Strait; Dr. Harvey. Improbable as it may at first sight appear, I have some suspicion that this may be a stunted variety of the last. The extreme forms are very distinct, but I have a singular series of intermediate specimens.

5.—*C. alata, n. s.* Plate VI., Fig. 4.

Cells pyriform. Fenestræ 5–7.

Irregular grooves pass inwards from the fenestræ, giving the space within a somewhat granular appearance. Lateral processes enormous, consisting of a large hollow conical ascending process, with a pyriform opening in front, a nearly tubular "avicularian chamber" passing outwards opposite the upper third of the cell mouth, and ending in a minute avicularium; and a wide hollow fringe continued down to the base of the cell, and irregularly perforated in front. Ovicell (?).

The specimen figured is somewhat smaller and more delicate than usual. The cœnœcium does not appear to attain a great size. All the specimens in the collection are parasitical on other Polyzoa, and on red

Algæ. Old specimens have often lost their large ascending processes, which gives them a very different appearance.

Bass's Strait; Dr. Harvey. Port Fairy; J. Dawson, Esq.

6.—*C. plagiostoma* (*Busk*).

Bass's Strait; Dr. Harvey. On Fucoids, abundant and fine.

7.—*C. margaritacea* (*Busk*).

Bass's Strait; Dr. Harvey. Port Fairy; James Dawson, Esq. New Zealand; Dr. Joliffe.

β.—Catenicellæ Fasciatæ (*Wyv. T.*).

8.—*C. Harveyi, n. s.* Plate VII., Figs. 1, 2.

Cœnœcium forming loose, handsome, curling, brown tufts. Cells large, purely horny, vase-shaped; expanded superiorly by moderately large lateral processes, usually bearing large sublateral avicularia. External membrane thin, loosely investing the inner; and raised into conical papillæ on the front of the cell. Inner membrane strengthened by a raised strap of chitine, continuous with the thickened rim of the cell-mouth, dividing immediately below the lower lip, and forming a ring, again uniting and passing down the middle of the front of its cell to its base; and by similar straps spreading, apparently irregularly, over the avicularian processes, and over the back of the cell. Ovicell calyptriform; sessile by a broad base in the position of one of the avicularian processes of a cell, which it replaces. Back of ovicell furnished with a very large sessile avicularium.

Bass's Strait; Dr. Harvey. A single tuft. This is a remarkable and most distinct species. The cells are nearly as large as, and resemble in form, those of *C. amphora*.

The cell walls are very evidently formed of two membranes, which remain distinct.

In dried specimens the inner and stronger coat retains its form, while the outer appears to invest it in loose, wrinkled folds, expanding into an irregular projecting frill round the mouth. When the cœnœcium is boiled, to expel the air and expand the tissues, the water passes freely between the two layers, raising the outer wall into distinct papillæ, and showing it loosely hung round the cell.

The true avicularian chamber is a continuation of the inner cell-wall, but the hollow lateral processes, whether cups or spines, are formed of the thin outer membrane alone.

γ.—Catenicellæ vittatæ (*Busk*).

9.—*C. formosa* (*Busk*).

Van Diemen's Land; Dr. Harvey.

10.—*C. elegans* (*Busk*).

Bass's Strait; parasitical on Algæ and on other Polyzoa; abundant; Dr. Harvey.

11.—*C. Dawsoni, n. s.* Plate VIII., Fig. 1.

Cells rounded, gibbous; lateral processes large, curved forwards and outwards, blunt, with usually a little depression, apparently an abortive avicularium at the apex. Cell-mouth rather small, rounded; operculum prominent. Surface of cell irregularly dotted with minute papillæ. Vittæ broad and short, sublateral near the base of the cell. Ovicell (?).

This species does not seem to attain a large size. There appear to be two varieties, a broader and a narrower, but agreeing in all essential characters.

The broad form occurs of a fine yellowish-brown colour, and in great beauty on Algæ from the Fremantle district, Western Australia (Harvey); and the narrower is abundant, of a cinereous gray, on Ballia sent from Port Fairy by James Dawson, Esq., of Kangatong, to whom I am indebted for many Australian rarities, and for much curious information.

12.—*C. castanea, n. s.* Plate VI., Fig. 3.

Cells ovate, elongated. Superior lateral processes small and rounded; united above the cell aperture by a *smooth* prominent ridge; the lateral processes continued round the lower angles of the mouth, so as almost to form a corresponding ridge beneath.

Cell mouth small and round. Operculum very thick. Avicularia small, lateral; vittæ linear, lateral, extending nearly the whole length of the cell. Ovicell (?).

Cœnœcium forming graceful curling tufts. Cells of a rich chestnut hue, contrasting well with the bright red of the fibrous compound stem. Allied to *C. gibbosa* (*Busk*), which does not occur in the collection.

Bass's Strait; Dr. Harvey.

13.—*C. umbonata* (*Busk*).

Bass's Strait; Dr. Harvey.

14.—*C. crystallina, n. s.* Plate VI., Fig. 1.

Cells subglobular, pyriform, fringed on either side by a wide hollow border, spreading upwards, outwards, and slightly forwards, into large lateral processes, frequently furnished with small lateral avicularia, seated in cup-like depressions.

Two arched markings, very constant in form, traverse this wide portion of the lateral process, which is continued downwards in a hollow fringe to the base of the cell.

Cell aperture large: rim slightly prominent. Vittæ long and well marked, sublateral, and extending nearly to the level of the lower lip. Front of cell studded with elevated papillæ, and whole surface ornamented with delicate diverging lines, which give the cœnœcium a beautiful glistening appearance. An elevated ridge runs down the middle of the back, the lateral portions falling off like the roof of a house, giving the transverse section of the cell a somewhat triangular outline. Ovicell unknown.

Parasitical in delicate glassy tufts on Polyzoa.

Bass's Strait; Dr. Harvey.

A very distinct and beautiful form. The arches in the hollow wings seem to be lines along whose course the membranes of which the opposite walls of the wings are composed are in contact. In the Vittatæ generally the double cell-wall is by no means so distinct as in the fenestrate group. There are, however, frequent indications that the structure is the same.

The vittæ seem to be rows of bead-like spaces between the layers.

15.—*C. Buskii, n. s.* Plate VIII., Fig. 2.

Cells almost cylindrical, slightly contracted towards the truncated base. Connecting horny tube very short. Superior lateral avicularian processes represented by longer or shorter slightly retrocedent spines, or by open lacerated cups usually bearing small avicularia at the base. Spines longer in the newer cells towards the ends of the branches. Cell-mouth small and round. Vittæ linear, sub-lateral extending nearly the whole length of the cell. Front of cell slightly tubercular. Ovicell galeriform, superior; anterior surface slightly concave, bordered above by

a projecting crescentic beaded rim; posterior surface convex, encroaching on the cavity of the next cell, against which it is cemented, and which is sessile on the ovicelligerous cell.

Probably allied in habit to *C. taurina* (*Busk*), as its resemblance to *Thuiaria thuia* is remarkable. Cœnœcium very calcareous.

Bass's Strait; abundant; Dr. Harvey.

16.—*C. perforata* (*Busk*). Plate VI., Fig. 2.

Bass's Strait; abundant; Dr. Harvey.

The ovicell of this pretty species resembles that of *C. taurina* (*Busk*). It is galeate, tuberculate, sessile on the apex of one of the cells of a geminate pair.

δ.—Catenicellæ simplices (*Busk*).

17.—*C. carinata* (*Busk*).

New Zealand; Dr. Joliffe.

ε.—Catenicellæ auritæ (*Wyv. T.*)

18.—*C. aurita* (*Busk*).

Bass's Strait and Fremantle; Dr. Harvey. Port Fairy; J. Dawson, Esq. New Zealand; Dr. Joliffe.

Fine specimens have the front richly tuberculated. Three or four tubercles below the mouth are perforate; but there is no approach to the true fenestrate character.

19.—*C. geminata, n. s.* Plate VII., Figs. 3, 4.

Axial cell geminate. The secondary cell developed alternately on either side of the axis. Axial cells pyriform; a large gaping avicularium on the angle opposite the secondary cell. Secondary cell giving off by a terminal horny tube a single wedge-shaped peripheral cell. Cell-mouth large; a deep notch in the centre of the lower lip. In the primary and secondary axial cells four or five blunt spines surround the upper margin of the mouth, which is surmounted in the peripheral cells by two longer ear-like processes. Front of cell tuberculated. Ovicell unknown.

A small species, apparently generally distributed in the Australian seas. Epiphytic on red Algæ.

Bass's Strait and Fremantle; Dr. Harvey. Port Fairy; Mr. Dawson. New Zealand; Mr. Joliffe.

Had it not been for its close resemblance to *C. aurita* (*Busk*), evidently a true Catenicella, and with which it often grows associated, one might have almost been inclined to consider this curious little form the type of a new generic group, or an aberrant species of the genus Calpidium. As in Calpidium, the cells have two "key-holes;" but a single glance must satisfy us that the cell consists of a primary and a secondary chamber, bearing the same relation to one another that the two cells of a geminate cell bear at a bifurcation in any of the other species of the genus. *C. geminata* bifurcates at every cell, so that all the axial cells are geminate. The septum between the cells is traced on the back of the cell by a deep groove in the usual position. The back of the primary cell, both in this species and in *C. aurita*, is frequently perforated to give origin to a horny, tubular tendril. The secondary cell sometimes gives off a secondary axis, but more usually only a single wedge-shaped cell, apparently partially abortive. The cœncecium is very calcareous, and becomes very thick with age, a calcareous deposit obliterating all the markings. The horny connecting tubes between the cells are unusually long.

2.—Cothurnicella, *n. g.*

Cells in simple rows, each row arising from the side of a joint of an articulated stem, each cell springing from the upper and back part of another by a short horny tube. Cells all facing the same way.

Cell-mouth provided with a movable operculum. Ovicell an ordinary cell of a series, much enlarged, but scarcely modified in form.

C. dædala, n. s. Plate VIII., Figs. 3, 4, and 5.

The only known species.

This genus seems to have a sufficient number of characters in common with Catenicella to warrant its admission into the same family. It is, however, at once distinguished from the rest of the Catenicellidæ by its simple rows of cells arising regularly from the joints of an articulated stem. The joints of this stem appear to be abortive cells. The last joint of one branch is often dilated into a cell, while the other branch ends in a single or double tendril of narrow joints, and the final cell of a row is frequently capped by a similar tendril, representing a continuation of the series. In *C. dædala* the stem is at first simple, then makes a single bifurcation, and the cells start in straight rows, a

row from the inner aspect of each joint of each branch, so that the triangular space within the fork is closely strung, like a harp, with parallel strings of cells (Plate VIII., Fig. 3). The anterior aspect of the cell is narrow and slipper-shaped.

The mouth is placed near the top of the cell, large and crescentic, with a thin projecting upper rim. A movable semicircular operculum, with a raised edge, covers, or hangs below, the cell mouth. The operculum has at its base on either side a projecting triangular catch, which fits into a notch in the lip. One would almost expect this apparatus to shut with a snap like the clasp of a purse, it is so nicely fitted, and so eminently mechanical-looking.

Below the cell aperture a long, depressed area stretches nearly to the base of the cell. The cell is much compressed laterally; the side view is much broader, and almost reniform. The cell-wall is double throughout, with a wide space between the layers, thus forming two distinct chambers, the inner not even resembling the outer in form. The anterior depressed area is formed by the outer layer alone, so that beneath there is still another space before reaching the inner wall. In the centre of the area a tube passes through this space, uniting two corresponding apertures, one in either membrane, and thus communicating directly with the interior of the cell. The side view shows the inner chamber as a doubly bent expansion of the common tube of the cœnœcium.

Here and there one of the cells of a row is about double the size of the rest. These large cells have their opercula always closely shut. They are slightly more gibbous than the others, but scarcely differ from them in form. They are, doubtless, the ovicells.

The cœnœcium is small and delicate, very calcareous, with a beautiful pearly lustre. Parasitical on Fucoids.

Fremantle District, Western Australia (Dr. Harvey).

Subsect. 2.—Bi-Multiserialaria.

Family 2.—Salicornariadæ (*Busk*).

1.—Salicornaria (*Cuv.*).

1.—*S. tenuirostris* (*Busk*).

Bass's Strait; Dr. Harvey.

2.—Nellia (*Busk*).

1.—*N. oculata* (*Busk*).

Bass's Strait; Dr. Harvey.

3.—Onchopora (*Busk*).

1.—*O. hirsuta* (*Lamx. sp. ?*)

New Zealand; abundant; Dr. Joliffe.

Family 3.—Cellulariadæ (*Busk*).

1.—Cellularia (*Pallas*).

1.—*C. cuspidata* (*Busk*).

Abundant; Bass's Strait; Dr. Harvey. New Zealand; Dr. Joliffe.

A very variable species. In one form the spine on the median cell at the bifurcation is absent, and in another there are two to three orifices in the back of the cell.

2.—Menipea (*Lamx.*).

Cells oblong, abbreviated, or elongated and attenuated downwards; imperforate behind with a sessile lateral avicularium (frequently absent), and with one or two sessile avicularia (also frequently absent) on the front of the cell. Ovicell globular, immersed in the internode.

This genus requires careful revision. It is said to be distinguished from Emma (*Gray*) by the structure of the cell-mouth, which is subtriangular in the latter genus, the opening being partially filled up by a tubercular calcareous plate; and by the position of the lateral avicularium, which in Emma is entirely below the cell aperture; while in Menipea it is seated, when present, on the upper and outer angle of the cell.

The two new species are so completely intermediate that I believe I am justified in uniting the Emmæ with the true Menipeæ into what I conceive to be a most natural generic group. *M. ternata* (*Ellis*) may be taken as a type of the genus thus constituted. *M. Fuegensis* (*Busk*) approaches it closely. The avicularia are still at the upper angle of the cell, and the cell-lip is still simple. The operculum, however, is reduced to a curved spine. In *M. Buskii* the lip is more projecting, and the calcareous plate which partially covers the cell-mouth is tuberculated. The lateral avicularium is slightly depressed, though still opposite the upper third of the aperture. The opercular spine is again expanded.

M. tricellata closely resembles the last in habit, but the tuberculated plate round the mouth is still more fully developed, the lip is more elevated, and the much smaller lateral avicularium is below the cell-mouth. The operculum is again reduced to a rudimentary spine.

M. cyathus is binate, the cell-mouth large and simple, as in *M. ternata;* the lateral avicularium very large half way down the cell-mouth. The operculum once more expanded and branched. It almost requires a microscope to distinguish *M. crystallina* (*Gray*) from the last, they are so similar in habit and general appearance; but in *M. crystallina* the expanded operculum is again absent, the lateral avicularia are reduced in size, and seated near the base of the cell, and the cell-mouth is again contracted by a granular calcareous plate.

The right of this genus to the name of Menipea depends upon the retention in it of the six-celled species, *M. cirrata* (*Lamx.*), of the propriety of which I think there can be little doubt. The general character is still remarkably the same. In *M. cirrata* a smooth plate covers the cell aperture, the lower part calcareous and fixed, the upper portion a movable, crescentic, horny operculum, closing over the true opening. I have not seen *M. Patagonica* (*Busk*), and from the figure I am more doubtful as to its position. All the species are distinguished by the presence of one or more sessile avicularia on the front of the cells, and by the remarkable hollow curved spines attached round the upper lip of the cell-mouth by horny joints.

This group does not seem to "fruit" freely. I do not know the ovicell even in our common British species, *M. ternata* (*Ellis*); but fortunately Dr. Harvey's collection contains a branch of *M. Buskii* from Bass's Strait, bearing several: globular, the surface granulated, immersed among the cells in the middle of the internode. One can scarcely doubt that all these closely allied forms have similar reproductive organs, and, if so, the ovicells will give an excellent generic character.

M. triseriata (*Busk*) and *M. multiseriata* (*Busk*), which have their ovicells galeate and superior, like those of Scrupocellaria, must seek other congeners.

I do not consider it necessary to subdivide the genus.

1.—*M. cyathus, n. s.* Plate IX., Figs. 1, 1*a*.

Cells very short and round; two in each internode, one a little above the other cell-mouth; large, oval, oblique; rim slightly thickened,

five to six spines round the upper and outer margin; the lower three, large, curved, hollow, and pod-like, attached by a horny joint to the thickened lip. Opercular spine expanded, branched, spreading downwards and outwards from the upper and inner lip of the cell-mouth. A large sessile lateral avicularium opposite the centre of the cell-aperture. Frequently an anterior sessile avicularium between the two cells of the internode. Internodes distant, connecting horny tube extending from the apex of a pair of cells, upwards and backwards, and slightly dilating as it enters the lower cell of the succeeding pair by its anterior aspect.

There is constantly on the front of the upper of the two cells a ring-like marking, usually filled up with a calcareous plate, but frequently giving off a horny, tubular tendril. At a bifurcation of the cœnœcium a third cell is introduced into the primary internode between the two secondary branches. Ovicell unknown.

A delicate parasitical species, twining its long tendril-like branches round zoophytes and red sea-weeds.

Bass's Strait; Dr. Harvey. Port Fairy; Mr. Dawson.

2.—*M. crystallina* (*Gray*).

Bass's Strait; abundant; Dr. Harvey.

3.—*M. Fuegensis* (*Busk*).

A single specimen; Bass's Strait; Dr. Harvey.

4.—*M. Buskii, n. s.* Plate V., Fig. 1.

Cells elongated, attenuated downwards, three in each internode. Cell-mouth large, oval, oblique, the lower third filled up by a tuberculated calcareous plate; upper lip prolonged, and fringed with from four to five spines, attached to the lip by horny joints, and one of them, usually the second from the outer edge, very long, curved, and pod-like. There is often an additional spine on the upper and inner margin of the cell-mouth. Operculum spine strong and clavate, stretching upwards and outwards from the lower and inner lip of the cell-aperture. Connecting horny tube between the internodes double. Ovicell spherical, with a richly granular surface, imbedded among the cells, on the cavities of two of which it encroaches.

Van Diemen's Land; rather abundant, and in fine condition; Dr. Harvey. New Zealand; abundant; Dr. Joliffe.

5.—*M. tricellata* (*Busk*).

Bass's Strait; very common; Dr. Harvey.

3.—Scrupocellaria (*Van Beneden*).

a.—Operculatæ.

1.—*S. scrupea* (*Busk*).

Frequent on Algæ and Polyzoa.

Bass's Strait; Dr. Harvey. New Zealand; Dr. Joliffe.

2.—*S. ornithorhyncus, n. s.*

Cell-mouth rather small, oblique, a tuberculated crescentic plate below the lower lip. Upper margin fringed with four to five long spines; pedunculate operculum prolonged upwards into a spine, which, with the superior spines, almost completes the circle round the true opening of the cell. Lateral avicularia very large. Vibracula small and obscure. Ovicell smooth.

A delicate transparent species, frequent, in small tufts, on sea-weeds and Polyzoa.

Bass's Strait; Dr. Harvey.

4.—Canda (*Lamouroux*).

1.—*C. arachnoides* (*Lamx.*).

Bass's Strait; abundant; Dr. Harvey.

Sect. 2.—Continua.

Subsect. 1.—Uniserialaria.

Family 4.—Scrupariadæ (*Gray*).

1.—Scruparia (*Oken*).

1.—*S. chelata* (*L.*)

Parasitic on *Caberea rudis* (*Busk*).

Bass's Strait; Dr. Harvey.

2.—Hippothoa (*Lamouroux*).

1.—*H. Patagonica* (*Busk*).

Bass's Strait; Dr. Harvey.

3.—Ætea (*Lamouroux*).

1.—*A. anguina* (*L.*).

Bass's Strait; Fremantle; Van Diemen's Land; Dr. Harvey. Port Fairy; Mr. Dawson. New Zealand; Dr. Joliffe.

2.—*A. ligulata* (*Busk*).

Bass's Strait; Dr. Harvey.

Subsect. 2.—Bi-Multiserialaria.

Family 5.—Farciminariadæ (*Busk*).

1.—Farciminaria (*Busk*).

1.—*F. aculeata* (*Busk*).

Van Diemen's Land; scarce; Dr. Harvey.

Family 6.—Gemellariadæ (*Busk*).

1.—Didymia (*Busk*).

1.—*D. simplex* (*Busk*).

Bass's Strait; a single fragment; Dr. Harvey.

2.—Dimetopia (*Busk*).

1.—*D. spicata* (*Busk*).

Bass's Strait; Dr. Harvey.

2.—*D. cornuta* (*Busk*).

Bass's Strait; parasitical on polyzoa; very abundant; Dr. Harvey. New Zealand; Dr. Joliffe.

3. Calwellia, *n. g.**

Cells in pairs, joined back to back. Each pair of cells arising by tubular prolongations from the pair next but one below it. Each pair having a direction at right angles to the next. At a bifurcation each cell of the primary pair giving off a secondary pair. Ovicell subglobular, placed immediately above and behind the posterior margin of the cell aperture.

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* I dedicate this genus, at Dr. Harvey's suggestion, to Mr. Callwell, of Dublin, the well-known microscopist.

1.—*C. bicornis, n. s.* Plate IX., Figs. 2 and 2*a*.

The only known species.

This genus supplies another link in the beautiful chain of modifications in the arrangement of cells in pairs furnished by the Gemellariadæ. By combining one of the peculiar characters of Notamia with a genera, appearance closely resembling Dimetopia, it affords another reason for retaining Notamia in the group, bearing, in fact, with the exception of the total absence of avicularia, the same structural relation to Notamia which Dimetopia bears to Gemellaria. The lower half of each pair is contracted and tube-like, the two tubes of which it is composed separating and curving over the walls of the inflated triangular upper half of the pair immediately beneath it. The cœnœcium is thus formed of two incorporated, independent rows of pairs of cells, all the cells of each row being in the same plane, but at right angles to all the cells of the other row. This somewhat complicated structure might be better understood if the reader would imagine another exactly similar double-stem incorporated at right angles with Fig. 2*a*, Plate IX.

The cell-mouth is small, nearly horizontal on the upper surface of the cell. The margin is thickened, rising at the outer angles of the nearly straight lower lip into a pair of strong, incurved, blunt spines. The cell-wall seems to consist of two membranes, and round the lower lip and at the base of the spines there are a few small, oval and round, fenestræ, passing apparently through one layer only. A small, granular, perforated papilla rises immediately below the cell-mouth, the oval aperture passing right through the cell-wall.

The ovicell is immediately above and behind the mouth of the cell, cemented against the triangular side of the pair of cells above, subspherical, slightly compressed, and beautifully marked, as if stamped with a miniature clam-shell.

The cœnœcium is very calcareous, forming delicate pure white, bushy tufts, about half an inch high.

It occurs sparingly with *Cellularia cuspidata* and *Dimetopia cornuta*, parasitical on *Catenicella ventricosa*.

Bass's Strait; Dr. Harvey. And on *Catenicella hastata*. New Zealand; Dr. Joliffe.

Fig 1.

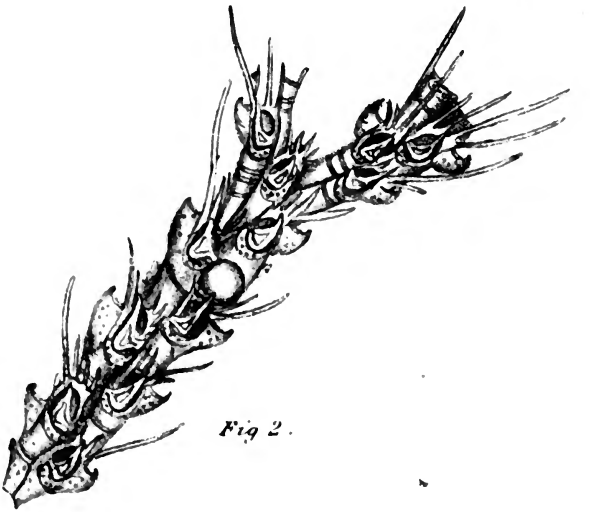


Fig 2.

W. T. ad nat. delt. Drawn & Lith.d at the Office of Dr Whitty. C.E. Dublin.

PLATE VI.

Fig 1

Fig 2

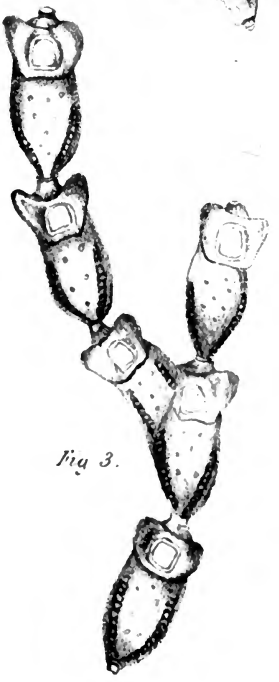


Fig 3.

Fig 4

W. T. ad nat. delt.

Drawn & Lith.d at the Office of Dr Whitty C.E. Dublin


BRITISH MUSEUM
NATURAL HISTORY

Fig 1.

Fig 2.

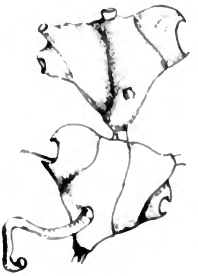


Fig 3.

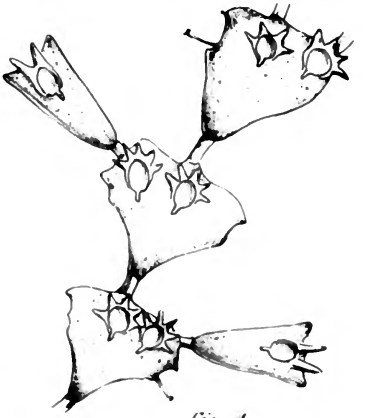
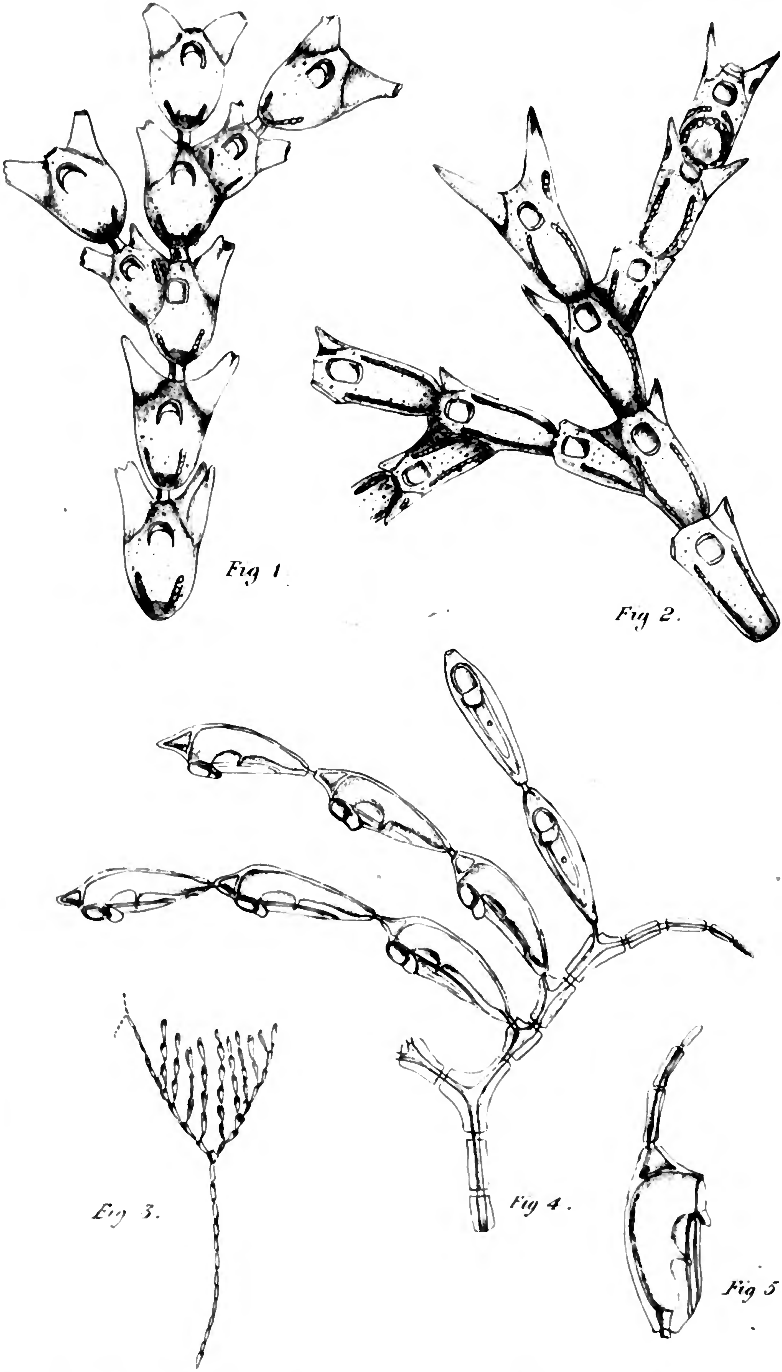


Fig 4.

W. Toad nat. del. W. H. H. Sculp. Lith.d at the Office of D.r Whitty C. E. Dublin.

PLATE VIII.



W. T. ad nat. del. W. H. H. Sculp. Lith^d at the Office of D^r Whitley C. E. Dublin


BRITISH MUSEUM
NATURAL HISTORY

PLATE IX.

Fig 1.

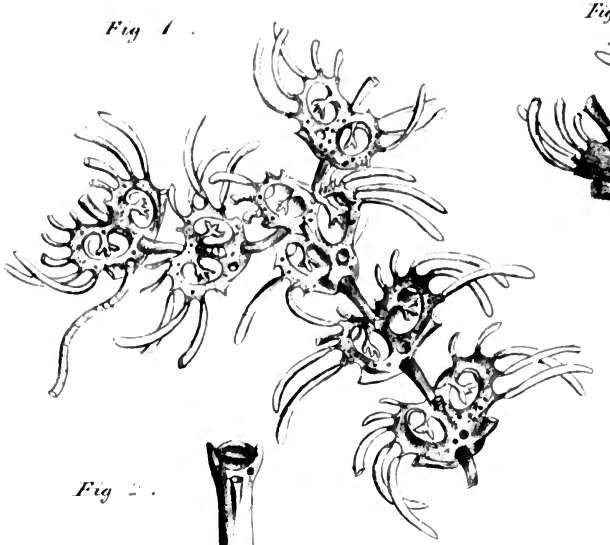


Fig 1 a.

Fig 2.

Fig 2 a.

W. Campbell delt.

Lith.d at the Office of Dr Whitty C. E. Dublin


BRITISH MUSEUM
NATURAL HISTORY

DESCRIPTION OF THE PLATES.

PLATE VI.

Fig. 1. Catenicella crystallina, *n. s.*
Fig. 2. Ovicell of C. perforata (*Busk*).
Fig. 3. C. castanea, *n. s.*
Fig. 4. C. alata, *n. s.*

PLATE VII.

Fig. 1, 2. Catenicella Harveyi, *n. s.*
Fig. 3, 4. C. gemmata, *n. s.*

PLATE VIII.

Fig. 1. Catenicella Dawsoni, *n. s.*
Fig. 2. C. Buskii, *n. s.*
Fig. 3, 4, 5. Cothurnicella dædala, *n. s.*

PLATE V.

Fig. 1. Menipea Buskii, *n. s.*
Fig. 2. Scrupocellaria ornithorhyncus, *n. s.*

PLATE IX.

Fig. 1, 1*a*. Menipea cyathus, *n. s.*
Fig. 2, 2*a*. Calwellia bicornis, *n. s.*

Specimens of the new genera and species were exhibited to the members.

The Ballot being opened, and the Rev. Eugene O'Meara, M. A., appointed Scrutineer, the following were declared duly elected as Ordinary Members:—

S. A. Brenan, Jun. Soph., and H. L. Smith, Sen. Fresh.

The Meeting was then adjourned to the 16th of April.

FRIDAY EVENING, APRIL 16, 1858.

ROBERT HARRISON, M. D., PROFESSOR OF ANATOMY AND LECTURER IN ZOOLOGY, in the Chair.

THE Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

The following paper was read by WILLIAM ARCHER, M. R. D. S.:—

SUPPLEMENTARY CATALOGUE OF DESMIDIACEÆ FOUND IN THE NEIGHBOURHOOD OF DUBLIN; WITH DESCRIPTION AND FIGURES OF A PROPOSED NEW GENUS AND OF FOUR NEW SPECIES.

(WITH PLATE XI.)

ON a former occasion I had the pleasure to read to this Association a Catalogue of Desmidiaceæ found by me in the neighbourhood of this city, which the Council did me the honour to print in the Proceedings. It is now my privilege to be permitted to follow up that list with a supplementary one, containing such additional species as resulted from some gatherings made during the last summer, and, in addition to the species hereafter to be enumerated, which are contained in Ralfs' "British Desmidiæ," to bring to notice and to describe four new species; and, although two of them are very minute, and the others not so striking as many of the other members of this interesting group, I do so with the hope that these additions to our Flora may be to some not without their interest.

For the reception of two of the new forms to which I think I am the first to direct attention, I now venture to form a new genus; and, while opposed (as I should undoubtedly be) to the formation of unnecessary generic characters and names, I do not think that in proposing a new genus, I have, in the present instance, fallen into so grave an error. I admit I am myself inclined to think it true that genera, like species, have an existence in nature,—an opinion held, I imagine, by the minority; however, there can be no doubt that many of the genera of our systems cannot be strictly natural, and this perhaps sometimes arising from a desire to divide into two or three other genera, possibly a good and natural genus, merely because, containing numerous species, it is thought too cumbrous and unmanageable, or from the natural and true characters limiting each genus not having been arrived at. In

the Desmidiaceæ the distinctive characters of the genera are usually sufficiently well marked and decided; while, with two exceptions of genera, each containing only one species, they are formed of often numerous species, embodying and presenting, in, generally, an obvious manner, the characters of the genus under which they fall. I think, then, it is repugnant to a proper classification to unite in any genus, the species of which in an evident manner, by the possession of common characteristics, form a natural assemblage, one or more other species (although as a matter of course there must be minor points of affinity) which positive and negative characters of form and habit, it may be slight, but decided, and not held in common with the true species of the genus, exclude from being therein embraced.

A belief in the correctness of the opinion I here endeavour to express has emboldened me to the step which in this paper I now venture to take, in an attempt to form a new genus, and which I do with much diffidence; for, being wholly without the guidance of any of our masters in the study of these minute Algæ, or the benefit of their opinion, I would put forward the following, rather as suggestive than conclusive, more in the hope of, perhaps, ultimately eliciting information and correction, than as indisputably settling the position of the forms presently to be described.

It will, perhaps, be more convenient that I first proceed to describe the new forms which I have met with, one of which belongs to the genus Sphærozosma, another to Staurastrum, while the remaining two fall under the proposed new genus; and then to enumerate the species as described in Ralfs' monograph supplementary to my former catalogue, including therewith those species now for the first time noticed.

Before drawing attention to the new forms, however, it has been suggested to me, in deference to those of this Association (as well as to those who may hereafter favour this paper with a perusal) who, not having immediate access to Ralfs', or the "Micrographic Dictionary," &c., or not having directed their attention to the organisms themselves, may be comparatively unacquainted with the Desmidiaceæ, or kindred minute Algæ, that a short account of their nature and position in the vegetable kingdom may not be uninteresting; and while endeavouring to do so I have to apologize to those to whom this sketch will, I fear, prove tiresome and dry, from being to them so familiar, because so devoid of novelty or originality. I hope, then, that those who have made these

or kindred forms a study will bear with me while I try, as briefly as I can, to put together a short description of the appearance, nature, and position of the group to which I have, on the present occasion, the pleasure to add some new species.

The name "Desmidiaceæ" (taken from the genus Desmidium, considered as typical), is applied to a group of microscopic organisms, undoubtedly a family of confervoid Algæ, though, at first, they were associated with their kindred family, the Diatomaceæ, as one group, considered by Ehrenberg and his school as animalcules,—and, indeed, I believe I would not be wrong if I stated that they were still so considered by that illustrious observer. The definition of the "Diatomaceæ" is given in Lindley's "Vegetable Kingdom" as follows:—"Crystalline, angular, fragmentary bodies, brittle, and multiplying by spontaneous separation"—and of the group so defined the Desmidiæ were made a sub-order, distinguished from the "Diatomeæ" proper, and characterized as "cylindrical." To any one at all acquainted with these two groups of organisms, it appears to me that the foregoing definition will not be satisfactory. I believe most modern authorities concur in the opinion that the Desmidiaceæ are entitled to rank as an order of Algæ, separate from but related to, the Diatomaceæ, which latter order is thus defined by the late Professor Smith:—"Plant a frustule, consisting of an unilocular or imperfectly septate cell, invested with a bivalve siliceous epidermis. Gemmiparous increase by self-division, during which process the cell secretes a more or less siliceous connecting membrane. Reproduction by conjugation and the formation of sporangia." Various species of the large group, thus accurately characterized, are met with in every ditch, pond, and stream, and in the sea, some of them very common, whilst others occur rarely. They are microscopic cellular organisms, free or attached, occurring singly or enclosed in gelatinous tubular investments, the individual frustules with yellowish or brownish contents, and provided with a siliceous coat, which may be broken, but not bent, and composed of two usually symmetrical valves with a connecting band at the suture, the siliceous coat or shell remaining permanent after the organic contents have perished, and often possessing minute and elegant markings. They are endowed, many of them, with a power of motion, and when this was supposed to be peculiarly an animal function, it is not surprising that these beautiful organisms were referred to the animal kingdom. They are, however, now almost universally, and there can

be no doubt correctly, esteemed to belong to the vegetable world, but into the discussion it is not the province of this slight sketch to enter.

It is now my duty to revert to the kindred order, Desmidiaceæ. Whatever doubt may have existed as to the true nature of the Diatomaceæ, I am somewhat at a loss to see how there could have been any hesitation with regard to the vegetable nature of the Desmidiaceæ. In the highest and most recent authority we have on these organisms, Ralfs' elegant monograph,—they are thus defined:—"Fresh-water figured mucous and microscopic Algæ, of a green colour; transverse division mostly complete, but in some genera incomplete; cells or joints of two symmetrical halves, the junction always marked by a division of the endochrome, often also by a constriction. Sporangia formed by the coupling of the cells and union of their contents." These are microscopic gelatinous organisms, of a green colour, growing in fresh water only, the cellulose walls of which are covered with "pearly granules," or minute puncta, or asperities, or are smooth, without any siliceous coat, of peculiar and varied forms, such as oval, lunate, cylindrical, triangular, or compressed, &c., usually with variously formed rays or lobes, or quite simple, presenting a bilateral symmetry; the junction of the halves marked by a division or interruption of the green contents, often, though not always, by a constriction of the frond itself; the opposite valves connected by a suture; the individual cells either free, arranged in linear series, forming a filament, collected into faggot-like bundles, or disposed in circular, flattened, star-like groups. It will be seen that the most striking points of distinction from Diatomaceæ are the absence of the siliceous figured coat, and the contents being green, not brownish or yellow. The Desmidiaceæ are very striking objects under the microscope, from the singularity and variety of their forms, and their curious external appendages and lobes. That which is most distinctive and characteristic in their appearance is their bilateral symmetry, usually, though not always, accompanied by a more or less deep constriction between the segments of which each cell is composed. But in these respects there exists all shades of difference in the various genera. For example, in the genus Scenedesmus the symmetrical outline is wanting; in Pediastrum it is indicated by an external notch on the outside only; in Closterium and Penium, as well as in a new form I have the honour in this communication to bring forward, there is no constriction (nevertheless the tendency to the bilateral division is indicated in those forms by the

usual pale band at the centre of the endochrome); in Hyalotheca, various Cosmaria, Tetmemorus, &c., the constriction is but slight; in Desmidum and Didymoprium it is indicated by only a notch at each angle; while in various other genera the constriction becomes deeper and more obvious, until at last in Sphærozosma, Euastrum, Micrasterias, &c., the constricted portion becomes like a mere isthmus between the segments, giving them the appearance of distinct cells, and as such they were formerly considered. Each frond or individual, however, is always a single cell, as is often evidenced by the whole contents escaping through a single accidental rupture. The cells frequently possess warty or spinous processes, and the cellulose coat often presents minute markings or puncta, caused by the presence of little elevations. The cells are usually more or less surrounded by a gelatinous sheath,—in Hyalotheca, Didymoprium, and many others, this is well defined, but in some species it is so attenuated as to have its existence made known only by the gelatinous investment preventing the contact of the fronds. The contents of the cells of the Desmidiaceæ appear to be similar to the green confervoids generally, that is, protoplasm coloured green by chlorophyll, and entirely enclosed in a "primordial utricle," which organ appears more evident as a real and distinct *utricle* than in any other vegetable cells I have seen. The contents of the cells often contain starch granules. A circulation of their fluid contents has been noticed in various species; in Closterium and Penium, &c., it is of a very remarkable character. In *Cosmarium Ralfsii* (*Bréb.*), after the contents had lost their characteristic somewhat radiate appearance, and had become broken-up, I have seen a regular current rotating somewhat rapidly round-and-round the internal margin of each segment, and carrying the chlorophyll granules with it, very strikingly like that in Anacharis, &c.

The ordinary mode of multiplication of the individual cells is by repeated transverse division, which is effected by the interposition of new growth between the original segments, the older segments remaining unaltered, except (when they remain for some time attached) by being pushed asunder by the enlarging young segments. The exact manner in which this takes place differs slightly in detail in the different genera. In Closterium, which in the various species is more or less of an arcuate or lunate form, the original cell acquires a constricted appearance at the middle; a separation of the endochrome having taken place, the new constriction gradually becomes deeper, until at length it is

complete, when ultimate somewhat sudden separation is effected by a from-side-to-side sawing motion of the segments, which is highly curious to observe; the blunt convex new end of each now separated individual cell afterwards grows out, till the symmetrical more or less attenuated arcuate form of the frond is restored. Although I have not witnessed it in *Penium digitus*, I am greatly inclined to think that the mode described in Closterium holds good in this species. In *Penium Brébissonii*, although it doubtless follows the same rule as the other Desmids, the mode of increase can hardly be distinguished, and some botanists have included that species amongst the Palmellaceous Algæ; but its central pale space and elongate form easily distinguish it. In such bipartite forms as Micrasterias, Euastrum, Cosmarium, Staurastrum, &c., to produce two exactly similar fronds from one, it is obvious that two new segments must be formed; but in these the growth of the new segments takes place, always to some, and often to a considerable, extent before their separation. The constricted portion of the old frond expands by the formation of a connecting tube, "of which the interposed new coat is the direct continuation of that which lines the internal surface of the cracked halves of the old shell" (Hofmeister),* and which is soon dilated into two globular or roundish enlargements. These are the rudiments of the two new segments, which soon increase in size, and in doing so push asunder the two older segments, acquire colour, and ultimately assume a like appearance, with all the characteristic lobes, sinuosities, or processes of the species, similar to those possessed by the older segments. Plate XI., Fig. 12, happens to afford an example of this. I have seen this process of division in specimens of *Micrasterias rotata* (obtained with the division just commenced), accomplished in between twenty-four and thirty-six hours, at the end of which time separation had taken place, the new segments being of full form and dimensions. In the free genera they are at length disconnected, each new segment bearing with it the old one, thus producing two distinct fronds, and when this transverse division is incomplete a filament is formed. This mode of division does not appear to differ essentially from that which holds good in other Algæ, and seems to be only a necessary modification resulting from the exigencies produced by the con-

* Translated in "Annals of Nat. Hist.," third series, vol. i., No. 1, January, 1858.

stricted form of the cells; while it does not appear improbable that other Algæ not Desmidian may have a like mode of cell-increase.

The mode of true reproduction in the Desmidiaceæ is by conjugation, very like the same process in the Zygnemaceous group of Confervoids. This process consists essentially in the pouring out and amalgamating of the contents of two distinct cells, resulting in a definitely formed spore or sporangium; and in the different genera of Desmidiaceæ presents some slight modifications. In the filamentous forms, such as Hyalotheca, Didymoprium, &c., conjugation does not take place till the constituent joints of the filament become disunited, apparently any two of which meeting in the water, couple and blend together their contents, the old cell-wall of each pair of conjugated joints remaining, as it were, fused together, and surrounding the sporangium. In Closterium, Penium, Cosmarium, Staurastrum, &c., the free cells conjugate in pairs. In them the process differs somewhat from that which takes place in the Zygnemaceæ. In that group, the cells of two filaments lying side-by-side, bud-out, as it were, pouch-like protrusions towards each other, which, meeting half-way, become inosculated, forming ladder-like transverse tubes between the connected filaments; the contents of each conjugated cell of one side either pass over by the transverse tube into the cavity of the opposite cell, or the contents of each meet half-way in the centre of the connecting tube, and in either case become ultimately massed together into a rounded compact spore. In the most of the Desmidiaceæ there is no transverse tube formed; but the fronds about to conjugate approach and dehisce by the transverse suture, and each pours out its contents in one mass into the water, which, gradually becoming consolidated with the contents of the other conjugating individual, assumes a membrane, and becomes a perfect sporangium, surrounded by gelatine, and destined for reproduction. The sporangium, which is usually spherical (sometimes quadrate) either remains smooth or ultimately by degrees produces, in every direction from its surface, variously formed spines or forked processes, and bears, in this state, no resemblance to the parent species. Plate XI., Fig. 13, is an example. Any observations that have been made in regard to the subsequent development of the sporangium go to prove that its contents ultimately give birth, by binary segmentation into a definite number of portions, to forms which at first are very minute, but when set free by the solution of the wall of the sporangium, afterwards attain the size of the parent species. We have, in an

interesting account by Hofmeister, lately published (*loc. cit.*), a description of the germination of the sporangium of *Cosmarium tetraophthalmum* (*Kg.*); and of the evolution therefrom, by segmentation of its contents, of a brood of eight or sixteen young Cosmaria, and which, according to his statement and figures, more resembled *Cosmarium Meneghinii* (*Bréb.*) than *C. tetraophthalmum*. His observations do not appear to have been continued long enough to prove that these young Cosmaria ultimately grew into the mature form of *Cosmarium tetraophthalmum;* but there can, I apprehend, be no doubt they did, or would have done, in their native habitat. It might, perhaps, hence appear probable that *Cosmarium Meneghinii* is not a true species, but only the young state of *C. tetraophthalmum*. However, if it indicate, as I should suppose it does, that when a Desmid repeats itself by transverse division, it has attained the mature size and form of the species, *then* must *Cosmarium Meneghinii* be considered a good species, for I have myself met it in a divided state. If this be so, then I apprehend all that can be inferred is, that the *young* state of *Cosmarium tetraophthalmum*, immediately upon development from the sporangium, greatly resembles the *mature* form of *C. Meneghinii*. A very similar observation by Mr. Jenner on the sporangium of *Closterium acerosum* (*Schrank*) is described and figured in Ralfs, but in this case the young brood were miniature resemblances of the mature form of that species. The sporangia of the Desmidiaceæ, as well as the similar productions in other Algæ, appear to be endowed with the power of remaining dormant for a length of time (which is, perhaps, sometimes of some considerable duration) before their vegetative activity is aroused, and this probably occasionally under a state of dryness which would be fatal to the parent species. The following-out of the development of the sporangium appears very difficult; seldom is the happy opportunity presented to the observer. I have myself repeatedly had the sporangia of several species, sometimes abundantly; and while I have been able to trace, for my own satisfaction, their formation (in *Arthrodesmus incus*) from the first approach of the parent fronds to conjugate, to the ultimate perfecting of the fully formed sporangia, they, however, in all cases, perished before any alteration in their appearance took place.

A mode of propagation by unquestionable zoospores has been noticed and described by Alexander Braun, in Pediastrum.* The zoospores, in

* "Rejuvenescence in Nature," Ray Soc. Publication, 1853.

this genus, do not escape separately, but are emitted *en masse*, still inclosed in the inner membrane of the parent cell, within which, however, they exert a vigorous movement, and involved still in which they settle down, and arrange themselves in a flat cluster, resembling that from one cell of which they originated. But a more general increase by zoospores has been attributed to the Desmidiaceæ, but I cannot find it corroborated by *direct observation* that this actually takes place. Certain it is that a peculiar motion (or commotion) of the granular contents not uncommonly occurs, and this more especially (in which my own experience confirms Mr. Ralfs'), in specimens which have been kept some time in the house. These minute moving bodies are apparently formed of the cell-contents disintegrated and subdivided into an immense number of granular particles, and which exert an active, vigorous, tremulous, dancing kind of motion, as if each one were elastic and perpetually meeting with something to make it rebound, and as quickly stopped only to meet with another impulse, resulting in little or no actual change of position of the individual particles, notwithstanding all the commotion. I greatly fear this fanciful description will hardly be intelligible; indeed I think this peculiar phenomenon thus attempted to be described must be witnessed to be comprehended. These moving granules have been assumed to be zoospores, but the phenomenon may be due, possibly, to some sort of "molecular motion." I have myself seen it in numerous genera and species. Mr. Ralfs suggested that they (the agitated granules) are zoospores, and says they occur when the cell approaches maturity. Dr. Carpenter calls them such, and says they *may* be ciliated; but without giving authorities. I have seen this curious movement in cells undergoing division, and as active in the young and as yet unformed segment of a frond during division as in an old fully developed one. I have noticed, too, a precisely similar movement in the germinating spore of an Œdogonium. To my eyes this "swarming motion" does not resemble that of the true zoospores of Cladophora, or of other Algæ which give birth to undoubted zoospores. I have not seen anything to indicate cilia, with only a $\frac{1}{4}$-inch object-glass, however; and for my own share I believe the nature or import of this curious motion is undecided, and I should be glad, indeed, to meet with any observations which would throw light on this phenomenon, while, upon this point, as on many others, it would be as untrue, as it would be unbecoming, to avow myself as not open to conviction.

I have before stated that the Desmidiaceæ were formerly regarded

as animals. The principal reasons advanced by the Ehrenbergian school for surrendering this group to the zoologist, are, that they exert a *voluntary motion;* that they increase by transverse self-division; and that in Closterium there are at the extremities apertures and protruding organs continually in motion. With regard to the first reason, it is clear that using the term "voluntary" is a begging of the question. That they move is beyond doubt, for these organisms, if buried in the mud, will come to the surface and become exposed to the light. While this is doubtless a highly curious phenomenon, it strikes me as not more remarkable than any flowering plant cultivated in-doors bending its leaves towards the window under the stimulus of light (not to speak of the vigorous movements of unquestionable plants high in the scale). As to the second reason, the increase by transverse self-division,—this is by no means an exclusively animal characteristic; the very same argument might, with greater force, be applied in proof of their vegetable nature, as I need hardly insist on. With regard to the third reason,—the various species of Closterium have been too often made the subject of examination by numerous observers to allow of terminal apertures and protruding organs not having been seen, if they really existed. There can be no doubt that they do not. At each extremity of the Closteria, however, there is a distinct chamber or space containing active moving granules constantly flitting about; what they mean, or what their purpose or import, is as yet unexplained. It may be that they are merely passively tossed about by the eddy which is likely to be produced by the conflicting currents of protoplasm, which are so evident and so curious in Closterium. But a very similar circulation occurs in *Penium digitus*, but here, notwithstanding the current, there is no open clear space at the ends containing moving granules. In that species, however, there are moving granules to be seen travelling over the surface of the mass of endochrome, which sometimes make their way down the frond, at one side, to the end, where they follow its curve and come up by the other side, which looks like as if these granules were carried by the current, which is, however, apparently of an irregular character like that in Closterium. But, again, it is no uncommon thing to see the broken-up granular contents of a Closterium pressed-out upon a slide, to exhibit the same agitated dancing motion as a few possessed within the living frond; and I have seen (it was in *Closterium lanceolatum*), in a specimen from which the contents had nearly all been pressed-out,

leaving only comparatively a very small quantity within the ruptured frond, the (as yet) contained granules flitting about quite like the few terminal ones in the normal state. Very little actual change of position, however, was effected on the part of any of these granules, except by a few which happened to lie at one side of the frond. These were (as it appeared to me) guided along by their happening to be in this position, and effected sometimes a somewhat considerable onward motion. The whole thing struck me as forcibly resembling the terminal space, enlarged as it were by the withdrawal of the great mass of the endochrome, and only leaving behind enough of the disintegrated cell-contents to furnish a somewhat evenly distributed crowd of granules moving, their only definite boundary being now the external wall of the frond, and not, as in the normal state, a little cavity or chamber, excavated, as it were, out of the endochrome. A very similar movement occurred amongst the pressed-out granules, but probably, on the whole, not so active as that noticed in the still contained granules. I apprehend this phenomenon must have been due to "molecular motion," for the current even within the frond must have been, of course, wholly destroyed, which, even did it exist, would be hardly likely to produce their curious dancing motion; and if the pressed-out contents exhibit motion in obedience to that curious law, I should imagine that the granules normally disassociated from the endochrome within the living frond cannot be exempt from it, and which may account in some measure, in conjunction with the circulation possibly, for the remarkable movement noticed in the Closteria. The "swarming motion" before alluded to as occurring in many species may be a movement of a similar nature; it is, however, more vigorous and active than that which is noticeable in the pressed-out cell-contents in the ordinary condition. I shall presently advert to this phenomenon of moving granules as displayed by my new form. The foregoing are the principal arguments for the animal nature of these organisms, which clearly do not hold good. On the other hand, the arguments in favour of their vegetable nature are more numerous and convincing. The cell-wall composed of cellulose, the presence of starch, the multiplication of the cells by transverse division in a manner analogous to other Algæ, the reproduction by conjugation and formation of sporangia similar to other Confervoids, their herbaceous green colour owing to the presence of chlorophyll, the rotation of their cell-contents, &c., all combine in proving their vegetable nature. Nor are special

points of affinity wanting with various neighbouring groups of Algæ, irrespective of the Diatomaceæ. For instance, they approach the Palmellaceous Algæ by their gelatinous nature and likeness of form in some species of Penium; to the Ulvaceous Algæ they approach through such as *Scenedesmus obtusus*, connected with Merismopædia; Spirotænia considerably resembles a joint of Spirogyra; while a form to be brought to notice presently and its congeners point, I apprehend, to the Zygnemaceæ.

The Desmidiaceæ occur in shallowish, undisturbed ponds in open exposed situations, such as little pools on boggy moors and commons, permanent ponds in old quarries, &c. A few are met with in gently flowing water. They are either mixed imperceptibly with the mud, or disposed in a green stratum on the bottom, or projecting in little tufts, or floating in little gelatinous masses on the surface, or forming a cloud-like mass investing the submerged leaves of aquatic plants, or sparingly scattered amongst the masses of filamentous Confervoids. Several species are quite common, but as a group they are more local in their distribution, than, as a group, are the Diatomaceæ, the commoner species of which occur almost universally.

Having thus tried, as briefly as I could, to communicate an epitomized account of the nature and appearance, and of the distinctive characters of this group of Confervoid Algæ, and because an explanation seems to be due for obtruding so much that is not new, I would beg again to remark that I have undertaken it for the use only of those of our members who may be unacquainted with the facts and details brought forward. I will now pass on to describe my new forms, being that portion of this communication to which any interest will be likely to attach on the part of those who are experienced.

I have now to bring to notice an Alga which, to the naked eye in the mass, and perhaps at first sight under the microscope, does not at once strike the observer as belonging to the Desmidiaceæ. The organism in question forms rather dense masses of filaments, sometimes an inch or two or more in length, attached to aquatic plants, and, in the mass, is of a bright and beautiful green, and of an elegant appearance, like "floss silk" in the water. When placed under the microscope, the filaments are seen to be composed of very greatly elongated joints, of moderate diameter, with truncate ends, and possibly might, at a hasty glance, be taken for a Mesocarpus, or some allied form. Probably the first circum-

stance which attracts notice, in addition to the remarkable length of the cells, is the presence of a narrow pale band, or interruption of the endochrome at the centre of each joint, which fact appears to me sufficiently significant to indicate that towards the Desmidiaceæ we are to look for its affinities. I will try briefly to describe a joint more closely. Each joint in proportion to its breadth is extremely long, sometimes, though rarely, as many as forty times, averaging, perhaps, from twenty to thirty times longer than broad, and it is nearly cylindrical and quite smooth. (See Plate XI., Fig. 1.) There are two points of view from which a different aspect of the cell-contents is obtained, from the fact of the endochrome being disposed in a longitudinally compressed or flattened band. When the broader diameter of the endochrome is towards the observer, it is seen to fill the entire width of the cell, and having, as before adverted to, a narrow, transverse, pale space at the centre (separating the endochrome into two equal portions), sometimes band-like, but more frequently circular, from the endochrome terminating at each side with a concave outline. There is a single central longitudinal series of "vesicles" (or bodies similar to those in Closterium, &c.), reaching from end to end of the endochrome, and disposed at intervals of somewhere about the diameter of the joint, one of these always occupying the centre of the pale space. The bodies which, following the name used by Ralfs for similar appearances in Closterium, &c., I have just called "vesicles," I believe are not truly *vesicles*, but solid bodies, or corpuscles. Pressure upon the joints obliterates, or rather hides them, causing the endochrome, which before was apparently of an uniform character, to assume a granular appearance; while a still greater force upon the pressed-out cell-contents, now become somewhat scattered-about, shows these globular bodies, perhaps some not much altered, others cracked or split, and others in fragments (Fig. 4). If these were truly "vesicles," or if they were vacuoles, I do not think this appearance could result. Were they vesicles, I apprehend that, by careful manipulation, they should be capable of being pressed out either in a collapsed or burst state. Were they vacuoles, I should imagine that pressure would only efface them, and that they would hardly be found in the mass of extruded endochrome, whereas in reality pressure cracks and breaks them, as before stated, into fragments. I think, then, that the endochrome is at first of a very finely granular nature, so as to appear homogeneous, or uniform, when fresh, with this median series of firm corpuscles imbedded, which are spherical, and of a smooth

and well-defined outline. They are, I should think, granules of chlorophyll, of a firmer texture, but of a lighter colour, than the remaining endochrome. That they might occasionally contain starch is, I suppose, probable. I tried the application of iodine, but without being able to see the characteristic tint of starch,—the whole plant being stained a yellowish-brown, while the central corpuscles became very much darker than the other part of the endochrome. At each extremity of the joint the endochrome becomes more or less retracted from the end of the "primordial utricle," leaving a clear space, which, in cells just after division, is very small, but which afterwards becomes greatly larger. Within this clear space several active granules may be seen in constant agitation, like those in Closterium, Docidium, &c., though there does not appear any special chamber, as it were hollowed out of the endochrome, containing the moving granules, as in those genera. These were more numerous and more evident in the fresh specimens some five or six months ago, when I first noticed this plant, than they are in specimens gathered during the winter. Of these active granules I have remarked sometimes one or two in some specimens notably larger than the others, and I have noticed the granules continue their active motion in the water for some time after being set free by the forcible fracture of the cell, as will presently be again alluded to. If the joint under examination be now caused to make a quarter of a revolution on its long axis, the narrow or side view of the compressed endochrome becomes turned towards the observer, and consequently presents a different aspect (see Fig. 2). The outline of the endochrome, now brought to view, is seen to be somewhat undulatory or waved, owing to the mass of endochrome closely embracing the central row of light-coloured corpuscles which are still distinctly visible, so that at the regular intervals of their occurrence they form slight protuberances or distentions of the compressed band of endochrome, which at this edge view does not fill more than about a third of the diameter of the cell. I have sometimes noticed (but rarely, however) each half of the endochrome to be turned a different way with regard to the other, or at right angles, that is, one half presenting the broad view simultaneously with the other showing the waved, compressed, lateral view, which conditions were of course reversed on the joint being caused to turn longitudinally one quarter of a revolution. I have once noticed one half of the band of endochrome to be, as it were, *twisted* upon itself. The transparent pale space, due to the suspension of the endo-

chrome, is again manifest at this edge or lateral point of view, when it is also seen that each half of the endochrome does not approach the other directly straight, but, at a short distance from the central clear space, they are each somewhat suddenly curved towards each other, and towards the boundary wall, to which they approximate closely at the *same* side. I have only once or twice seen the base of each half of the endochrome curved towards the cell-wall at opposite sides. Of course the transparent space at each end of the endochrome, bounded by the primordial utricle, is equally apparent in the present view as it was before, and the active granules can be equally well seen exerting their curious motion; and in addition, owing to the compressed and narrow mass of cell-contents leaving a considerable space, they can not unfrequently be seen at a distance from the end of the joint swimming up and down with a tremulous, agitated, fluttering, uncertain motion. Occasionally one can be seen, having travelled up the length of the joint, to escape into the terminal space and join in the active dance of the other granules. Even at the view of the joint, first adverted to (Fig. 1), which exposes the broader diameter of the band of endochrome, and which leaves no room for them at the side between it and the outer wall, these wandering granules can, with certain illumination, be seen like darkish specks moving about, as it were on the surface of the endochrome. They are, doubtless, identical in nature with the similar active granules in Closterium, Penium, &c. I have not been able to detect any appearance indicative of the occurrence of a circulation, except it may possibly be inferred from the up-and-down movement of these errant granules. But then, when the cell is broken by force these active granules appear to be more numerous, apparently arising from similar granules becoming disengaged by the pressure from the mass of endochrome, and themselves setting-up a movement in the surrounding water, of the same quivering, agitated character (Fig. 4). Those who have seen the "molecular" movement of the granules of the fovilla of pollen will, to my mind, have a better idea than I could convey of the appearance presented by these moving granules when pressed-out, only they are not so numerous. Perhaps there may be a current within the cell, and that the fluid contents between the mass of endochrome and the margin of the cell may be of too great tenuity to enable it to be detected; at all events, I have not seen any of these free granules carried directly and steadily onwards, similarly to what occurs in other vegetable cells. I apprehend, however, that the curious

"molecular" movement displayed by the *pressed-out* granules is only just a continuation of the *same* movement to be seen *within* the joint, and that the additional granules moving about when forcibly expelled would have also moved in the same manner inside, could they have been disassociated from the mass of endochrome *in situ*. When by violence one of these joints is broken, the separation takes place by a suture at the centre over the pale space, and by a smooth line of division.

Of such joints as I have thus endeavoured to communicate an idea are the filaments composed of which the plant is constituted, and which for some time, attached to aquatic plants, maintain their connexion as a filament (Fig. 3). There does not appear to be any dilated or scutate base by which the first joint is attached to the foreign objects, but on which the filaments seem to stand directly, and with which the truncate apex of the first joint appears merely to be in apposition. The joints frequently separate, however, and can be met with in the water singly. Indeed, my first acquaintance with this organism was made with a single detached cell. They increase in length, too, sometimes after separation.

The division of the joints into two segments by a suture, although there is no transverse stria or other perceptible indication in the unbroken cell-wall of its existence, coupled with the interruption of the endochrome into two distinct portions, as well as with the active granules, seem at once to decide that this organism belongs to the Desmidiaceæ.

The particular mode of increase by cell-division which prevails amongst the other Desmids (by the formation of a septum and by the interposition of new growth between the old, unaltered segments pushing them asunder, and afterwards becoming divided at the middle, each half of the newly grown portion ultimately attaining the size and form of the old segments, and usually becoming cut off, and separation, taking place), I need hardly repeat, is abundantly evident and unmistakeable amongst the more elaborately formed bipartite genera; whilst even in many of those of more simple, even cylindrical outline, there is often a difference of colour in the cell-wall marking the newly grown portion. For example, *Penium cylindrus*, in which the cell-wall of the older segments being reddish, the newly grown portion is well marked by its absence of colour. So also in Closterium and others. But in the form under consideration, the sides being parallel and straight, and the cell-wall destitute of colour, I do not see any *external* means of proving that the new growth of each joint takes place *only* between the older

segments. In the bipartite forms (such as Micrasterias, Euastrum, Staurastrum, &c.), the mode of increase is *necessary* in order to restore the symmetry of the dividing frond; but the form in question being destitute of lobes, inflations, or processes, and straight, the normal symmetry of the cylindrical dividing joint is not disturbed. Nevertheless (while it seems to me that the characters before detailed are abundantly sufficient, in fact do prove, that this organism is a true Desmid, for it will be noticed that the mode of cell-increase referred to does not form part of Ralfs' diagnosis of the Desmidian group), though it cannot be deduced, from any alteration in the *outward* form of the joints, that the new growth takes place in the manner described, yet I think the following circumstance indicates sufficiently definitely that this is really the mode which holds good, and to my mind it leaves no doubt.

On looking over a mass of the filaments upon a slide, in by far the greater number of the joints it may be seen that the pale interruption of the endochrome occupies the centre of the joint, and is distant from each extremity precisely, or very nearly precisely, the same interval. But in a few cases, it may sometimes be noticed, that in two neighbouring joints of a filament the pale space is not central, but in both is very considerably nearer the adjacent extremities of the two contiguous joints. It will also be remarked that the two joints displaying this peculiarity are also shorter than the remaining joints of the same filament: Fig. 3, representing a few joints of a filament (magnified 200 diameters), shows at its upper part the state alluded to. Now I believe that this occurs in the following way. A septum is formed—as in the other Desmidians under the isthmus at the constriction—here, at the pale space in the centre of the cylindrical joint, which represents the isthmus in the bipartite forms. Close to this new septum, at *each* side, there now exists an interruption of the cell-contents forming the pale space, which, by the growth (perhaps pretty rapidly) of the interval between it and the lately formed septum, and by a fresh accession of endochrome, soon, in place of being, as hitherto, eccentric, becomes removed to its normal or regular central position; and this taking place in each joint, the equilibrium of both is restored, because, moreover, the segments remote from the new septum, in both cases, seem to remain unaltered. This is as precisely similar to the mode of increase which is usually seen, here and there, in a few of the joints in the filaments of *Sphærozosma vertebratum*, as is compatible with the great difference of

the form of the joints in each species. In *Sphærozosma vertebratum* it is more apparent, because the constricted form of the joints renders it inevitable that the growing segments should be at first smaller and narrower than the older ones; in the form under consideration, however, the nascent segment has only to grow longitudinally to form a continuous cylinder with the opposite older segment. Having thus (at least to my own satisfaction), even without this last conclusive evidence, proved the form, of which I hope I have succeeded in conveying a satisfactory conception, to be a true Desmidian, of which group there can be no doubt it is a new species, I will now assume both these points conceded, when the next question becomes—to what genus of Desmidiaceæ does this plant belong? Confining our attention for a moment to a single joint, it might seem to possess as good a right to a place in the genus Docidium as *Docidium asperum* (*Bréb.*), as described in Ralfs, but I shall presently give, I believe, valid reasons, why I think neither of these organisms would be rightly placed in Docidium, and, if not in that genus, certainly not in any other known.

On a former occasion, when I had the honour to lay before the Association the first part of a Catalogue of Dublin Desmidiaceæ, I appended to the mention of *Docidium asperum* (*Bréb.*) a note of my having met that species forming short filaments. Now, I have since, on several occasions during last summer, met with it, and always forming filaments of indefinite length, but being usually mixed with other Algæ, never in very large quantity; frequently, however, detached cells occur, more especially when kept some time in the house. In addition to the fact of this species forming filaments, which is not alluded to in Ralfs, I have met specimens possessing, when fresh, in nearly every joint, a pale central space or division of the endochrome into two equal portions, and contracted in an irregular manner enclosing a single central series of corpuscles, somewhat like the side or edge view of the endochrome of the form to which I first directed attention, and sometimes disposed in a zigzag or subspiral manner, while possessing all the other characteristics, as described in Ralfs: I allude to the roughness, owing to minute scattered granules, and to the dilated extremities (Fig. 5). There can be no doubt whatever that it is the same plant. When a joint is fractured, it breaks at the middle, but not with so smooth a line of fracture as the before described form. There has also occurred to me another form nearly allied to *Docidium asperum*, but I believe a distinct species, being altogether a

smaller and more slender plant, and of a different outline (Fig. 6). This form, too, occurs filamentous, but is very fragile. It differs from *Docidium asperum* (*Bréb.*) in each joint being fusiform, at the middle of which, where it is broadest, it is little more than one-half the diameter of that species, whence it gradually tapers towards the extremities, which become somewhat suddenly dilated, giving to the ends a slightly capitate appearance. It, too, is rough on the surface with minute scattered granules. I think this form differs materially from the variety of *Docidium asperum* figured in Ralfs after M. de Brébisson, which is quite as large a plant both in the diameter and length of the cells as that species, which are not at all fusiform, and differ only in the extremities being somewhat constricted beneath the apex. I have found this fusiform species also to present a central division of the endochrome, which is also of a contracted waved outline, enclosing a central series of corpuscles similarly to *Docidium asperum* (*Bréb.*), and to the first noticed species. In this species I have also noticed indications of the same mode of division as described and figured in the first form. There is no *perceptible* gelatinous sheath, so far as I can make out, surrounding any of these three organisms. I regret I have not been fortunate enough to meet with the reproductive state of any of them. If I might venture on a conjecture, I should probably say that it takes place by conjugation of the separated joints.

It will be by this time seen that the end at which I aim is to indicate that I think the first-described organism, *D. asperum* (Bréb.), and the fusiform species, belong to the same genus. It is true I have not been able to see moving granules at the extremities of *Docidium asperum* (*Bréb.*) nor of the fusiform species, although, on the authority of Mr. Ralfs, it is stated that M. de Brébisson has seen them in the former. For my part, I do not doubt that they may exist, for it seems to me that the rather opaque asperities which cover the surface of the joints may hinder them being noticed. I have sometimes *thought* I saw them, but could never feel positive. In any case I might remark that we have species of Penium both with and without active granules.

Assuming it as granted that these three forms belong to the same genus, it may be thought necessary to inquire, is that genus Docidium? I do not think so. In the first place, all these species *entirely want* any constriction at the centre of the joints, nor are the segments *at all* dilated at the base; both which are, as it appears to me, essential cha-

racters of Docidium, and which are very manifest in all the British species, as well as in the American, as figured in Ralfs. This, I admit, however, must be stated with one slight exception, for here I am not unmindful of *Docidium minutum* (*Ralfs*). In that species there appears a distinct central constriction, but there is no evident inflation at the base of the segments. There appears a terminal, well-defined cavity in which are moving granules, not as in the first of the new forms which I now bring to notice, a space, left merely by the withdrawal of the endochrome, in which these move. Moreover, *Docidium minutum* is *not* a filamentous form. Mr. Ralfs himself allows *Docidium asperum* (*Bréb.*) to remain in that genus unwillingly, and merely because he had no better course open. But perhaps it might possibly by some be urged that the essential characters of the genus Docidium might with propriety be altered by omitting those before mentioned, which seem to be abundantly sufficient to exclude the three forms in question; or some might say they might be kept in Docidium as aberrant members of the genus. It occurs to me that the answer to such suggestion is found in the fact of these three forms being *filamentous;* else we might with as great propriety and as good reason include, for instance, Sphærozosma with Cosmarium, or Desmidium with Staurastrum, the separated joints of which filamentous genera resemble the free genera Cosmarium and Staurastrum respectively, more than do the separated joints of the filamentous forms under consideration resemble the apparently natural genus Docidium, as at present constituted. The same considerations will, I think, distinguish any of these forms from Penium. There is, perhaps, some resemblance, in a separated joint, to such forms as *Penium truncatum* or *Penium cylindrus*, but the ends in both these species are rather rotundato-truncate than truncate, while it seems that the affinities of Penium are rather with the Palmellaceous Algæ, through such species as *Penium Brébissonii*, whereas I apprehend the forms now described approach the Zygnemaceous Algæ.

These are, then, I believe, filamentous Desmidiaceæ, the individual joints of which bear some resemblance to Docidium (still less to Penium and Closterium), while the filament does not resemble any other established filamentous genus. I believe, then, the first described form must be taken as the type of a new genus, and which, so far as I know, will be the only example of a fixed or attached Desmid; along with which I would venture to associate *Docidium asperum* (*Bréb.*), and, as a matter

of course, the fusiform species. To some it may, perhaps, seem premature to found a genus upon the characters presented by the mature form alone, without acquaintance with the reproductive state. But it will be recollected that none of the genera, according to Ralfs, are founded upon any appearance or phenomenon presented by the mode of conjugation, or form of the sporangium, and it is rarely employed as a specific character; and this, for necessary and obvious reasons: the sporangia of numerous species are not known, in many but rarely met with, while in the same genus considerable diversity sometimes occurs in the sporangium, such as the form of the spines and other particulars. For my own share, I do not see any course open but to make a new genus. From the simplicity of form, however, I have found some difficulty in drawing up concise characters: I trust, however, the following may be found to meet the requirements of the case:—

Class.—ALGÆ.

Order.—Chlorosporeæ or Confervoideæ.

Family.—Desmidiaceæ.

Leptocystinema (*nov. gen.*).

Plant an elongated jointed filament (often separating); joints straight, much elongated and slender, without a central constriction or inflation, entire, ends simply truncate, or dilated and truncate (no evident gelatinous sheath).

1.—*Leptocystinema Kinahani* (*nov. sp.*).

Filaments attached, frequently breaking up into separate joints, which are slender, extremely elongate, linear, cylindrical, and smooth, their ends abruptly truncate; the junction of the halves marked by a pale transverse interruption of the cell-contents; endochrome forming a compressed longitudinal band, its broader diameter extending the entire width of the joint,—the narrower not filling more than one-third, and presenting an undulating outline,—at the extremities of the joint more or less retracted from the end of the primordial utricle, leaving a clear space, in which are active granules; the endochrome also having immersed within it a single longitudinal central series of light-coloured, well-defined, globular, dense corpuscles, one of these bodies occupying the centre of the transverse pale space.

Length of joint varying from $\frac{1}{100}$ to $\frac{1}{80}$ of an inch (averaging about $\frac{1}{100}$ in.); diameter of joint $\frac{1}{1000}$ in.

It affords me much gratification to have it in my power to connect the name of my friend Dr. Kinahan with this species, while I feel it a privilege to be permitted to employ this slight tribute of regard, and very unworthy recognition, on my part, of many marks of consideration.

2.—*Leptocystinema asperum* = *Docidium asperum* (*Bréb.*).

Filaments fragile; joints "slender, cylindrical, rough with minute scattered granules;" "ends dilated;" endochrome disposed in an irregularly narrowed, somewhat undulatory, or sub-spiral manner, sometimes bifid at the extremities, (or "scattered"?), and having immersed in it a single median series of globular corpuscles, and usually with a pale space at the centre.

Length of joint, $\frac{1}{87}$ to $\frac{1}{47}$ of an inch; breadth, $\frac{1}{333}$; breadth at end, $\frac{1}{333}$. (These are the measurements given by Ralfs, "British Desmidiæ," p. 159, with which my own have agreed very closely.)

3.—*Leptocystinema Portii* (*nov. sp.*).

Filaments very fragile; joints very slender, fusiform, very gradually tapering to the ends, where they become dilated, giving to the apex a sub-capitate appearance, rough with minute scattered granules; endochrome disposed in an irregularly contracted manner, having immersed in it a single median series of globular corpuscles, and usually with a pale space at the centre.

Length of joint varying from $\frac{1}{100}$ to $\frac{1}{105}$ inch; diameter at the middle of the joint, $\frac{1}{300}$; just under the dilated extremity, $\frac{1}{360}$; and of the extremity itself, $\frac{1}{460}$ in.

Although the compliment may be but an unpretending one, it affords me great pleasure to have the opportunity of associating the name of my friend, George Porte, Esq., with this species,—a gentleman whose manipulative skill in its use is only equalled by his admiration of the many beautiful objects brought to view by the microscope,—while it will be commemorative, too, of the origination and initiation by him of a series of pleasant re-unions, at once scientific and social, on the part of a limited little circle, in the number of whom it is my own esteemed privilege to be counted a unit.

Another form to which I would next direct attention is one in which I find a single, but important, difficulty, in referring to the genus Sphærozosma, and it is the following:—I cannot find either one or two "glandular processes" between the joints of the filament, the presence of which is one of the characters of the genus Sphærozosma (Corda). The filament, which is very minute, is, however, plane and fragile; while the joints, which are about as broad as long, are constricted by a sharp, not deep notch at each side between the projecting lateral inflations at the base of the segments, giving a pinnatifid appearance to the margin of the filament, which thus possesses all the characteristics of Sphærozosma, save the one above noticed. Surrounding this form I do not think there exists a gelatinous sheath; but I am not able to affirm this at all confidently. The ends of the segments are straight and abruptly truncate, each in close apposition to the truncate end of the neighbouring joint, without the apparent intervention of any "glandular processes" (Fig. 7).* This form is very minute, and is very fragile; hence seldom found having more than fifteen or twenty joints in the filament, generally less; often one single cell only is met with. The endochrome is light-green, and possesses a single "vesicle" (or corpuscle) at the centre of each segment. Its minute size, the absence of the conspicuous central solitary "gland," its truncate and square-angled (not rounded) ends, and the lateral pouting projections of each joint at the base of the segments, readily distinguish this form from *Sphærozosma vertebratum*. It differs from *Sphærozosma excavatum*, which it more nearly approaches in size, by its square ends and lateral protuberant inflations, with a sharp notch at the constriction at each side, and in being wider at the basal inflation of the segments than at the ends, not, as in *Sphærozosma excavatum*, with rounded ends wider there than at the centre, and having a deep wide sinus at both sides of the joint. I may add that, so far as my humble experience goes, the "junction-glands" of *Sphærozosma exca-*

* I would here remark that *Sphærozosma pulchrum* (*Bailey*), an American species, is described and figured (Ralfs' "Br. Des.," Appendix, p. 209, Plate XXXV., Fig. 2, *a* and *b*) as having straight junction-margins, connected by short bands, without any mention of "glandular processes." In the drawing the joints are represented in both figures as even without septa between them, giving the idea of a continuous compressed tube, with lateral inflations, but which in this respect is surely erroneous; but which, if drawn, would give a junction-margin somewhat like that described above.

vatum are often very obscure. The separated joints of the form of which I have tried to convey a conception, considerably resemble a minute form of Cosmarium, and such I thought a single joint was till I met it in lengthened filaments. To obviate the difficulty here met with, two courses may appear to be open: either to allow this plant to remain as an aberrant member of the genus Sphærozosma—an unadvisable course if it could be avoided—or else to alter the characters of the genus by omitting the "junction-glands" as essential to it, for it appears, I think, that the plane or compressed filament is itself enough to distinguish Sphærozosma from the cylindrical or angular filamentous genera, except, perhaps, *Aptogonum desmidium*, *β*, which, however, is distinguished by the foramina between the joints. This view I would, then, very submissively put forward. In any case I do not see I have an alternative but to describe this form as a Sphærozosma, as follows:—

Sphærozosma pulchellum (*nov. sp.*).

Filament very minute and fragile; joints (including inflations) about as broad as long; ends truncate, with square angles; segments suddenly inflated at the base, and separated from each other by a shallow acute notch, thus giving to the margin, at each side, a pouting appearance at the central constriction, each segment of the joints containing a single central light-coloured corpuscle.

Length of joint, $\frac{1}{1330}$ in.; diameter of joint at the end, $\frac{1}{1650}$; diameter at widest part of inflation, $\frac{1}{1330}$ in.

I have also to bring to notice a species of Staurastrum, which, though minute, and not very striking in appearance, there can be no doubt is an undescribed one. In the front view this little organism might possibly be taken for a small form of *Arthrodesmus incus* (Figs. 8, 10); but the central constriction is not so deep, nor is the constricted portion so narrow, nor are the segments comparatively so dilated at the ends, nor is the gibbous appearance at the base of the segments often seen in *Arthrodesmus incus* present in the form in question; however, an end view, showing its four, or frequently three angles, dispels all doubt, and at once proclaims the plant a Staurastrum (Figs. 9, 11). It differs from *Staurastrum dejectum* (*Bréb.*) by its much smaller size and less deep constriction, and angles not inflated in the end view; from *Staurastrum cuspidatum* (*Bréb.*), the end view of which the triangular variety most approaches, by its much smaller size, straight sides in end view, and non-

inflated angles, and by the want of a connecting band in the front view. It resembles more nearly *Staurastrum minus* (*Kütz.*), an end view of which is figured in Ralfs' monograph, but which has not yet (I believe) been found in Britain; but that species presents five angles, not three or four, as in this species. I do not think I need contrast it with any other species. The angles in the end view of the quadrangular form are right angles, and the sides straight; in the triangular form the end view is equilateral and straight-sided, both forms possessing a single awn or acute spine at each angle. The awns are a little longer in the triangular variety than those of the quadrangular. I was fortunate enough to meet with the sporangium of this species (Fig. 13); it is spherical and acutely spinous, in fact, very like that of *Arthrodesmus incus*. That this form is a sort of connecting link, as it were, between Arthrodesmus and Staurastrum seems probable, from the not remote likeness in the front view to *Arth. incus*, as well as from the similarity of the sporangium in each. I would, therefore, venture to put forward the following to serve as a description of this species :—

Staurastrum O'Mearii (*n. s.*).

Frond very minute; segments smooth, ends truncate (in the quadrangular variety slightly convex); central constriction not deep, forming an obtuse angle; constricted portion very short; a single awn at each angle; awns diverging in the front view, acute.

End view quadrangular or triangular; sides straight;* angles not inflated.

Sporangium orbicular, spinous; spines at first subulate, afterwards slightly inflated at the base, acute.

Length of frond of quadrangular variety, $\frac{1}{1866}$th of an inch; breadth at end (exclusive of spines), $\frac{1}{2500}$; diameter at isthmus, $\frac{1}{3110}$; length of spine, $\frac{1}{5600}$.

Length of frond of triangular variety, $\frac{1}{1750}$th of an inch; breadth at end (exclusive of spines), $\frac{1}{2300}$; diameter at isthmus, $\frac{1}{3500}$; length of spine, $\frac{1}{4200}$.

Diameter of sporangium, without including spines, $\frac{1}{1750}$th of an inch; including spines, $\frac{1}{870}$th of an inch.

* I fear the figures (Figs. 9, 11) may convey the idea of the sides being somewhat concave: they are quite straight, and have the angles tipped merely with an awn.

It is with very great pleasure I am permitted to call this species after my friend the Rev. Eugene O'Meara, to whom I trust it may afford some gratification to have his name associated with this species of a group kindred to his favourite and beautiful Diatomaceæ.

There remains one other new species which it becomes my duty to bring forward and describe, which, owing to its elongate form, and not being at all constricted, and its entire segments, at once takes its place in the genus Penium.* It is in size about equal to *Penium Brébissonii*, but otherwise not at all resembling that species. Its outline is broadly spindle-shaped or fusiform, tapering pretty quickly to the ends, with cuneate segments, which are bluntly and roundly pointed, and it presents always the same form when made to roll over. The endochrome is granular, and bright green, with a transverse, rather sharply defined, pale band at the centre; and usually has immersed in each half a single central corpuscle. Close to each end there exists a smoothly and sharply defined, perfectly circular cavity, excavated, as it were, out of the endochrome, in which there are two or three active granules, as in Closterium (see Fig. 14). The endochrome sometimes appears as disposed in longitudinal fillets, but more frequently this is not evident. The drawings represent this fully as marked as I have noticed it. The mode of division in this form appears to follow that in Closterium, by a separation of the contents and external constriction. Fig. 15 represents this process half accomplished. I was not able to see its commencement, but in the specimen from which the drawing has been taken, in about thirty-six hours from the time I saw the stage represented in the figure (Fig. 15), the new halves were completed. As is usual, the new segments maintained a connexion with each other simply by the extremity, until they had nearly fully grown, when they became detached; but I could not see that they were held together, or at all surrounded by any gelatinous investment. Like *Penium Brébissonii* and others, however, it may be that this is sometimes absent, though at other times abundantly evident. I apprehend that the act of division indicates that the individual had attained the full

* The description of this species of Penium having been written since this paper was read, and since the former part of it went to press, the "heading" includes only four new species, instead of five; but I have, nevertheless, introduced it, anxious to take advantage of the Plate.

form and size of the species. The straight outline of this form, as, indeed, I need hardly point out, at once excludes it from Closterium, while it is, of course, equally decisively distinguished from Docidium by its tapering form, rounded (not truncate) ends, and by its want of a central constriction and its non-inflated segments;—from Spirotænia (in the recent state at least), its scattered, non-spiral endochrome at once removes it;—the want of a constriction and terminal notch excludes it from Tetmemorus;—while, from all the foregoing circumstances, it will be seen that it is really a Penium. From the striate, or granulate species of Penium, it may at once be known by its smooth frond, from which, indeed, its attenuated ends would sufficiently distinguish it. Of the species with smooth fronds, it appears to have greatest affinity to *Penium closterioides* (*Ralfs*), by reason of its terminal cavities with moving granules, and its fusiform outline. But, in the form in question, its very much smaller dimensions, combined with the entire absence of, or sometimes faintly apparent, longitudinal fillets, as well as the presence of only two conspicuous dense corpuscles (not a longitudinal series), its more cuneate segments, and its more narrow and slender ends, to which the terminal cavities are closer, readily distinguish it from that species. From the other smooth species, except *Penium interruptum* (*Bréb.*), the presence of the terminal cavities, containing active granules, at once removes it, while it never could be mistaken for that species (with which it is, indeed, unnecessary to compare it), on account of its far more minute size, as well as the absence of the two additional transverse bands, and its fusiform (not cylindrical) outline. Neither can it be mistaken for *Cosmarium curtum* (*Ralfs*) = *Penium curtum* (*Bréb.*), from which it is at once separated by its smaller size, less inflated appearance, the want of any central constriction and of so conspicuous longitudinal fillets, as well as by the possession of the terminal cavities, containing moving granules.

There is only one other form with which I need particularly contrast it, and that is *Spirotænia obscura* (*Ralfs*). At first sight it might appear unlikely to be mistaken for that species, nor is there any resemblance when fresh specimens of both are examined. *Then* the spiral arrangement of the endochrome in Spirotænia alone is an abundantly sufficient mark of distinction; but when *Spirotænia obscura* is kept for some time in the house, this spiral disposition of the endochrome is lost, and it becomes uniformly green. Moreover, there not unfrequently occurs in

this state a withdrawal of the endochrome, leaving a little clear space at the ends, of a somewhat triangular outline, as if bounded on two sides by the outer wall, and in which there is sometimes to be seen a detached granule; but I am not able to make out that this moves. But even in this altered state of *S. obscura* (as in Scenedesmus), its oblique mode of division, and consequent unsymmetrical outline, will easily distinguish it from the form under consideration.

Indeed, this form to me appears very distinct from any other described, and though I have contrasted it with others (almost unnecessarily in some cases), a moment's inspection of recent specimens would, I think, on this point convince any observer. I shall, then, describe this species as follows:—

Penium Berginii (*n. s.*)

Frond minute, about three or four times longer than broad, smooth, fusiform; segments cuneate; ends roundly pointed; endochrome irregular, or sometimes with more or less evident longitudinal fillets, also with a transverse pale band, and having close to each end of the frond a conspicuous, well-defined circular cavity, containing moving granules, and each half usually having immersed in the rest of the endochrome a single central spherical corpuscle.

Length of frond, $\frac{1}{410}$ to $\frac{1}{510}$ of an inch; greatest breadth, $\frac{1}{1760}$ of an inch; diameter at the ends, $\frac{1}{4060}$ of an inch.

I feel very happy in being accorded the privilege of naming this species after the well-known microscopist, Thomas F. Bergin, Esq., M.R.I.A., President of the late Microscopical Society of Dublin; while I trust that gentleman may look upon this trifling compliment as a mark of unaffected, but sincere, respect for his numerous scientific attainments, and more especially in regard to microscopy, the active pursuit of which has been interrupted owing to delicate health, at once greatly to be lamented for his own sake, as well as much to be regretted for the cause of science.

I have thus endeavoured to give my own ideas as to the various new forms, or other matters to which I have directed attention. In regard to my new filamentous form there can be no doubt that it is a Desmid, and as I could not satisfactorily to myself refer it to any genus described, I had hence no alternative but to attempt to make a new genus to

contain it. Considering the note appended to the record of the occurrence of *Docidium asperum* (*Bréb.*) in my former catalogue, it may appear unjustifiable temerity on the part of an amateur to essay that, which I there expressed a hope that the occasion might arrive when some of our "master-hands" might see it advisable to accomplish. I had not at that time met with *Leptocystinema Kinahani*—the impression then upon my mind had grown into a conviction, so far as my own judgment on the matter was concerned—and so (though unaided by the advice or opinion of any fellow amateur making these organisms a study, but which I had reason to hope for, and which, had I been so fortunate as to obtain, would have met with a grateful reception), I have thought it my duty to bring forward this communication. I can only hope that those whose experience enables them to form an opinion may agree with me as to the propriety of the genus Leptocystinema,—while I trust I have succeeded in conveying my own views and meaning intelligibly, though I greatly fear that, in my anxiety to be exact, I may have been only tedious, and with a real wish to be succinct as possible, as well as comprehensive, I may, perhaps, occasionally be found to have drawn undue attention to comparatively trivial circumstances—it is to be hoped, however, not at the expense of points of higher significance, or of greater importance.

The following is the Supplemental Catalogue of Desmidiaceæ found near Dublin (for preceding one *vide* "Natural History Review," Proceedings of Societies, vol. iv., p. 36):—

Didymoprium Grevillii (*Kütz.*), rather rare; though (like other filamentous species) when met with, sometimes plentiful.

Leptocystinema Kinahani (*mihi*) (*n. g.*), very rare.

[Hitherto met with but in a single pond on the Shankhill road, about a mile beyond Ballinascorney Bridge.]

,, asperum = Docidium asperum (*Bréb.*), not rare.

,, Portii (*mihi*), not rare.

Sphærozosma vertebratum (*Bréb.*), rare.

,, pulchellum (*mihi*), very rare.

Micrasterias Jenneri (*Ralfs*), rare.

Euastrum cuneatum (*Jenner*), rare.

,, insigne (*Hass.*), not uncommon.

Cosmarium Ralfsii (*Bréb.*), not uncommon.
,, tinctum (*Ralfs*), rare.
Staurastrum O'Mearii (*mihi*), rare.
,, brevispina (*Bréb.*), rare.
,, monticulosum (*Bréb.*), rare.

[Of this rare and pretty species, I have found a quadrangular variety (Plate XI., Fig. 16, exhibits an end view), as well as the triangular form recorded in Ralfs. The former differs from the latter only in possessing an additional side and angle, and in the gatherings in which it occurred the quadrangular variety was rather the more numerous; both are rare, however. I do not think there can be any doubt as to the form of which the end view is figured (Fig. 16), being the *Staurastrum monticulosum* (*Bréb.*), yet as the drawing after M. de Brébisson in Ralfs appeared to me as not quite characteristic, especially as to the end view, at least as far as my plant was concerned, having the opportunity, I have thought it might be worth while to introduce a sketch. The diameter of end view is $\frac{1}{700}$th of an inch; extreme length of front view, $\frac{1}{350}$th of an inch.]

Staurastrum gracile (*Ralfs*), rare.
,, tetracerum (*Kütz.*), rare.
,, cyrtocerum (*Bréb.*), ,,
,, asperum (*Bréb.*), ,,
,, enorme (*Ralfs*), very rare.
,, spongiosum (*Bréb.*), very rare.
,, aculeatum (*Meneghini*), rare.
,, spinosum (*Bréb.*), common.
,, vestitum (*Ralfs*), rare.
Tetmemorus lævis (*Kütz*), not rare.
Penium interruptum (*Bréb.*), rare.
,, Berginii (*mihi*), very rare.

[Sparingly, in a dyke above the Devil's Glen, between the Waterfall and the high road; also in a pond on the "Piperstown road," rather more than a mile beyond Ballinascorney chapel.]

Closterium Ehrenbergii (*Menegh.*), not uncommon.
,, moniliferum (*Ehr.*), ,,
,, Jenneri (*Ralfs*), rare.
,, intermedium (*Ralfs*), rare.
,, angustatum (*Kütz.*), not uncommon.
,, lineatum (*Ehr.*), not uncommon.
,, setaceum (*Ehr.*), not rare.
,, acutum (*Bréb.*), not rare.
,, juncidum β (*Ralfs*), rare.
Spirotænia obscura (*Ralfs*), rare.
Pediastrum pertusum (*Kütz.*), rare.
Scenedesmus acutus (*Meyen*), not rare.

NOTICE OF THE OCCURRENCE NEAR DUBLIN OF A UNICELLULAR ALGA, BELIEVED TO BE ALLIED TO THAT ALLUDED TO BY M. HOFMEISTER ("ANN. NAT. HIST.," THIRD SERIES, VOL. I., NO. 1, JANUARY, 1858), "ON THE PROPAGATION OF THE DESMIDIÆ AND DIATOMEÆ."

Appended to a Catalogue of Desmidiaceæ appears not an inappropriate place to record the occurrence in our district of an unicellular plant, which, but for one reason, I think there might not otherwise be much difficulty in concluding to be the same as that alluded to by M. Hofmeister in the paper to which I have before adverted, and which organism he seems inclined to refer, very doubtfully, to this family. The plant met with here consists of a rather large, perfectly spherical cell, containing abundant and large smoothly defined chlorophyll-granules (which appear often as if containing one within the other, shell within shell, to the number of two or three), a scattered layer of which appears to line the internal wall of the cell, while others are distributed within in scattered rows (sometimes almost as if in broken, interrupted planes) radiating either from the central point of the cell, or, as it appears to me, sometimes as it were from a central axis,—thus often giving, more especially when viewed under low powers, a somewhat stellate appearance to the contents (see Fig. 17). The contents, however, are not unfrequently irregularly scattered. So far, this description appears to apply equally to the Leipsic and Dublin plants. In the plant met with here there usually appears a darkish (under a low power almost black) central mass. This, with the whole of the remainder of the endochrome,

can be expelled by fracturing the cell by pressure. This central portion is extruded in a cohering, somewhat stringy mass, but can be afterwards broken into granules. It is sometimes shot out with vigour, leaving the separate chlorophyll-granules behind, and which afterwards, in a continuous stream, make their exit through the ruptured cell-wall. The expelled chlorophyll granules, which at first are large and smoothly defined, by subsequent pressure can be broken up into smaller granules, which, when detached, as in other cases, often set up a "molecular" motion in the surrounding water. I have noticed, too (rarely), a molecular motion of the more minute particles within the uninjured cell.

This organism has occurred not unfrequently in the Desmidian gatherings I have made; but nowhere did I meet with the plant in such numbers, and so isolated from other forms, as in a small pool, close to the Sugarloaf Mountain, on the road to Roundwood. I have specimens still by me collected during last summer, and which, living ever since, have been healthfully preserved. A single specimen is visible to the naked eye, being from $\frac{1}{170}$ to $\frac{1}{100}$ of an inch in diameter. The chief difficulty adverted to in reconciling this with M. Hofmeister's plant is the comparative dimensions, as he says with regard to this—"Some are as much as ·05 millim. in diameter." This is (roughly) about equal to $\frac{1}{500}$ of an inch, the dimensions of my specimens being thus often three times as great. When I first met with individual specimens of this organism, I imagined it might have been the sporangium of some Desmidian (possibly of a Tetmemorus), though, as I afterwards found, too large for that. M. Hofmeister compares his plant to the sporangium of *Xanthidium armatum, as if* similar in size, and which it no doubt resembles. But though Mr. Ralfs met with but one specimen of the sporangium of that (with us) rather common species, and does not give the dimensions, yet it is surely not much smaller, according to his figure (comparing it with others of known size, and all equally magnified), than $\frac{1}{100}$ of an inch. However, the conjecture that our plant can be sporangium seems to be dispelled by its undergoing self-division; and, as Hofmeister remarks with regard to his plant, "this renders it in the highest degree probable that they are independent organisms,—Desmidiæ without a central constriction, which may form the commencement of a series of forms terminating in Micrasterias."

M. Hofmeister does not describe the mode of division in his plant. That met with here, when about to divide, appears to be more densely

filled with endochrome than in the ordinary condition, and its somewhat radiate appearance is less evident:—the first indication of the approaching occurrence of the process of division is the separation of the endochrome, which becomes, as it were, cut through-and-through abruptly into two exactly hemispherical masses, separated by a straight, sharp, smooth line; a slight elongation of the cell next occurs, which goes on, *pari passu*, with a constriction of the cell-wall immediately over the equatorial line of separation of the endochrome, at which stage the dividing cell becomes of a figure of 8 form. The first I met with undergoing this process I thought might be in a state of partial conjugation; but by a little further observation it became evident that this was a process of division. When a specimen has become so far divided, it has assumed a quasi-Desmidian appearance, as it might possibly be taken for a large Cosmarium; but the separated halves of the endochrome of the original spherical cell soon lose their exactly hemispherical form, grow larger, and become rounded off, having secreted a special cell-membrane, and eventually, as two distinct individual cells, similar to the parent, emerge from its loose old cell-wall by rupturing it (Fig. 17). This escape of the newly formed spheres seems to occur sometimes before the constriction of the old cell becomes entirely cut off. At other times this constriction is perfected, and single cells are thus frequently met with, the old cell-wall surrounding the newly formed cell like a loose tunic.

Supposing that M. Hofmeister's plant follows the mode described, might not the bursting (at the annular groove) of the constricted old cell, before the deepening constriction becomes entirely cut off, account, at least in some measure, for the openings or orifices described by him as met with in the empty coat? I have myself in our plant often found the cast-off coats, which are met with usually collapsed or wrinkled, and sometimes with an orifice like what might be supposed to occur under the conditions indicated. However, M. Hofmeister relates his having occasionally noticed as many as six coats inside each other. In the plant met with by me I have not seen more than one inside another. I am not able to state that in our plant the cell-contents, without division, first contracting, secrete a new cell-membrane still within the original coat,—such a process being, I imagine, the only way to account for the fact of several loose coats concentrically surrounding the same cell. Thus, while it appears as by no means decided that M. Hofmeister's plant and that alluded to as met with here, are identical, yet I think it will be at

least evident that they resemble each other very much, and are closely allied.

M. Hofmeister has already compared his plant to a Desmidian. At first sight ours has some resemblance to *Cosmarium Ralfsii;* but, being a perfect sphere, it, of course, wants the constriction and elliptic ends of that species. I hardly think, in our plant, that there is a central suture, though the cast-off coats have a *tendency* to split into two hemispherical portions: they often display, after collapse, a flattened or depressed circular portion (when viewed sideways, almost as if a small segment had been *abruptly* cut off the sphere), possibly representing the somewhat flattened surface of contact with the companion cell, just after the complete shutting off of the two cells or entire formation of the double wall. We have seen that there is not an interruption of the endochrome until the commencement of the process of division. As to the mode of cell-increase which prevails amongst the Desmidiaceæ, it does appear probable that during the division and formation of the constriction, the original hemispheres may be pushed asunder, by *new* growth, without their materially altering. But, even so, is this an *exclusively* Desmidian (and Diatomacean) characteristic? An apparently similar mode of division seems to hold good with the greatly more minute cells of the moniliform filaments of the Nostochaceous Algæ (e. g. Dolichospermum). One of these globular cells appears to elongate, to become constricted into a figure of 8 form, deeper and deeper, until two new globular cells grow out of one, during which process the opposite hemispheres of the original cell appear to remain unchanged. So in the plant in question. The main distinction appears to be, as I apprehend, that in neither of these organisms is the first step of the process of division—the formation of a septum between the halves of the cell-contents, as appears to prevail in the Desmidiaceæ. So far as I can make out, the halves of the contents of the cell about to divide (in the plants alluded to) merely become retracted from each other, separated by a sharp, smooth line of demarcation, and eventually become shut off by an addition to, and external gradual constriction of, the original outer cell-wall, as well as, of course, the original primordial utricle, afterwards producing each its own proper cell-membrane. In other words, the new and intervening growth appears to be an extension and continuation of the original outer wall of the dividing cell, —still a single cavity only, until the constriction becomes shut off, or until the halves of the cell-contents have withdrawn and become invested

each by its own special coat,—not, as in Desmidiaceæ, according to Hofmeister, the expansion of the "younger inner layer of membrane not firmly adherent to the older portions." But, again, both our Dublin plant and Hofmeister's appear to have some affinity to Glæocapsa. In them, however, there is enclosed, in the loose outer cell-membrane, only one green cell,—not as in Glæocapsa, 2, 4, 8, &c. But there does appear, perhaps, a greater similarity in the separate persistence for some time of the outer cell-wall in each. In Glæocapsa the outer concentric layers, formed by their solution into a confluent gelatinous mass, usually remain in some numbers—in M. Hofmeister's plant he states to the number of six sometimes—the chief difference in this respect apparently being, that they do not, as in Glæocapsa, become gelatinous, but are eventually cast off as loose wrinkled membranes. The green cells sometimes escape from Glæocapsa, too, by a fracture at the side, leaving behind the empty concentric layers.

It is greatly to be hoped that upon a study of his plant M. Hofmeister may decide upon "a local habitation and a name" for it (and along with which, I apprehend, our plant must follow), which, simple in form as it may be, appears a sufficiently puzzling problem. I have, nevertheless, thought it possible that this imperfect notice of the occurrence with us of an organism, at all events closely allied to, if not identical with, that alluded to by that distinguished author in his most valuable paper, might possibly, to our local observers at least, possess some interest. Others may have met with the same plant, who, while abstaining from making them public, may have carried out further and far more conclusive observations; and if, by drawing attention to this plant, I should be the unworthy means of eliciting their information, I shall have done some good, and my object in coming forward will have been accomplished.

DESCRIPTION OF PLATE XI.

Fig. 1. Represents a single detached joint of *Leptocystinema Kinahani*, $\frac{1}{50}$ of an inch in length, magnified 330 diameters, showing the broad view of the compressed band of endochrome, with its longitudinal median series of corpuscles, central interruption, and terminal clear spaces and granules.

Fig. 2. A single detached joint of the same, $\frac{1}{75}$ of an inch in length, magnified 330 diameters, showing the narrow or side view of the compressed endochrome, and terminal granules as well as one or two wandering motile granules remote from the end.

Fig. 3. A portion of a filament of the same, the joints in this case $\frac{1}{100}$ of an inch in length, magnified 200 diameters, showing at its upper portion the lateral view, at its middle the oblique or intermediate view, and at the lower end the front view of the endochrome. The green contents of the continuous joints are, however, in the same filament, usually disposed in the same plane. The second and third joints from the top (shorter than the others) illustrate the fact of recent self-division after the manner prevalent in the Desmidiaceæ, as indicated by the (as yet) not fully grown new portions of endochrome and nascent halves, and the consequent still eccentric position of the pale interruption, which in both joints is as yet considerably nearer to the recently formed septum than when in its ultimate regular central situation in the joint. [Of course, it will not be assumed that the joints are always absolutely mathematically straight. Although usually straight, some are occasionally more or less curved, or even bent (the sides being, however, always parallel), and this, no doubt, owing to external circumstances. I have drawn them not more curved than they not unfrequently have presented themselves. *Docidium Ehrenbergii*, for instance, is described as straight; this is its usual state; but specimens sometimes occur bent almost at right angles, and others sometimes with one segment, in place of being of the usual narrow and elongate form, considerably inflated, or almost globose.]

Fig. 4. Exhibits the pressed-out cell-contents of *Leptocystinema Kinahani*, magnified 330 diameters, showing the gradually broken-up central *corpuscles*, not "vesicles"—bodies similar, in fact, to those in Spirogyra, &c.—some entirely shattered, when they lose their light-coloured appearance; also representing the granules of the extruded cell-contents, as breaking off and setting up their molecular motion in the surrounding water.

Fig. 5. Three joints of a filament of *Leptocystinema asperum* = *Docidium asperum* (*Bréb.*), magnified 330 diameters, showing the con-

tracted mass of endochrome, with its central corpuscles, and in two of them the pale central interruption (which, however, is not always present). I have introduced this drawing because, so far as my experience goes, that in Ralfs' does not show the normal state of the cell-contents, but an irregular, somewhat densely scattered condition (possibly preparatory to decay), and without any pale central interruption, or series of corpuscles, nor is it exhibited as filamentous. In this, as well as *Leptocystinema Kinahani* when kept for a length of time in the house, and evidently decaying, I have found the cell-contents broken-up and scattered, and the characteristic smooth compressed state of the endochrome very considerably altered.

Fig. 6. Three joints of a filament of *Leptocystinema Portii*, magnified 330 diam.

Fig. 7. Portion of filament of *Sphærozosma pulchellum*, magnified 450 dm.

Fig. 8. Front view of the quandrangular variety of *Staurastrum O'Mearii*, magnified 450 diam.

Fig. 9. End view of the same, magnified 450 diam.

Fig. 10. Front view of the triangular variety of the same (*St. O'Mearii*), magnified 450 diam.

Fig. 11. End view of the same, magnified 450 diam.

Fig. 12. The triangular variety of the same, front view, in a partially advanced state of self-division, magnified 450 diam.

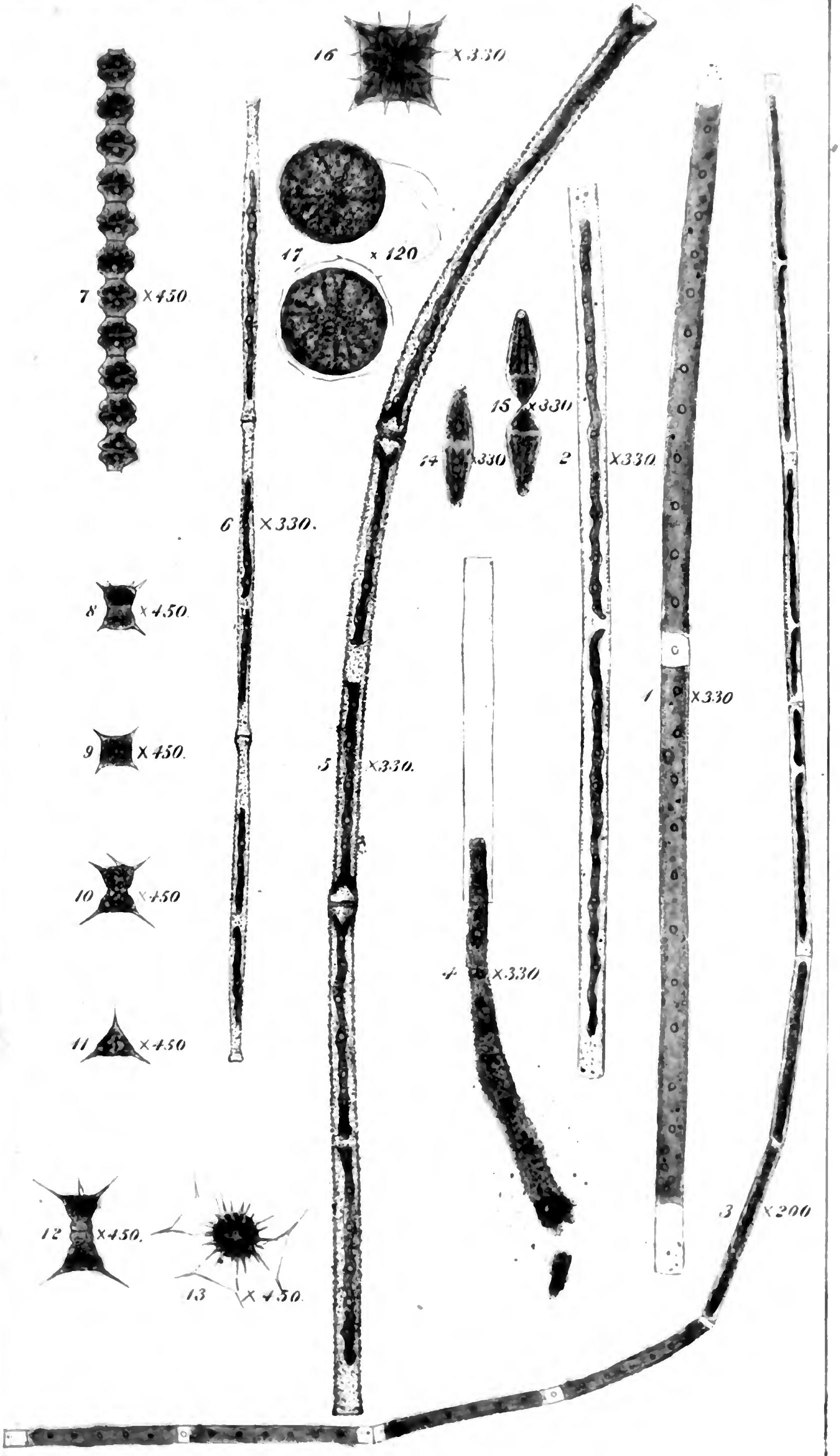
Fig. 13. Sporangium of same, magnified 450 diam.

Fig. 14. *Penium Berginii* (*mihi*), a specimen $\frac{1}{175}$ of an inch in length, magnified 330 diam.

Fig. 15. The same, after division, magnified 330 diam., the new, partially grown segments still remaining apparently attached by their extremities.

Fig. 16. End view of quadrangular variety of *Staurastrum monticulosum* (*Bréb.*), magnified 330 diam.

Fig. 17. Unicellular plant, showing a small specimen, $\frac{1}{100}$ of an inch in diameter, magnified 120 diameters, referred to at page 124, after division and the entire completion of two new spherical cells. One (the upper) is represented as slipping out from the loose original outer coat. See also M. Hofmeister's figures, *l.c.*, Plate I., Figs. 28, 29, which are, I suppose, magnified 300 diam., although this, with regard to the figures referred to, unfortunately, is not stated.



W. Campbell del. Lith at the Office of Dr Whitty. C.E. Dublin.


BRITISH MUSEUM
NATURAL HISTORY.

CONTENTS.

PROCEEDINGS

OF THE

DUBLIN UNIVERSITY

Zoological & Botanical Association.

VOLUME I.—PART II.

JULY, 1859.

With Ten Plates.

DUBLIN:

PRINTED AT THE UNIVERSITY PRESS,

BY M. H. GILL.

LONDON:] [WILLIAMS & NORGATE.


NATURAL HISTORY

PLATE XII.

Fig 1.

Fig 2.

Fig 3.

Fig 4.

Fig 5.

Fig 6.

W. Campbell delt

Lith.d By D.r Whitty C.E. Dublin.

Dr. E. Perceval Wright then exhibited a specimen of a Sea-anemone recently obtained by Professor J. Reay Greene on the coast of Cork. It belonged to the genus Bunodes of Gosse, differing, however, from *B. crassicornis* and its allies in the much greater smoothness of the column, in the absence of the crenated margin round the upper edge of the disk, and in the extreme length and slenderness of the tentacles. Its habit, too, would appear to be somewhat different from that of a Bunodes, and to resemble more that of *Actinia mesembryanthemum;* indeed, when fully expanded, it might almost have been taken for the variety of that species in which the blue or red spherules are absent. Its attachment to the rock-work in my aquarium was very slight, in this differing from any of the species of Bunodes with which I am acquainted; and in its original habitat it was discovered not secluded in the narrow clefts of the rocks, which abound on the coast of Cork, but adhering to the side of the rock at low-water mark. All these peculiarities have induced me to exhibit the specimen. Should it prove to be but a variety of *B. crassicornis*, it will be, even as a variety, worth recording, as, so far as my experience goes, this species is not subject to much variation in form or appearance, though it sports so many varied hues; and should it, upon further examination, prove to be a distinct species, I would propose for it the name of *B. Greenii*, after its discoverer.

Professor Harvey, in the absence of Mr. John Bain, Curator of the College Botanic Gardens, next exhibited a fine plant of *Sowerbœa juncea*, and at the same time mentioned that the College Gardens were indebted for the successful culture of this and many other rare plants to the skill and attention of Mr. Bain. He also communicated the following description of—

A NEW MYRTLE. (PLATE XII.)

Hypocalymna (*Cardiomyrtus*) *Phillipsii:* ramis junioribus ferrugineo-tomentosis teretibus; foliis oppositis oblongo-ovatis basi subcordatis sessilibus semi-amplexicaulibus obtusis margine plano cartilagineo-denticulatis uninerviis viridibus pellucide punctatis; floribus axillaribus solitariis (v. geminatis ?) pedunculatis, pedunculo pubescenti brevi.

Hab.: described from a cultivated specimen, grown in the College Botanic Gardens from seeds communicated, through the Archbishop of Dublin, by Mr. Phillips, of King George's Sound.

A shrub 3-4 feet high or more, densely leafy. *Branches* frequently forking from the abortion of the terminal bud and the development of

the lateral buds, terete, the younger ones clothed with a short, ferruginous pubescence or tomentum. *Leaves* in pairs, about an inch apart, decussating, 1 or $1\frac{1}{3}$ inch long, $\frac{3}{4}$ inch wide, oblong-ovate, subcordate at base and partly amplexicaul, sessile, horizontally patent, somewhat wavy, glabrous, pellucid-dotted with a cartilagineo-membranous serrulate margin, one ribbed, with immersed pinnating and intramarginal veins. *Peduncles* axillary, geminate (?), (in our specimen only one is developed), 2–4 lines long, terete, pubescent. *Bracteæ* subtending the base of each peduncle, and two at the base of the calyx, where that is articulated to the peduncle. *Calyx tube* turbinate, rather shorter than the limb. Sepals 5, oblong-ovate, very obtuse, with scarious entire margins. *Petals* 2–3 times as long as the sepals, ovate, tapering at base into a short claw, concave, very obtuse, pellucid-dotted, marcescent. *Stamens* inserted with the petals in a single series, confluent at base into a broad perigynous ring, very numerous for the genus, 50 or more; filaments filiform, of unequal length, incurved, anthers short, erect, 2-celled; cells parallel, opening longitudinally, with a gland-like, swollen connective, dorsally inserted. Ovary nearly superior, its base only confluent with the tube of the calyx, but the whole of the ovule-producing portion is free, rising above a broad perigynous fleshy rim, which separates it from the staminal circle, trilocular, and distinctly three-lobed; ovules numerous, about twelve in each cell, fixed to a fungous axile placenta, sessile; style subulate, curved, stigma simple.

This plant seems to agree in all essential respects with Hypocalymna, except that the ovules are more numerous, in which respect it coincides with Astartea; but it differs from that genus in having the stamens monadelphous. In habit it most resembles *Hyp. cordifolium*, but is much larger and more robust, with broad leaves and tomentose terete branches.

The mere circumstance of a greater number of ovules in each cell, where they vary from one to three in other species, seems hardly sufficient to establish a separate genus for the present species.

FRIDAY EVENING, MAY 21, 1858.

PROFESSOR W. H. HARVEY, M. D., F. L. S., VICE-PRESIDENT, in the Chair.

THE Minutes of the last Meeting having been read, were approved of, and signed by the Chairman.

The following Resolution was moved by the Rev. Professor Haughton, seconded by Dr. Carte, and carried unanimously:—

"That this Association desires to place on record its sense of the loss it has sustained, in common with other scientific bodies in Dublin, by the unexpected death of the late Professor Harrison,—a loss which this Association feels in particular, in consequence of the interest always manifested by Dr. Harrison in the progress of zoological science in the University, as evinced by his Lectures on Comparative Anatomy and Zoology, and by his constant attendance at the meetings of this Association."

Professor Haughton, in moving the resolution, stated that Professor Harrison had been a member of the Association since 1853, and had taken the chair at the meeting immediately preceding his death. He further observed that such was Dr. Harrison's zeal in the discharge of his duty, that on the very night in which he was seized with his fatal illness he had been occupied to a late hour in the preparation of his examination for the candidates for the Anatomy Prize of the Medical School of Trinity College. His last lecture of the Winter Course was to be delivered on the very day on the morning of which he was summoned to his final account. He died, as he had lived, in the cheerful and conscientious discharge of daily and plain duties, and had left behind him an example worthy of the imitation of all, occupied, as he had been, in advancing the boundaries of human knowledge, and aiding in the alleviation of human suffering. His love of science, and honest detestation of quackery and pretension in every form, were well known and appreciated by those who knew him; and he had the courage on all suitable occasions to rebuke the arrogance and inform the ignorance of all pretenders to knowledge they did not possess, no matter how high their station, or how great their conceit.

Dr. Carte, in seconding the resolution, remarked that he was the oldest pupil of Dr. Harrison present, and could bear testimony to the services that eminent man had rendered to medical science in Dublin. When he was a student, the classes were obliged to rely on their note-books of lectures and their own observations, with regard even to such matters as the course of the arteries and nerves. This state of things had been remedied by the publication of Harrison's "Surgical Anatomy of the Arteries," which was now known and used wherever the English

language was spoken. Dr. Harrison was characterized by all the good qualities of a citizen and a friend, and all young men who had intercourse with him, in his capacity as a teacher of anatomy, would gladly bear testimony to his skill and assiduity in communicating to others the knowledge he possessed so largely himself. It afforded him a melancholy pleasure to second the resolution proposed.

The resolution was unanimously adopted by the Meeting, and ordered to be placed on record in the proceedings of the Association.

The following paper was then read :—

ILLUSTRATIONS OF THE FOSSIL FLORA OF THE LOWER CARBONIFEROUS BEDS OF GERMANY AND IRELAND, FROM SPECIMENS PRESERVED IN THE MUSEUM OF TRINITY COLLEGE. BY THE REV. SAMUEL HAUGHTON, FELLOW OF TRINITY COLLEGE, AND PROFESSOR OF GEOLOGY IN THE UNIVERSITY OF DUBLIN.

(I.)

Plate III. represents, on a scale one-half that of nature, a fine specimen of Knorria (named *Sagenaria Veltheimii* (Sternberg), and *Knorria imbricata* (Göppert), by the German palæontologists). It is a cast of the woody axis of this genus, and exhibits well the dichotomous arrangement of its branches, and the imbricated, spirally-arranged leaf-scars characteristic of the Lepidodendra, to which it is evidently allied.

Locality : Hayntren, Saxony.

Geol. horizon : Base of the Lower Carboniferous.

(II.)

Plate IV., Figs. 1 and 2.—Side view and cross section of imperfectly preserved stem of plant, showing central coaly axis and longitudinal striations on external surface; natural size. I cannot refer this plant satisfactorily to any known form. It is a cast of the woody axis of some form of Lycopodiaceous or Endogenous plant; but the central tube presents a structure different from that of any recent forms. The character of the external surface of the cast is better seen in Plate X., which shows the structure of the base of the leaves.

Locality : Harrylock Bay, county of Wexford.

Geol. horizon : Yellow sandstone, 380 feet below the lowest bed of Carboniferous Limestone.

PLATE III.

1/2

W. Campbell delt

Lith^d at the Office of D^r Whitly C.E. Dublin.


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Fig. 1

Fig. 2

Fig. 3

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Fig 1.

Fig 3.

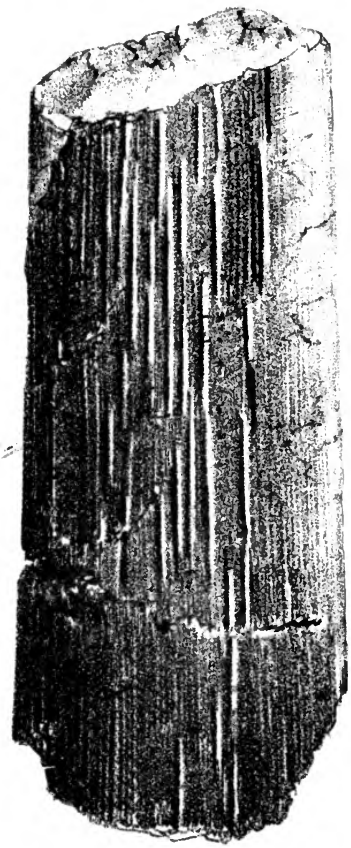
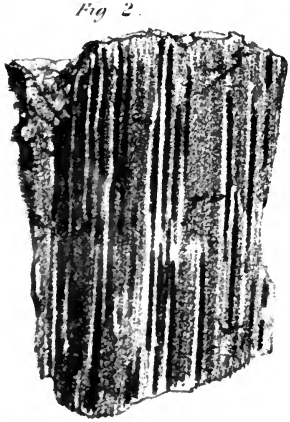


Fig 2.



W. Campbell delt. Lith.d at the Office of Dr Whitty. C.E. Dublin.

(III.)

Plate IV., Fig. 3.—Natural size; stem of smaller branch of same plant as last, showing bases of leaves at lower portion of external surface. The peculiarity of this specimen consists in the spiral tube, filled with coaly matter or peroxide of iron, which twines round the stem, as shown in the figure. Professor Phillips, of Oxford, has suggested to me that it may (possibly) be the stem of some kind of twining fern, which has compressed the stem so closely as to penetrate below the external surface. The bases of the spinous leaves are well shown in the figure.

Locality: Harrylock Bay, county of Wexford.

Geol. horizon: Same as last.

(IV.)

Plate X.—Casts of the stems (natural size) of the same plants as those figured in Plate IV. Figs. 1 and 2 show the cast of the leaves at their insertion into the stem. Fig. 3 shows the raised coaly bases of the spinous, lanceolate leaves themselves. They exhibit but a rude tendency towards a spiral arrangement, which may be owing to their very imperfect preservation.

The plants figured in Plates IV. and X. are too imperfectly preserved to be named, and appear not to have grown in their present position, but to have been drifted from a distance. They occur in a loose, friable, micaceous, white sandstone, and are accompanied by about an inch and half thick of anthracite coal, occasionally passing into an ochraceous powder, in which no vegetable structure is visible.

Locality: Harrylock Bay, county of Wexford.

Geol. horizon: Yellow sandstone, 380 feet below the Carboniferous Limestone.

Professor Harvey, M.D., F.R.S., read the following description of—

THREE NEW SPECIES OF SOUTH AFRICAN PLANTS.

Since announcing my intention to prepare a new "Flora Capensis," or descriptive catalogue of the plants native in Southern Africa, several correspondents at the Cape have sent to the University Herbarium collections of dried specimens of South African plants, in aid of the proposed work. I bring before the Association this evening three

plants, selected from the communications of three friends, and specially remarkable: one from its structural peculiarities, which point it out as possibly the type of a new Order; the others, from their geographical distribution and rarity. Other new forms may be brought forward from time to time, and from the activity now awakening among the collectors and botanists at the Cape, and especially from the recent appointment of Dr. Pappe, as Colonial Botanist (with a handsome salary from the Treasury), most important additions will probably, ere long, be made to our knowledge of the Cape Flora. As Dr. Pappe* undertakes to furnish me with duplicates of all his collections, our Herbarium will probably become unrivalled as a receptacle for Cape plants, in which already it is tolerably rich. I take this opportunity of soliciting from all well-wishers to the forthcoming "Flora" contributions, large or small, of specimens from the Cape; as, in preparing a Flora of so great a region, specimens from all localities are imperatively required. The first to be described is a very remarkable and beautiful shrub or small tree, which forms a most distinct new genus, to which Sir William Hooker and myself have jointly agreed to give the name of Greyia, in honour of Sir George Grey, K.C.B., Governor of the Cape Colony, who takes a warm interest in developing the natural history of South Africa. Of Sir George's merits in other respects, it is unnecessary to speak; his present exalted position having been won, step by step, by important public services rendered to four colonies, and his able conduct, under very difficult circumstances, as Governor of the Cape, having earned for him the respect of two hemispheres. But I may be permitted to take this opportunity of tendering to his Excellency my grateful acknowledgment of a favour conferred on myself by his insertion in the "Capetown Gazette" a government notice (No. 387, 1857), of which the following is an extract:—

"His Excellency has also directed it to be notified, that a communication has been received from Sir W. Hooker, announcing that Dr. Harvey, Professor of Botany in Trinity College, Dublin, and author of the well-known work on 'The Genera of South African Plants,' published at the Cape in 1838, which has long been out of print, is engaged

* Whilst this sheet is under press, Dr. Pappe's first instalment—a most valuable and extensive one—has come to hand.—W. H. H.

in preparing for publication a complete Flora of the Cape Colony, and is desirous of obtaining the assistance of those persons who can contribute towards perfecting this much-wanted work. His Excellency, therefore, invites all persons capable of contributing, by information or specimens to this work, to forward the same, addressed to Dr. Harvey, to the Colonial Office, Capetown, whence they will be forwarded by the first opportunity to his address; or to communicate direct, if they should prefer it, with Dr. Harvey, at his address, Trinity College, Dublin. All communications received and sent through the Colonial Office will be free of local postage, and of charge of transport to London."

To this notice and patronage I feel that I am ultimately indebted for many of the parcels I have received; and in associating Sir George's name with the new genus now exhibited to the Association, I desire to express my respect and my warm thanks for the aid his Excellency has afforded me.

GREYIA,* *Hook.* and *Harv.*

Calyx quinque-partitus, brevis, persistens, laciniis obtusis æstivatione imbricatis. *Petala* 5, oblonga, sessilia, calycis laciniis alterna, basi maculata, decidua, æstivatione imbricata. *Stamina* in fundo calycis inserta, subhypogyna, biseriata; 10 exteriora ananthera, in cupulam carnosam connata, filamentis brevissimis apice glandulâ peltatâ coronatis; 10 interiora fertilia, libera, cum exterioribus alterna, longissime exserta, filamentis subulatis, antheris ovatis erectis brevibus didymis longitudinaliter dehiscentibus. *Ovarium* liberum profundè 5-sulcatum, ex carpidiis quinque valvatim cohærentibus conflatum uniloculare, apice in *stylo* attenuatum. *Stylus* subulatus, exsertus; stigma simplex. *Ovula* ad suturas ventrales indefinita. *Capsulæ* folliculares, ad suturas leviter cohærentes, chartaceæ. *Semina* minuta, testâ membranacea, albumine copioso carnoso, embryonis orthotropi radiculâ umbilico prox-

* Not to be confounded with *Grayia* (Hook. and Arn.), named in honour of Professor Asa Gray. The similarity in sound is certainly great; but as there are two British peerages (one *Grey*, the other *Gray*) which are held to be sufficiently different, we trust that our *Greyia* and *Grayia* may, without confusion, be also admitted; at least while *Laurencia*, and *Lawrencia*, and *Laurentia*, respectively pass muster, our *phonetic* similarity need not be criticised.

imâ. —*Arbor mediocris, foliis alternis, simplicibus, crenato-lobatis, exstipulatis petiolatis, petiolo basi dilatato amplexicauli; racemis terminalibus densis, pedicellis basi bracteolatis, floribus coccineis, speciosissimis.*

Greyia *Sutherlandi, Hook.* and *Harv.* MSS. (Plates XIII. & XIV.).

Hab.—In rocky, exposed mountain situations, near Port Natal, at from 2000 to 6000 feet elevation.—*Dr. Sutherland.*

A small tree, or large shrub, with light, porous wood, and a gray bark. The branches are densely leafy towards the ends, the flowering branches bare of leaves for some space below the raceme. The *leaves* are borne on petioles of half their own length at least, and are subrotund, cordate at base, multi-lobulate at the edges, glabrous, but covered on both surfaces with minute glandular dots, which exude a viscid fluid; the petioles clasp the branch by their expanded base, and are destitute of stipules. The *racemes* are densely many-flowered, 2–4 inches long, with the flowers so closely set on all sides that the whole appears like an oblong fascicle. The *pedicels* are glabrous, three-quarters of an inch long, patent, each subtended by a small lanceolate bract. *Calyx* continuous with the pedicel, five parted, of five elliptic-oblong or slightly ovate, obtuse, glabrous, externally dotted sepals, persistent. *Petals* alternate with the sepals, sessile, broadly linear-oblong, and very blunt, of a thick, glossy substance, and bright crimson colour, thrice as long as the calyx, minutely ciliolate at the edges, deciduous. *Stamens* 20, in two rows, those of the *outer* row abortive, connate into a deep fleshy cup (or *nectary*), whose border is crowned with the ten short filaments, each of which is terminated by a broad, peltate, incurved gland, representing the anther; those of the *inner* row fertile, free, much exserted, hypogynous, or nearly so, alternate with the barren filaments, which they many times exceed in length; filaments filiform, tapering upwards; anthers erect, two-celled, didymous, introrse, dehiscing longitudinally. The pollen has been shed in our specimen. *Ovary* formed of five lanceolate carpels, whose inflexed edges cohere round a very narrow central cavity, but do not unite in a central point; the ovary, therefore, consists of a single loculus, but with five radiating sinuosities. The ovules are numerous, and are borne on parietal placentæ at the ventral sutures of the carpels. The *capsule* is membranaceous, deeply 5-lobed, and almost resolved into five follicles, cohering by their ventral sutures. *Seeds* minute, with abundant fleshy albumen, and a small dicotyledonous orthotropous embryo in its base.

Plate XIII., Fig. 1. Raceme of *Greyia Sutherlandi*.—Fig. 2. Leaves in situ; both of the *natural size*.

Plate XIV., Fig. 1. A flower.—Fig. 2. The same, with the petals removed.—Fig. 3. Back view of the calyx; *natural size*.—Fig. 4. A petal.—Fig. 5. The ovary, surrounded by the nectaroid cup of barren stamens.—Fig. 6. Portion of the cup, with one of the inner, free, fertile stamens.—Fig. 7. Cross section of the ovary.—Fig. 8. Section of one of the inflexed carpels, to show insertion of ovules.—Fig. 9. The five connate capsules, subtended by the calyx.—Fig. 10. Section of a seed.—Fig. 11. Embryo; *the latter figures variously magnified*.

My first knowledge of this very remarkable plant was derived from Dr. Sutherland's specimens; nor can I find, on inquiry, that any botanist or botanical collector has previously noticed it. This is the more extraordinary, because, as Dr. Sutherland informs me, it is found in several parts of the Natal Colony, where Drege, Krauss, Wahlberg, and Plant largely collected, and must be so conspicuous, with its rich clusters of large crimson flowers, that it could not escape the most casual observer. To Dr. Sutherland, also, I am indebted for the information that a sketch of it is given in Captain Gardiner's "Travels in the Zooloo Country" (Plate II., Fig. 2), alluded to in these words at page 305 of the "Travels:"—"While toiling up a very steep ascent this afternoon, I observed a remarkable tree, about the size of a large apple-tree, growing near the bank. From the circumstance of its bearing a reddish blossom, and being totally divested of leaves, I at first mistook it for the Umseensi; but on a nearer inspection I found that the blossom was of a deep cherry or blood-red colour, and am inclined to believe that it is a species little known. The Fig. No. 3, Pl. III. [*sic*], from a sketch taken at the time, will probably assist the botanist in deciding this point." This is the whole information furnished by Captain Gardiner, and it is scarcely necessary to add that no botanical opinion can be formed either on it or on the figure quoted; nor without Dr. Sutherland's guidance should I have even guessed at the traveller's meaning. It is greatly to be regretted that intelligent travellers in new countries should be so ignorant of botany and of the simplest botanical terms.

The botanist will at once perceive, on reading the generic character, as above given, that Greyia does not exactly fall under any established natural order, as usually limited; nevertheless, that it agrees

in many points with the multiform assemblage that embraces Saxifragaceæ in its widest sense, including therein, besides the proper Saxifrages, the Droseraceæ, Brexiaceæ, Cunoniaceæ, Escaloniaceæ, &c., yet it will fall under none of these sub-orders, though partaking of the characters of each. From Brexiaceæ, which it greatly resembles in the structure of its andrœcium, and the outward appearance of the ovary and style, as well as in the calyx and corolla, it differs, in having a unilocular ovary, with parietal placentæ, and abundant albumen in the seeds. The alternate leaves, simple style, and placentation, separate it from Cunoniaceæ; the placentation and free ovary, from Escaloniaceæ; lastly, though differing so greatly in habit from Droseraceæ, it agrees with that sub-order in placentation, and in the glandular exudation of its leaves. The leaves and their glands are, however, much more like those of a Ribes, or of one of the scarlet Pelargoniums of the section Ciconium. At present, all things duly considered, I place it as the type of a sub-order in Saxifragaceæ, standing next Brexieæ.

I am happy to be able to add, that healthy plants of it are now growing in the Botanic Gardens, Glasnevin, having been raised by Mr. Moore from a few seeds sent by Dr. Sutherland. A more interesting addition to our conservatory shrubs has not been made for many years.

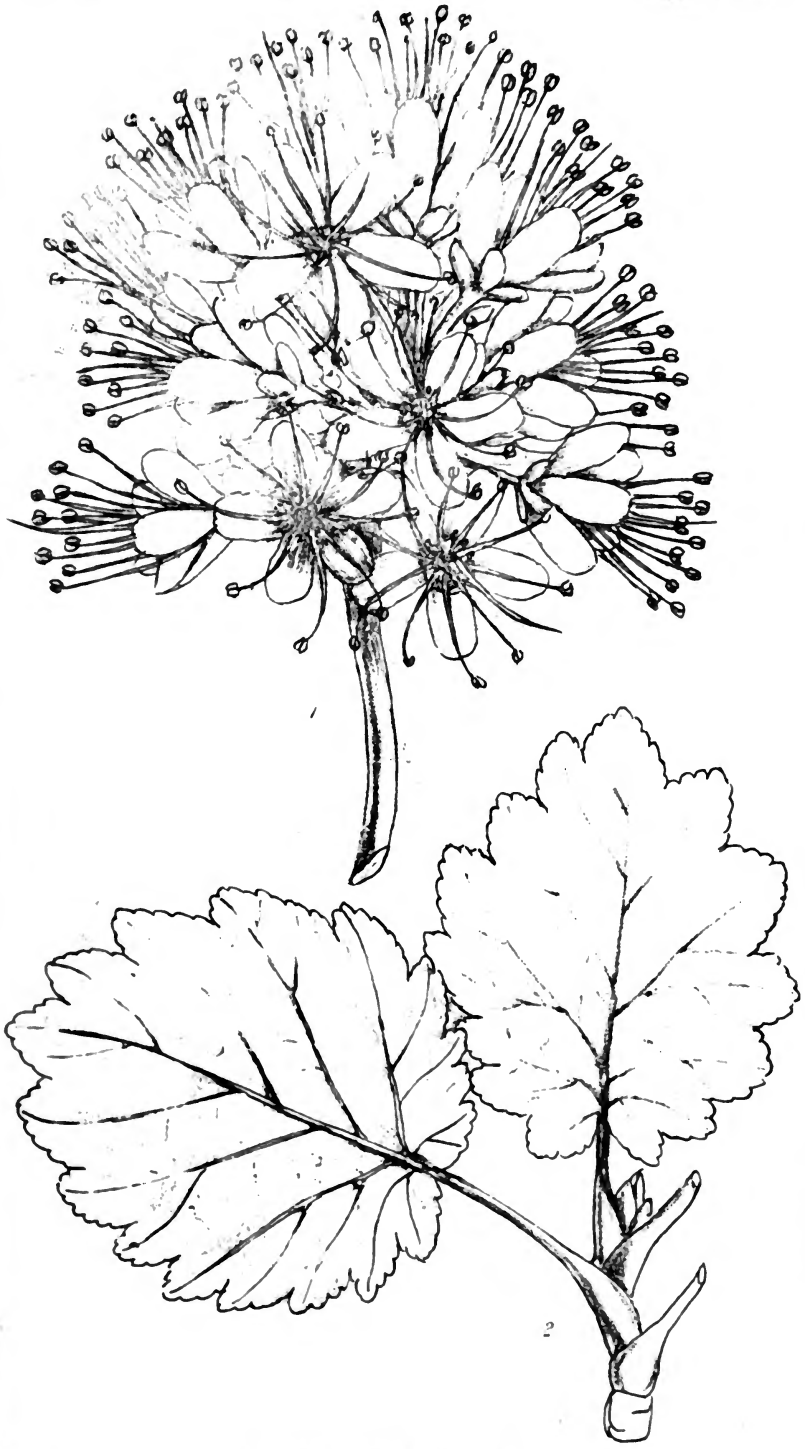
The next plant to be noticed is a new species of Sterculia, discovered by Dr. R. C. Alexander, F.L.S., in a narrow "kloof" (or gully) of the Vanstaaden Mountains, close to the town of Uitenhage, in a neighbourhood rendered famous among botanists by the explorations and long residence of Mr. Charles Zeyher, one of the ablest of South African collectors. Yet this Sterculia, though a tree, has escaped his notice, and probably, therefore, it is of very rare occurrence. Dr. Alexander observed but a solitary trunk, and that in a remote gorge of the mountains. The following character will suffice to distinguish it:—

Sterculia *Alexandri* (*Harv.*): foliis digitatim compositis quinatis; foliolis oblongis obtusis mucronulatis basi acutis glabris reticulatis; racemis pauci-floris petiolo brevioribus; calyce campanulato 5-7 fido utrinque puberulo. (Plate XV.)

Hab.: Mountain Kloof, near Uitenhage; Dr. R. C. Alexander.

A small tree, with a thick stem, and soft, spongy wood; the leaves crowded near the ends of the branches.

It is obviously related to *S. fœtida*, a common species in tropical Asia; but in that the leaflets are acuminate, the racemes long and lax,



Greyia Sutherlandi

J. J Whittle A.L.D C.E
33 Parliament St London
and Dublin Lith

W. H. H. del


BRITISH MUSEUM
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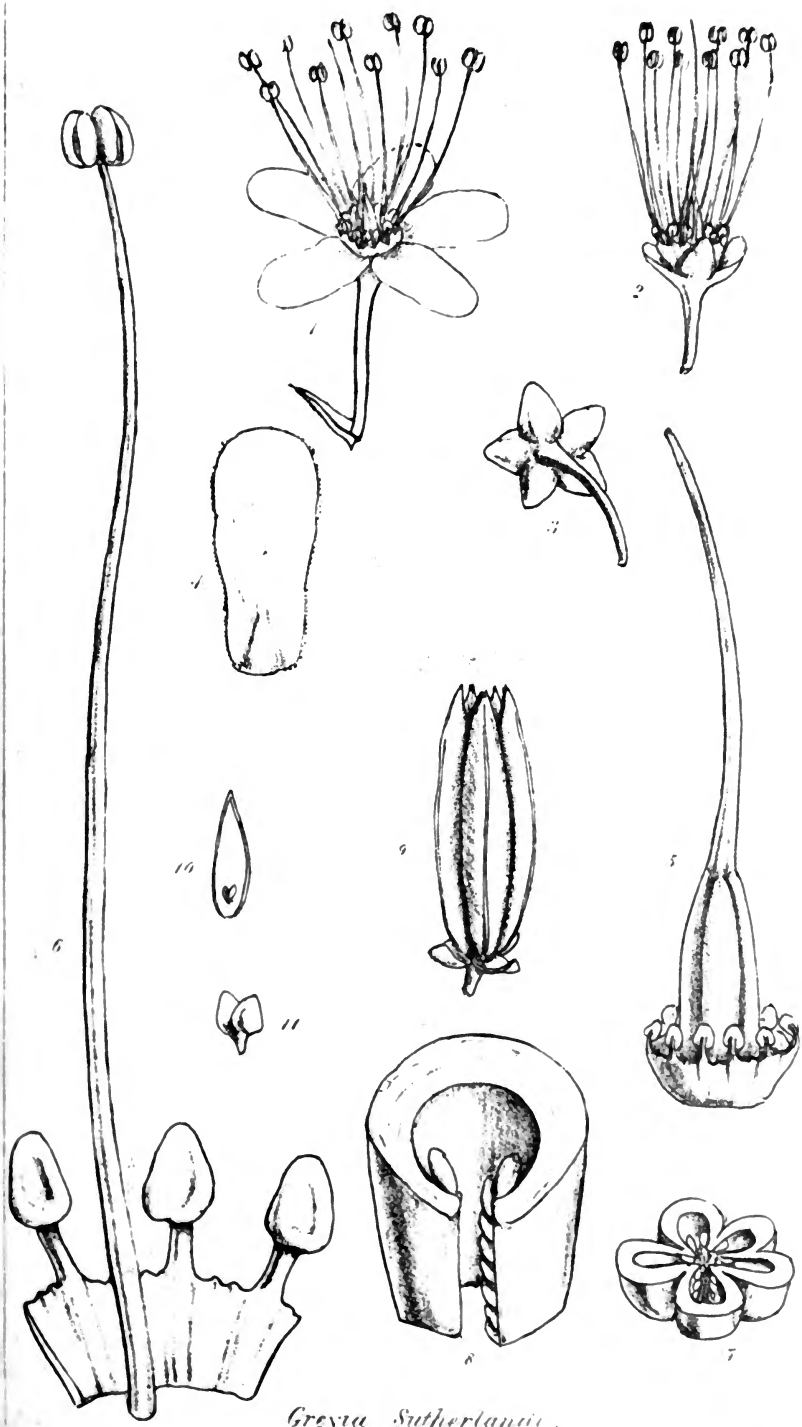

Grevia Sutherlandii

J. J. White. LL.D. & E.
35 Parliament St. London
and Dublin. Lith.

W. H. H. del.


BRITISH MUSEUM
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Pl. 15.

Sterculia Alexandri.

J. I. Whitty LL.D. C.E.
37 Parliament St London
and Dublin Lith.

W. H. H. del.


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NATURAL HISTORY

Anagallis Huttoni.

W. H. H. del.


BRITISH MUSEUM
NATURAL HISTORY.

and the calyx densely tomentose on the inner surface. No other species of Sterculia has hitherto been detected in South Africa.

Plate XV., Fig. 1. *Sterculia Alexandri;* the *natural size.*—Fig. 2. The staminal column, and one of the segments of the calyx, *magnified.*

I shall at present conclude by describing a new and very distinct species of Anagallis, sent by Mr. Hutton, and thus characterized:—

Anagallis *Huttoni* (Harv.): caulibus tetragonis decumbentibus v. basi repentibus simpliciusculis, foliis rotundato-ovatis obtusis petiolatis, pedicellis folio longioribus, sepalis lanceolatis, corollæ rotatæ laciniis acutis, filamentis late-subulatis pilosis. (Plate XVI.)

Hab.: Howison's Poort; Henry Hutton, Esq.

A slender, herbaceous, decumbent *perennial* (?), with long, trailing, simple branches, and white flowers. It has much the habit of *A. arvensis*, but differs in the decidedly petioled leaves, acute lobes of the corolla, and (probably) perennial root, &c. In the leaves it agrees with *A. tenella*, but differs in all other characters. I can find no described species to which it can be referred, and have much pleasure in naming it after its discoverer, to whom I am much indebted for numerous interesting specimens of Cape plants, and from whose explorations of the frontier more may be expected. This graceful little plant recommends itself to notice, as well by its intrinsic beauty, as from being an addition to the South African Primulaceæ—an Order only previously represented in extra tropical South Africa by one Lysimachia, two Samoli, and *Anagallis arvensis*—the latter probably introduced from Europe.

Plate XVI., Fig. 1. *Anagallis Huttoni;* the *natural* size.—Fig. 2. A corolla laid open, bearing the stamens.—Fig. 3. A stamen.—Fig. 4. Pyxidium and calyx.—Fig. 5. A leaf; the latter figures variously magnified.

Professor J. R. Kinahan, M. D., M. R. I. A., then read the following:—

NATURAL HISTORY NOTES IN DEVON AND CORNWALL.

During a hurried visit paid to Cornwall and South Devon, a few interesting facts came under my notice, which I would wish to place on record in the Proceedings of the Association, as bearing on a subject which at present is assuming some importance among naturalists, viz., the distribution of the lower forms of animal life in the British isles.

The greater part of the observations were made in company with C. Spence Bate, F. L. S., to whose kindness I am indebted for the identification of most of the amphipodous Crustacea noticed, and most of which were obtained in a dredging excursion in company with him and Dr. Hugh Falconer, the Rev. Mr. Everest, and Dr. Dansey, in the harbour and roads of Plymouth, within the Breakwater, on the 22nd of April last.

The results afforded deserve to be noted, as the ground is similar in its nature to the ground over which most of my Dublin work has been done, and, therefore, allowing of a comparison being drawn between these two localities.

The nature of the grounds over which we dredged were as follows :—

1. Muddy black sand: here we obtained *Gebia deltura* (one specimen). *Ophiocoma bellis*, *Comatula rosacea*, and a few other species.

2. Shingle free from mud or sand; from hence the more remarkable species were—*Bernhardus Hyndmanni*, *B. Thompsoni*, *B. lævis*, *B. Cuanensis*, *Bernhardus streblonyx*,—all, however, except the last, much rarer than in similar grounds in Dublin. *Inachus Dorsettensis*, tolerably common; *Hyas coarctatus*, one specimen; *Eurynome aspera*, common; *Pilumnus hirtellus*, common. *Portunus puber* and *P. depurator*, common. *P. holsatus*, one specimen. *Porcellana platycheles*, one specimen. *P. longicornis*, very common. *Galathea Andrewsii*, common, but rarer than in Dublin.

3. A Zostera bank, called by the boatmen the "Leek Bank." Here, in addition to *B. streblonyx*, *Port. depurator* and *puber*, single specimens of *Galathea squamifera*, *Crangon vulgaris*, and *Hippolyte* (*Lysippe*) *Cranchii*, occurred; and the only Isopod met during the day, *Idotea pelagica*. We took but one cast of the dredge here.

4. Ridges of slate, which were perpetually bringing up the dredge, required a long and strong pull to free it. Among these, in addition to Echinidæ, we met an old bone containing, safely ensconced within it, a female *Portunus arcuatus* in spawn. It was impossible to note the localities of the Amphipoda obtained, further than that they were more numerous than in Dublin Bay.

The following were among the rarities obtained:—*Gammarus* (?) *pallidus*, *G. obtusatus*, *G. Othonis*, and two undescribed species (of which Mr. C. Spence Bate will send an account hereafter), *Lembos Websterii*, *Ampelisca typicus*.

During the course of the day we landed on the Breakwater, and I was much struck by the immense numbers of Allorchestidæ—a family which has never occurred to me in Dublin. *Allorchestes imbricatus* swarmed all along high water-mark.

The following Echinodermata occurred:—

Comatula rosacea.—Very common.
Ophiura texturata.—Not so common as in Dublin.
Ophiocoma granulata.—One specimen; a perfect pest in Dublin.
Ophiocoma rosula.—Not so common as in Dublin.
Uraster glacialis.—One small specimen; common in Dublin.
Uraster rubens.—Common.
Cribella oculata.—Three specimens; very common in Dublin.
Asterina gibbosa.—One specimen on Leek Bank; not met in Dublin.
Echinus miliaris.—Two or three specimens.
Echinus sphæra.—One young specimen. We were not dredging on ground where this species generally abounds; they grow to a very great size off this coast, 13 or 16 inches in circumference.
Amphidotus cordatus.—One specimen.

This group, on the whole, was remarkably deficient as regards *number of specimens*, as contrasted with Dublin Bay dredgings.

I spent several days examining the littoral zone which supplied the following:—*Orchestia littorea*, and *O. lævis*, abundant; *Allorchestes Danai*, common; *Talitrus locusta*, not rare; *Ligia oceanica*, *Porcellio scaber*, and *Philoscia muscorum*, abundant.

There were well-marked differences in the distribution of the aquatic species of this zone, especially at the borders of the Laminarian zone; not merely as contrasted with those which occur in Dublin Bay, but also in the case of those which are found at Valentia Island, the difference in the latter case being probably due to the fact of the influx of the Plym.

Carcinus mænas.—Abundant.
Cancer pagurus.—In great abundance, markedly more so than in Valentia or Dublin.
Pilumnus hirtellus.—The *common crab* of the beach; extremely rare both in Dublin and Valentia.

Porcellana platycheles.—In about equal abundance as at Dublin and Valentia.

Porcellana longicornis.—Rather rare; very common in Dublin and Valentia.

Portunus puber.—Much commoner than in Dublin, and about as common as in Valentia.

Portunus arcuatus, so common as a littoral species in Valentia, not found here as such, while the following, which are common in Dublin, were not met with:—*Palæmon squilla*, *Hippolyte varians*,* *H. Cranchii*.* *Xantho florida*, also a common littoral species in Valentia, does not occur here, except in deep water, and I was told was nowhere abundant along the coast. Can this be a Lusitanian form?

To one who had never explored these southern shores the extreme littoral zone furnished a most remarkable sight:—Several species of Tunicata regularly festooning the rocks and squirting water over you at every step;—great bunches of a sponge (*Grantia compressa?*) and of Polyzoa overhanging every nook and cranny, which were lined with a cirriped (*Chthalamus punctatus*), not found in Dublin, as far as my knowledge goes;—and, to make the scene more striking in every sense, the rock bored on every side by colonies of *Saxicava rugosa*, all contributing their share to the involuntary shower-bath which the adventurous explorer was compelled to undergo in his researches after the treasures of this shore. I regretted that the short time at my disposal precluded my examining more fully the species found here. Idoteas were rare as contrasted with Dublin; there were but few pools suited for them. I met *Dexamine spinosa*, *Gammarus locusta*, *Amphitoe littorina*, in abundance.

Accompanied by my host, I took a short trip into Cornwall, as far as Polperro, passing through Millbrook, Craft's Hole, and Looe.

Many features of the Botany were remarkably striking. The immense profusion of *Asplenium Adiantum nigrum*, which, interspersed with *Lophodium affinis* and *Scolopendrium vulgare*, completely swathe the steep hedge-rows of the district, unlike anything I had ever seen in Ireland, except in the county of Waterford. The profusion of plants, either unknown as indigenous in Ireland, or else extremely rare, such

* Both these species occur not uncommonly elsewhere in this district.

as the lesser Dodder, which purpled the furze near Polperro; the common parsley, which grows abundantly in the town itself; the purple orchis (*O. mascula*), which abounded along the road side; the dog mercury; several species of Galliaceæ, and many other plants which had not as yet flowered,—made me regret I had not more time to examine the quaint old hollow lanes of this interesting county.

Near Polperro, facing the sea, just outside the town, I met *Asplenium lanceolatum* growing in great abundance; its mode of vernation very distinct from that of its ally, *A. Adiantum nigrum*, *A. Ruta muraria*, *A. trichomanes*, *A. marinum*, *Lophodium multiflora*, *L. Fœnesecii*, and *Athyrium Filix fœmina*, were all abundant. Near Millbrook, on the top of a wall, was a large mass of the sinuated form of *Polypodium vulgare*, as strongly marked in its characters as the specimen first described from the Dargle, county of Wicklow.

We had not passed far on our journey before a dead adder on the road reminded us that we were within the range of the Germanic species of Vertebrates, a fact which the numerous mole earths ridging the pastures and corn-fields on every side of us, and the numbers of blackcaps and redstarts singing and flying about, also confirmed. We did not see any snakes or other reptiles, except one viviparous lizard.

The chief object of our trip was for the purpose of examining the collection of the father of Cornish zoology, Dr. Jonathan Couch, F.L.S. He liberally allowed me to examine an unequalled series of drawings of the fishes of the coast, many of which are unique. He also showed us drawings of many rare Crustacea which have passed through his hands, and accompanied us to the house of a most enthusiastic zoological collector, Mr. William Loughrin, on whom I would strongly recommend every zoologist who may visit this locale to call. Through him, in addition to much valuable information, I was enabled to obtain some very rare Crustacea, such as *Portunus longipes*, &c., which have hitherto only occurred on the south coast. His mode of preparing animals, particularly the skeletons of fishes, I have never seen surpassed, and seldom equalled, and his charges are most moderate. He also showed me a most ingenious mode for capturing the lesser crustacea by means of two large corks, such as are used as floats for nets, which he pegs together loosely, and anchors in deep water; this is left down for some months, till overgrown with ulva, &c., and then, on separating the corks, numerous small crustacea will be found ensconced in it, such as *Nebalia bipes*, &c.

In the gardens of the inn at Polperro, *Philougria riparia* is not uncommon; *Porcellio scaber*, *Oniscus fossor*, *O. murarius*, and *Philoscia muscorum*, as usual, abundant. I was surprised not to be able to find *Porcellio pruinosus*, so abundant in Kent, although I searched several likely localities.

In returning home we took the Cliff-road, and at Talland Cove spent a few moments examining the supra-littoral zone (the tide being nearly full in). Here, as might be expected, *Ligia oceanica*, *Porcellio scaber*, *Philoscia muscorum*, and *Orchestia littorea*, were abundant; but I was much pleased by also meeting with a Philoscia new to me, and also undescribed in the books. This I have named *Philoscia Couchii* (*vide* "Proceedings, Dub. Nat. Hist. Soc.," vol. i. p. 111, "Nat. Hist. Review," vol. v. p. 195), in memorial of one of the pioneers in the study of the zoological geography of England, and of a few pleasant hours spent in his company. The species appeared abundant, and the following description of the spot where it occurred may probably aid others in finding it. Having descended the hill from Polperro, you cross the stream which drains an extensive osier marsh; the road then turns up a narrow ferny lane, into a very heavy hill; instead of turning up this lane, keep straight on from the bridge, and a few yards brings you up at the foot of the cliff. Here, amongst the loose stones and sea-weed carried up by the high tides into the clefts of the slate rocks, in company with the other Oniscoids and many Myriopoda, *Philoscia Couchii* will be seen hiding among the shingle, and easily distinguishable from *P. muscorum*, which also occurs, by its uniform colour.

At Looe, *Philougria riparia* occurred abundantly among sticks along the river side. I looked carefully for *Phil. vivida*, but could not find it.

In and about Plymouth, the following was the distribution of the Oniscoids:—*Philougria riparia*, rare; *Philougria rosea* (added to our lists by C. Spence Bate), abundant in the gardens of that gentleman's house, and also in his cellars. *Philoscia muscorum*, *Porcellio scaber* and variety, *marmoratus*, *Oniscus murarius*, and *O. fossor*, all common. *Ligia oceanica*, very common.

I did not pay much attention to the Mollusca, but the following Helices are tolerably abundant:—*Helix virgata*, *H. fusca*, *H. aspera*, *H. caperata* (Devil's Point). *Helix hortensis* and *H. nemoralis* are by no means rare in the Cornish lanes. Several of the latter sported the white lip which led Forbes from the examination of shell specimens in

collections to fall into the error of uniting the two species, but in all the specimens which I obtained the coarse texture of the animal, and the colour and texture of the foot, proves the distinctness of the animals; and specimens of *H. nemoralis* with white lips, obtained by me in August on the Antrim road, Carrickfergus, confirm this observation. Among the specimens of *H. hortensis* obtained were several of the curious Albino variety, in which the glands of the mantle not secreting any colour, translucent bands pass along the whorls of the shells.

An examination of the original specimen of *Pagurus Dilwynii* (Spence Bate), in that gentleman's possession, enables me to point out another distinction between this species and all the British Paguriform Anomoura which I have had an opportunity of examining, viz., the form of the scale at the base of the eye, which in sp. *Bernhardus*, *Thompsoni*, *lævis*, *Prideauxii*, *Cuanensis*, *Hyndmanni*, and *Ulidianus*, is invariably entire along its outer edge, and the scales of opposite side divergent, whilst in *P.* (?) *Dilwynii* these parts are triangular, strongly denticulate along upper outer margin, the inner edges parallel, and closely approximating, exactly as in many species of the genus Paguristes of Dana. It evidently belongs to a distinct genus from the other species of Paguroid Anomoura found on the British coasts.

The following shows the species of Crustacea met with during my visit; it of course gives only an imperfect idea of the Crustacea of the neighbourhood:—

LIST OF SPECIES.

(D., dredged; L., littoral; T., terrestrial.)

Inachus Dorsettensis, D.
Hyas coarctatus, D.
Eurynome aspera, D.
Cancer pagurus, D. and L.
Pilumnus hirtellus, D. and L.
Carcinus mænas, L.
Portunus puber, D. and L.
,, arcuatus, D.
,, depurator, D.
,, holsatus, D.
Bernhardus streblonyx, D. & L.
,, Cuanensis, D.
Bernhardus Hyndmanni, D.
,, lævis, D.
,, Thompsonii, D.
Porcellana platycheles, D. & L.
,, longicornis, D. & L.
Galathea squamifera, D.
,, Andrewsii, D.
Gebia deltura, D.
Homarus vulgaris.
Crangon vulgaris, D.
Hippolyte Cranchii, D.
Mysis chamæleon, L.

Talitrus locusta, L.
Orchestia littorea, L.
,, lævis, L.
Allorchestes Danai, L.
,, imbricatus, L.
Montagua monoculoides, D.
Ampelisca typicus, D.
,, Bellianus, D.
Dexamine spinosa, L.
Lembos Websterii, D.
Gammarus locusta, L.
,, Othonis, D.
,, pallidus, D.
,, obtusatus, D.
Amphitoe rubricata, L.
Amphitoe littorea, L.
Ligia oceanica, L.
Philoscia muscorum, L. and T.
,, Couchii, L.
Philougria riparia, T.
,, rosea, T.
Oniscus murarius, L and T.
,, fossor, L. and T.
Porcellio scaber, L. and T.
,, ,, var. marmoratus, L. & T.
Armadillium vulgare, T.
Idotea pelagica, D.
,, tricuspidata, L.

Mr. Bain exhibited a specimen of the Water Chestnut (*Trapa natans*); also some plants of *Bossiæa Preissii*, raised from seeds presented by the Archbishop of Dublin, to whom they had been sent from Australia.

Mr. E. Burchall exhibited a collection of foreign Lepidoptera from Demerara.

The Meeting then adjoured to the 21st of June.

FRIDAY EVENING, JUNE 21, 1858.

PROFESSOR W. H. HARVEY, M.D., F.R.S., F.L.S., VICE-PRESIDENT, in the Chair.

THE Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

The REV. EUGENE O'MEARA, A.M., then read the following—

CONTRIBUTIONS TOWARDS A CATALOGUE OF DIATOMACEÆ OF THE COUNTY OF DUBLIN (SPECIES OBTAINED AT MALAHIDE AND PORTMARNOCK).

THE author stated that he had been engaged for some years in investigating the Diatomaceous Flora of the county of Dublin. At a previous meeting (*vide* page 62, *ante*) he had laid before them a list of fresh-water forms which he had discovered in Lord Powerscourt's demesne, which

lay on the very borders of the county of Dublin. This evening he would wish to place on record the following list of marine forms, chiefly from Malahide. On future occasions he would contribute supplementary lists, hoping that the time was not far distant when the Association would be enabled to print a Dublin Flora and Fauna.

Achnanthes longipes, *a*
,, ,, *γ*.
,, brevipes.
Actinocyclus undulatus.
Amphipleura sigmoidea.
Amphiprora alata.
,, didyma.
Amphitetras antediluviana.
Amphora ovalis.
,, membranacea.
,, affinis.
Bacillaria paradoxa.
Biddulphia aurita.
Biddulphia pulchella.
,, rhombus.
,, turgida.
Campylodiscus parvulus.
Cocconeis diaphana.
,, scutellum.
,, ,, *β*.
Coscinodiscus minor.
,, radiatus.
Diatoma elongatum.
,, grande.
Epithemia constricta.
,, musculus.
,, Westermanni.
Eupodiscus sculptus.
Gonphonema marinum.
Grammatophora marina.
,, serpentina.
Himantidium Soleirolii.
Isthmia nervosa.
Melosira nummuloides.
,, subflexilis.
Navicula ambigua.
,, convexa.
,, didyma.
,, elliptica.
,, elegans.
,, Jennerii.
,, inflata.
,, minutula.
,, ovalis.
,, palpebralis.
,, punctulata.
,, rhyncocephalus.
,, Westii.
Nitzchia angularis.
,, bilobata.
,, sigma.
,, spathulata.
Odontidium Harrissonii.
,, mesodon.
Orthosira marina.
Pinnularia cyprina.
,, distans.
,, peregrina.
Pleurosigma angulatum.
,, æstuarii.
,, balticum.
,, fasciola.
,, hypocampus.
,, quadratum.

Pleurosigma strigosum.
Podosira hormoides.
,, maculata.
Rhabdonema arcuatum.
,, minutum.
Rhipodophora paradoxa.
Schizonema cruciger.
,, comoides.
Schizonema Smithii.
,, parasiticum.
Stauroneis pulchella.
,, salina.
Surirella fastuosa.
,, gemma.
,, ovata.
,, ovalis.
Synedra arcus.
,, affinis.
,, radians.
,, ulna.
,, Vaucherii.
Tryblionella acuminata.
,, marginata.
,, punctata.

Not described by Smyth.

Amphiprora complexa (*Greg.*)
,, maxima ,,
Amphora quadrata ,,
,, proboscidea ,,
Denticula nana ,,
Epithemia marina (*Donkin*).
Navicula granulata (*Bréb.*)
,, rectangulata (*Greg.*)
,, lyra ,,
Nitzchia virgata (*Roper*).
Pinnularia late-striata (*Greg*).
Pleurosigma Wansbeckii (*Donkin*).

Professor J. Reay Greene, Honorary Secretary, read a paper, of which the following is an abstract:—

ON THE BRITISH SPECIES OF THE GENUS EQUOREA.

In the late Professor E. Forbes's "Monograph of the British Naked-eyed Medusæ" there occurs no mention of any species belonging to the genus Equorea. Since the publication of that work, however, four British species of this genus have been figured and described, viz.:—

1. *Equorea Forskalea* (*Peron*). First ascertained by Professor Forbes to be an inhabitant of the Scottish seas (*vide* "Proc. Zool. Soc.," Nov. 1851).
2. *Equorea vitrina* (*Gosse*).
3. *Equorea Forbesiana* (*Gosse*).

These two species, previously undescribed, were obtained by Mr. Gosse on the coast of North Devon (*vide* "Devonshire Coast," pp. 340–8).

4. *Equorea formosa*, described by the author in his paper on the "Acalephæ of Dublin Coast" (*vide* "Nat. Hist. Rev.," vol. iv., p. 245).

To these may be added a fifth species, first discovered by the author in Dublin Bay, and since found by him on several parts of the south-west coast of Ireland. The umbrella of this Equorea varies in shape, being in some specimens almost discoidal, whilst in others it is campanulate and convex. The sub-umbrella is about half the height of the disk. The central polype is exceedingly simple in structure, apparently consisting of two regions, from the upper of which issue the gastro-vascular canals, which vary in number from eight to twelve, according to the size and age of the specimens selected for examination. The marginal tentacles are very numerous, and highly contractile, each springing from a pale tawny bulb, at the upper part of which is situated a conspicuous ocellus, of a black, or rather, perhaps, intensely dark violet, colour. To the naked eye these ocelli are invisible, but they serve to impart an exquisite roseate tinge to the margin of the disk. The reproductive glands occur as thickenings in the radiating canals, being usually placed in the neighbourhood of the central polype. It is probable that this Equorea is identical with some one of the numerous foreign species of the genus described by Peron, or Quoy and Gaimard; but the descriptions given by these authors, too often scanty and insufficient, together with the impossibility of obtaining access to the plates of Peron and Lesieur, renders this point difficult of determination. This Medusa is gregarious, occurring in considerable numbers in those localities where its presence has hitherto been detected. In size it does not exceed one inch in diameter.

Dr. Kinahan read the following communication:—

DESCRIPTION OF PANDALUS JEFFREYSII (SPENCE BATE, "FAUNA OF SWANSEA," 1850). BY C. SPENCE BATE, F.L.S., CORRESPONDING MEMBER.

Pandalus Jeffreysii (*Sp. Bate*).

P. rostro recto, superne pauce-dentato (7–8), infra binis dentibus, apice vicino, armatis.

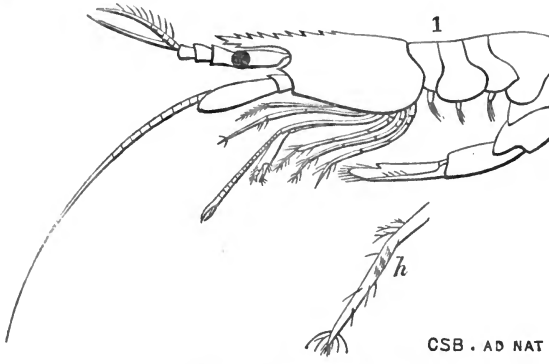
Jeffrey's Æsop, Prawn.

Rostrum not turned up at the extremity, armed above with eight teeth, the two posterior being separated by a space from the others, and two below not remote from apex.

This animal in general form approximates to the Hippolytes. The rostrum is shorter than in *Pandalus annulicornis*, and directed in a straight line. Five of the six anterior teeth that surmount the rostrum are an-

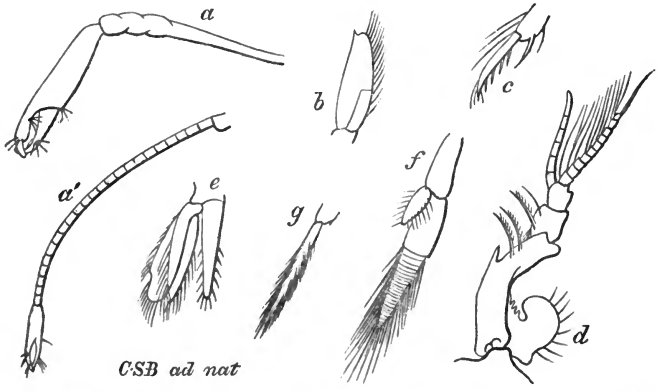
terior to the ophthalmic notch, and a space separates the two posterior from the rest.

The superior antennæ (*b*) have the secondary appendage much slighter than the flagellum. Upon the inner side, at the base of the first articulation of the peduncle, a squamiform plate is developed. The inferior antennæ have the peduncular scale (*d*) toothed upon the external margin of the apex.



1, P. Jeffreysii, enlarged; *h*, 1st foot.

The second pair of pereiopoda (ambulatory legs) have the leg (*a*) upon the right short and robust, that upon the left side (*a'*) long and slender, with a multi-articulate carpus. Telson (*e*) furnished on each side with from six to eight short spines.



a, Pereiopoda, 2nd pair, right; *a'*, do. do., left; *b*, external antenna; *c*, 3rd, 4th, 5th pereiopoda; *d*, internal antenna; *e*, telson; *f*, pleopod; *g*, 2nd gnathopod.

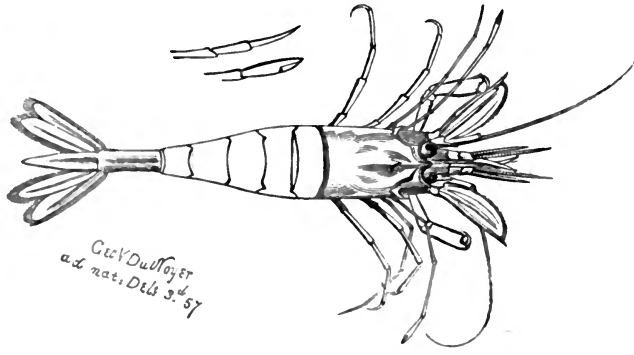
Habitat: Oxwich Bay, South Wales (C. Spence Bate); Moray Firth (Rev. G. Gordon); Plymouth Sound (Spence Bate).

Easily distinguished from *P. annulicornis* by the shortness and straightness of its beak, and from *P. leptorhynchus* by the straightness of the beak and difference of the tooth armature.

Dr. Carte exhibited a specimen of the *Lepidosiren annectens*, brought from the Gambia by Lieutenant Dunn. It had lived in confinement for some time, and, among other peculiarities noticed, it was constantly in the habit of coming to the surface of the water, and taking in a fresh supply of air. A small portion of the tail had been abraded, and was covered with the *Saproglenia ferox;* otherwise, the animal appeared in good health.*

[Dr. Kinahan presented specimens of *Crangon Allmanni* to the University Museum.

This new species had been recently discovered by him at Bray, county of Wicklow, and has been fully described in the "Proceedings of the Dublin Natural History Society."† The following were the specific characters:—



CRANGON ALLMANNI (*mihi*).

"C. *Crangone vulgari* affinis. Rostrum frontale brevie. Carapax lævis, spinis tribus armatus, una brevissima regione gastricâ mediană,

* This specimen is still alive, and has quite regained its health; it is at present in the Gardens of the Royal Zoological Society, March 1, 1859.

† *Vide* "Natural History Review and Quarterly Journal of Science," vol. iv., p. 80

duæ regionibus branchialibus insitæ. Abdominis articulus sextus suprà canaliculatus, ultimus supra-sulcatus, dentibus binis utrinque armatus, infra dentibus minutis prætextus. Pedum par primum subcheliforme, brachium. Maribus spinâ sternale brevissimâ, fœminis obsoletâ. Colore albus-cærulescens rufis et aureis punctis maculatus."

Habitat: "Zonam corallinam Maris Hibernici juxta 'Bray,' comitat: 'Wicklow.' Longit, unciæ tres."

Channel-tailed Shrimp.

Spec. Char.—Carapace smooth, excepting a small spine on the median line of gastric region, and one on each branchial; second pair of legs as long as third; sixth segment of abdomen deeply channelled above; channel continued as shallow sulcus on terminal segment; third joint of anterior pair of legs spined; a minute spine between insertion of second pair of legs in males; in the female spine, obsolete.

The colour is bluish gray, dotted over with brown and red. Length of specimens, 1·5 to 3 inches.—*E. P. W., Director, Univ. Mus.*]

The Chairman then declared the Association adjourned for the Session.

SESSION 1858–59.

FRIDAY EVENING, OCTOBER 15, 1858. (STATED MEETING.)

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., F.R.S., VICE-PRESIDENT, in the Chair.

THE Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

DR. E. PERCEVAL WRIGHT, Hon. Sec., then read the following—

REPORT FROM COUNCIL.

YOUR Council, while congratulating the Members on the commencement of this, the Seventh Session of the Dublin University Zoological and Botanical Association, would briefly review the Proceedings of the last Session for 1857–58, which has been distinguished as the one in which Graduates of this and the sister Universities have been admitted as Ordinary Members, and in which we have been enabled for the first time to print our Proceedings in a separate form. The General Meetings have been on each occasion well attended, many of the Papers read having been of an interesting character. For full details of the Papers we refer to the published Proceedings: fifteen of these were devoted to zoological, and eight to botanical subjects, which, with the Address of the Rev. Professor Haughton at the opening of the Session, and the Memoir of the then late President by Robert Patterson, M. R. I. A., make a total of twenty-five, or an average of three papers at each meeting.

Upwards of five-and-twenty species new to science have been described in the Papers read at the General Meetings, the greater number of which have been published with illustrations in the Proceedings.

The exhibition of various new or rare plants and animals has contributed in no slight degree to the interest of our Evening Meetings; and your Council consider the thanks of the Association due to Mr. Bain, Curator of the College Botanic Gardens, for his kindness in constantly exhibiting many rare and valuable specimens.

For a list of the works, &c., added to the Library, your Council

would refer to the Librarian's Report (Appendix III.); but they would desire to direct your special attention to the valuable donation of the Geological Map of Ireland, presented by Sir Richard Griffith, Bart., LL.D. Your Council also cannot but feel that the special thanks of the Association are due to the Provost and Senior Fellows for their liberal grant of £25 towards the illustration of original Papers contributed to the Proceedings, which, without this aid, would have been very imperfectly illustrated. This sum of money has enabled your Council to publish fifteen plates, representing thirty objects of natural science, together with several woodcuts.

Your Council would congratulate the members on the appearance of the First Part of the Proceedings, containing 130 pages, with nine plates and three woodcuts; and they have every confidence that by thus publishing your Proceedings, they have taken the best and surest means, not only of increasing the number and value of the Papers that will be read before the Association, but also of increasing its importance, both at home and abroad, and of adding to the Library (by exchanges) the proceedings and transactions of various important scientific societies. They trust that Part II. will be in the hands of the Members early in December next; it will contain the Papers read at the May and June Meetings in the past Session, and those read in October and November of the present.

To enable them to conduct the Journal in a manner worthy of the University and Association, they would appeal to the Members to exert themselves to procure additional members. There appears no reason why the list of the Ordinary Members should not approach 90 or 100 members, and as the incidental expenses of the Association do not exceed a sum of £25 per annum, there would be, should we reach that number, a large margin, not only to provide for the Library, but also to print and fully illustrate all our Proceedings. The Council would also ask the co-operation of the Associate and Corresponding Members by their subscribing towards the Publication Fund.

In conclusion, your Council have reason to hope that the present Session, from the promises of Papers they have already received, will prove equally, if not more interesting than any that have preceded it.

The adoption of this Report was moved by the Rev. Eugene O'Meara, A. M., seconded by J. Irvine Whitty, LL. D.

After the Treasurer's (Appendix IV.) and Librarian's (Appendix III.) Reports for the last Session had been read and adopted, the election for Officers and Council for the ensuing Session was proceeded with, when the following were declared duly elected:—

PRESIDENT.—Professor W. H. Harvey, M. D., M. R. I. A., F. R. S., F. L. S., &c.

VICE-PRESIDENTS.—Alexander H. Haliday, A .M., M. R. I.A., F. L. S., &c., and Rev. Professor S. Haughton, A. M., F. T C. D., M. R. I. A., F. R. S., &c.

HONORARY TREASURER.—Rev. Thaddeus O'Mahony, A. B.

HONORARY LIBRARIAN.—W. B. Brownrigg, Science Sch. T. C. D.

HONORARY SECRETARIES.—Joseph Reay Greene, Professor of Natural History, Queen's College, Cork; and E. Perceval Wright, A. B., M. B., M. R. I. A., Lecturer on Zoology in the University of Dublin.

BOTANICAL COMMITTEE.—Rev. Eugene O'Meara, A. M. (*Chairman*); William Archer (*Council*); John Bain, Curator of the College Botanical Gardens; Robert Callwell, M. R. I. A.; David Moore, A. L. S.; and E. Perceval Wright, M. B. (*Secretary*).

ZOOLOGICAL COMMITTEE.—Alfred Furlong, M. R. I. A. (*Chairman*); Rev. S. Haughton, A. M., V. P.; Alexander Carte, A. M., M. B.,; A. H. Haliday, A. M., V. P.; J. R. Kinahan, A. B., M. D. (*Council*); Joseph Reay Greene (*Secretary*).

COUNCIL.—The President, the Vice-Presidents, the Treasurer, the Librarian, the Honorary Secretaries, Professor R. W. Smith, M. D.; Professor Ingram, LL. D.; Professor Stokes, M. D.

After which the President delivered the following—

ADDRESS.

GENTLEMEN,—It has hitherto been the general custom of your President, in taking the Chair for the first time, to offer a review of the various papers and notices which have been brought before the Association during the previous Session. If I depart from this time-honoured custom, adopted from older and larger societies than ours, and ask your attention instead to a few general remarks on the studies which have brought us together, I trust you will bear with me. It appears to me to be a needless reiteration to recapitulate matter so recently handled by the authors of the papers, and which, in our printed Proceedings, is, or ought to be, in the hands of all our Members. Whatever of value

has been brought before the Association will have found a permanent place in those Proceedings, and may be regarded as so much harvest reaped and gathered, and added to the general storehouse of zoological and botanical lore. Shall we ask ourselves, therefore, of what our harvest has consisted? what proportion of wheat there has been to our chaff? and what per-centage of profits returned for the capital invested or expended?

Such questions may be very proper for each of us to ask himself individually, in order to ascertain whether he has or has not been a useful member of the Association during the past year. But, as an incoming President, my business is less with the past than with the future. Neither my duty nor my inclination impels me to sift the wheat from the chaff in what has hitherto come before us. Time, the destroyer, will sweep away the chaff, the wheat will become matter of history. And, without particularly alluding to the papers of preceding sessions, whatever their per-centage of "the seed of immortality" may have been, we may be allowed to look forward in coming seasons to an increasing harvest. Our beginnings have been small; we have gradually increased, and are, I trust, now firmly established as an institution. Every year hitherto has added to the strength and vigour of our Association, and still there is abundant room for further growth and increased fruitfulness. Or, to shift the metaphor from botany, and give it a zoological turn, the originators of the Association provided in its construction the elements of a high organization. Its working parts were planned on a large scale, long before there was work for them to do. You have all noticed the apparent disproportion between the organs of a young pigeon before it has left the nest—the great scald head, the round staring eyes, the unwieldy and flabby body, and the legs and wings that have yet to learn their functions. The helpless nestling, if it were to remain in that condition, would excite only pity or disgust, as a misshapen monster; but as it continues to grow, the relation between its parts becomes fixed, the monstrosity disappears, and we then recognise a wise forethought that arranged beforehand the essential elements of a future being, destined to take the strongest and most rapid flight. So our framers, in giving us a President, Vice-Presidents, Treasurer, Librarian, Secretaries, Botanical Committees, Zoological Committees, and a Council, have certainly provided well for all future possible wants, and it only remains for the Members

of the Association, by keeping it well supplied with original Papers, to carry out its objects, and give employment to its numerous officers.

But yet, mere employment for a showy staff is not the proper function of our Society, and should not be its highest aim. We are not associated together merely for the purpose of passing an agreeable evening, giving and receiving information on subjects of natural history. This is certainly one motive for our assembling at stated periods. But the true objects of the Association are much higher: they are to develop a taste for natural history in the younger members of the University, to train up a succession of faithful observers, and, if possible, to found a school of Irish naturalists worthy of the old walls within which we meet, and of those honoured names who have preceded us in similar studies. We, who hold office in the Association, ought to consider how these several objects can be best carried out.

The first object, that of developing a taste for natural history, is attempted to be attained by our regular meetings, where original papers are brought forward and freely discussed; and which generally begin and end with pleasant social intercourse. When numbers are thus brought together by a common object, it can hardly fail but that some interest will be excited, and some taste for the subject discussed be developed. The University Museum, the Herbarium, and the Botanic Gardens are also, under efficient guidance, thrown open to the student, whose early difficulties can best be met by reference to such collections, and whose taste may be fostered by seeing what has already been done, and how much remains to do. Our next object, that of training up a succession of faithful observers, is necessarily second in order of time, and higher in aim. Taste for a subject must precede observation and study; and having acquired the taste, or motive power, the student often needs direction from experienced hands how he can best turn his powers to account. What class of observations are they which are most needed by the present state of natural history; and what can a student in a restricted locality, or with limited time, do towards contributing to the general stock? Are the student's endeavours to be wholly or chiefly directed to the discovery of new species, or of new habitats for the rarer kinds; or how else may he become a useful and original observer?

To answer all these queries fully would lead me too far. I must

content myself with a few casual hints on what a student should avoid, and what he may best pursue. Young observers are very apt to imagine that every varying form of animal or plant that presents itself is specifically different from the type from which it varies; and, in a limited locality, and with limited experience of variations, mistaken notions of species almost of necessity arise. This, which is true of young observers in almost every country, applies with equal force to older observers, who confine their labours to the contents of a single area. Hence, we find that a large per-centage of the bad species that incumber books of systematic botany have been introduced by authors acquainted only with the plants of the country they inhabited or described. The same plant occurring in different countries has acquired a different name in each, and thus a large synonymy has grown up to incumber the science. Many plants have a dozen, and several have twenty names, under which they are known in different places. The common Bracken (*Pteris aquilina*) is a well-known instance, not to speak of the bramble (*Rubus fruticosus*), whose name in many modern books is truly Legion. I doubt not that all departments of zoology would afford equally striking instances of redundancy, and therefore I would caution young observers not to be too hasty in proposing new names, and, above all, would impress upon them that the discovery of new species is not by any means the most important work of a naturalist. It is indeed right that we should know all the species in our Fauna and Flora, and therefore any novelty has a definite value; but the value of a new species, though always definite, is often small—as in cases where it is a mere addition of specific form, without perceptibly influencing the limits of a higher generalization—and at best the discovery of a species is the least fact in connexion with it. The man who claimed to have first observed the comet in England (you may have seen his strangely mis-spelt letter in the "Times") has certainly a degree of merit, but of a very different order from that of an astronomer who, by observing its path through a few constellations, can predict its times and seasons, and point out the whole of its course through space. Thus the man who first finds a new species deserves one kind of praise, and he who demonstrates its affinities or traces its development deserves another, and a far higher kind. A clown may pick up a nugget; none but a prince can transform it into a guinea. Any one may find any number of species; none but a naturalist can convert them into capital.

The young student cannot be supposed to have sufficient knowledge to demonstrate the affinities of the objects he may discover, but he ought to be able to observe characters instructedly in such a way that his notes may be available to others. Thus, he ought to be able, by the use of the exact language of Zoology or Botany, to give a description intelligible to any naturalist whose opinion he may afterwards consult. Such a description presupposes a knowledge of general structure—of comparative anatomy in Zoology, of organography in Botany—such as can only be acquired by careful study. Therefore, at the very beginning of his career, and before he can render his discovery of new species creditable to himself, the student must have acquired by study, either in the lecture-room or the field, a considerable amount of information.

And here I would observe, that this particular kind of preliminary knowledge, though attempted to be detailed in books, cannot be really learned, though it may be crammed, from books alone, or without the patient use of the knife or dissecting-needle, verifying on actual organisms the particular structures described in books. To get a useful idea of the mutual relations of the parts of any plant or animal, you must have seen a specimen, and examined it carefully; otherwise you have only a dreamy notion, such as one has of an Afreet or a Griffin, or any other creature of romance or of heraldry. The want of preliminary training in the use of the exact language of Zoology and Botany is a chief cause why so little is added by ordinary travellers to the general stock of our science. Unless the traveller actually brings home specimens of the curious or useful plants, or animals, he writes about, it is in most cases impossible to divine of what he is speaking. Dr. Livingstone mentions many valuable plants, met with in his great expedition, in such loose terms that none of them can be recognised but those few of which he contrived to bring home specimens, which were submitted to a botanist for examination. Messrs. Huc and Gabet, the enterprising explorers in Thibet, who passed over a vast tract of country previously untrodden by Europeans, from their profound ignorance of natural history or its terminology, have contributed nothing to our knowledge of the Thibetan Fauna and Flora, save vague shadowy pictures, such as that of "the tree of a thousand images." And so of many other travellers; but not so of Bruce, of Burchell, or of Humboldt, and more recently of Hooker. When these travellers speak of plant or animal, they give us either its

authorized name, or else afford us such an exact description that we recognise its place in the system before we have seen a specimen.

Let us hope that this Association will afford that degree of training to the student that may serve him in good stead, should he ever be called on, as a traveller in untrodden lands, to make known to others the marvels of the wilderness. We shall then have fulfilled an important part of our mission.

Lastly, as to the school of Irish naturalists which may spring from our nest, I shall say little. I have already ventured to compare this Association to a promising young pigeon. Now, there are various kinds of pigeons, all derived from one species, all laying similar eggs, and all having a resemblance in early growth; but as they grow older, the peculiarities of the variety are gradually assumed. We have, then, among others, the tumbler, the fantail, the pouter, and the carrier. Now, I trust that our future Irish school will neither be addicted to puffing like the pouter, to strutting like the fantail, or playing antics like the tumbler; but, like the carrier, the noblest of its race, will fly far and fly high, and return to its nest, this famous University, only to take a new flight, and to carry to the ends of the earth the treasures of wisdom and knowledge.

The Members then proceeded to ballot, the Rev. E. O'Meara being appointed as Scrutineer, when the following were declared duly elected :—

Ordinary Member :—The Right Hon. the Lord Chancellor, LL. D.

Corresponding Members :—Lucas Barrett, F. G. S., Woodwardian Museum, Cambridge; Joseph Hooker, M. D., F. R. S., Kew; R. M. Andrew, F. R. & L. S., London; Robert Garner, F. L. S., Stoke-upon-Trent.

Associate Members :—W. H. Baily, Palæontologist to the Museum of Irish Industry; Ryland Byron, 2, Fitzwilliam-place.

The Meeting then adjourned to the 19th of November.

FRIDAY EVENING, NOVEMBER 19, 1858.

Rev. Professor Haughton, A.M., F.T.C.D., F.R.S., Vice-President, in the Chair.

The Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

Dr. M'Donnell read the following remarks:—

ON THE URTICATING ORGANS OF ACTINIA.

In the course of last winter I had the honour of making a communication to the Association on the power exercised by the Actiniæ of our shores in killing their prey (see *ante*, page 55). I wish now, through the same medium, to correct the view which I was at that time led to adopt, this power is due to electrical influence.

In the communication alluded to, the idea of these creatures being electrical was based on the fact that when the nerve of a frog's limb, prepared after the manner of Matteucci's galvanoscopic frog, is seized by the tentacles of an Actinia, contractions of the muscles promptly ensue. It was admitted, however, that all attempts to produce deflection of the galvanometer needle had failed, and this being the very doubtful state of the question, I ventured to look forward to the pleasure of making another communication on the subject when I had further opportunities of examining the Actiniæ in health and vigour. I have now had these opportunities, and have found that the most delicate electrometers are unaffected by them. But I conceive that by the following simple, and indeed obvious experiments, all idea of the Anemones of our coasts being electrical may be set aside.

Having prepared a galvanoscopic frog's limb, with the nerve as long as possible, it is laid on a piece of perfectly clean glass, so that the nerve hangs over the edge. The pendent nerve is lowered into the water, containing an Anthea, and the nerve is brought in contact with a *single one* of the long tentacles of this creature. Immediately vigorous contractions follow in the muscles of the limb, and if everything be left undisturbed, these twitchings will continue for some minutes after the nerve is withdrawn. If, however, a thread be tied round the nerve below the point where the tentacle of the Anthea touched it, all twitch-

ings at once cease. If the portion touched by the tentacle be snipped off, all twitchings also cease.

Having thus repeatedly observed that contact between the nerve and a single tentacle was followed by muscular contractions, which at once ceased as soon as the portion of the nerve which had been in contact with the tentacle was removed, it occurred to me to try the effect of applying to the nerve a single tentacle removed from the body of an Anthea. I therefore had recourse to the following experiment:—

The hind leg of a frog is separated from the body; the sciatic nerve dissected out carefully, so that the nerve be not crushed or injured; and the thigh cut away. The limb, with the nerve thus dissected out as long as possible, is to be laid on a plate of clean glass. A silk thread is tied round the base of one of the tentacles of an Anthea, and the tentacle snipped off. The mere tentacle, separated from the animal to which it belonged, is drawn gently across the nerve, or laid upon it at the upper part. Immediately muscular contractions follow in the leg. These contractions cease at once if the portion of nerve touched by the tentacle be cut off.

There can, it seems, no longer be any doubt that the muscular contractions are excited, not by electricity, but by irritant action of the urticating organs of the Anthea, which, being more powerful in this respect than the Actinia or other genera, has been chosen for experiment, although other species give similar results.

I now see that I was in error in supposing that the effect produced on the frog's limb by the Actiniæ could be transmitted along a wire. I presume that in preparing the experiment alluded to, which I performed in the open air at the sea-side, some of the irritant materials of the Anemones, which I had possibly handled, had been brought by my fingers in contact with the nerves, and I was thus deceived. I am very happy, however, that I am myself the first to perceive and correct this error.

The Rev. Eugene O'Meara, A. M., read the following—

NOTES ON THE ENCYSTED CONDITION OF DIATOMA VULGARE. (PLATE XVII.)

I have the gratification of bringing before this Meeting a series of observations recently made by me on the encysted condition of *Diatoma vulgare*, calculated to throw some light on the nature of this phenomenon in the Diatomaceæ.

On the 27th of August last I made a gathering from a streamlet which passes through the grounds of Delgany Glebe, down a gentle slope, so that the water runs along with considerable rapidity. On a former occasion I had made a gathering from the same place, which produced nothing worthy of notice, for which reason I was not disposed to make a second trial; but observing the algæ in the channel to be more than usually swollen, I thought the fact indicative of a strange condition, and, therefore, was induced to take a portion for examination. Upon inspection I found *Synedra radians* occurring frequently, and sometimes in an encysted condition; the prevailing form, however, was that of *Diatoma vulgare*, the frustules of which adhering, as usual, by their opposite angles, formed long filaments of fifty individuals and upwards; the endochrome was of a green colour; and the space within the valves was filled with granules (Figs. 1 & 2).

Upon this occasion I noticed several cysts packed with frustules of *Diatoma vulgare*, which lay in horizontal layers, packed as closely as herrings in a barrel. Nothing of the kind had ever been remarked by me before; and, lest another opportunity of observing the phenomenon might not be afforded, I took particular notice of every circumstance, and soon discovered that the cysts were not uniform in their appearance, but presented different phases, reducible to three distinct and well-marked classes.

Class A (Fig. 4) consisted of pellucid cysts, in which the included frustules exhibited the same appearance as the free forms, both as regards the colour of the endochrome and the disposition of the granules.

Class B (Fig. 4) included cysts, pellucid like the former, but without granules, the frustules, also, having the endochrome more compact than in the free forms, and of a brick-red colour.

Class C (Fig. 5) contained cysts of a yellowish brown hue, consisting apparently of two envelopes, one within the other, the interspace being filled with granules; the frustules included were destitute of granules, and the endochrome compacted into the centre of the cell, and of a brick-red colour. Subsequently, several hundreds of these cysts came under my notice, all reducible to the three classes just described; the only additional circumstance remarked was, that in variety B the wall of the cyst was more closely pressed upon the mass of frustules within than in either of the other cases.

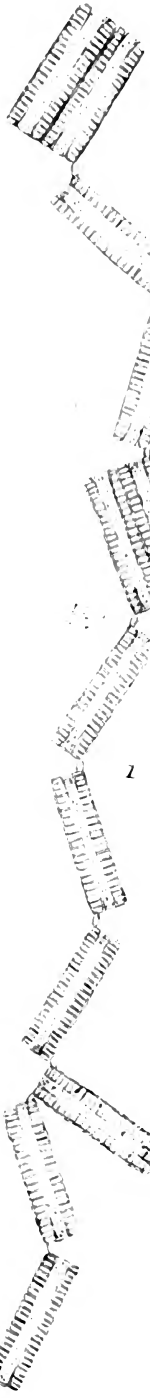
Desirous to obtain such information on the subject as was available,

I referred to Smith's work on the Diatomaceæ, and in the plates of the second volume found described two cases similar to that which had just come under my own observation—one of *Synedra radians*, the other of *Cocconema cistula;* and in the preface, where he refers to the phenomenon of encysted diatoms, were the following remarks :—

"In the gathering of *Cocconema cistula* made in April, 1852, which contained numerous instances of the conjugating process, I observed the frequent occurrence of cysts enclosing minute bodies, variable in their number and size, and many of which had the outline and markings of the surrounding forms, and were obviously young frustules of the Cocconema. These cysts and their contents are figured in Plate C, 221, III., IV. and V. It would appear from these figures that the production of the young frustules is preceded by the separation and throwing off of the siliceous valves of the sporangium, and the constriction or enlargement of its primordial utricle, according to the number of young frustules originating in its protoplasmic contents. In this gathering, forms of every size intermediate between the minutest frustule in the cyst, and the ordinary frustules engaged in the conjugating process, were easily to be detected; and the conclusion was inevitable, that the cysts and their contents were sporangia of the species with which they were associated, and indicated the several stages of the reproductive process."

It is obvious from the above quotation that Smith's opinion in the case of *Cocconema cistula* was, that the encysted frustules were the infant condition of the organism—a step in the process of development from the sporangium produced by the conjugation of the parent frustules. In this opinion Hoffmeister, in a paper of his on the "Propagation of Desmidiæ and Diatomeæ," published in the January Number of the "Annals of Natural History" for the current year, seems to concur. "Smith," he says, "has endeavoured to render it probable that the colonies of young individuals enclosed in a cyst of *Cocconema cistula, Gomphonema dichomum,* and *Synedra radians,* some of which he found associated with conjugated, full-grown individuals, must have originated from the division of the spores (sporanges of English authors). This hypothesis has much in its favour, but in the present condition of our knowledge it is inexplicable where the siliceous shells of the spore-cells remain."

I was not disposed to question the correctness of an hypothesis resting on such authority until the 31st of August, when, on examining a drop from the gathering, I observed a cyst of *Diatoma vulgare* (Fig. 5), with



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a frustule of *Synedra radians* included. I had before this noticed cysts in which frustules of *Colletonema subcoherens* and *Melosira varians* seemed to be included; but the hypothesis of Smith exercising an influence on my mind, I was disposed to consider that these foreign forms, which seemed to be folded within the cysts of *Diatoma vulgare*, might possibly be adhering to the outer surface of the cell-wall. No doubt, however, could exist as to the fact of the frustule of *Synedra radians* being not adherent to the outside of the cyst, but actually included within it, because the shape of the cyst was such as to show that in its formation it had accommodated itself to the shape of the Synedra. Usually the wall of the cyst did not extend much beyond the frustules included, and at all points was at an equal distance from it; but in the case I now refer to, the frustule of Synedra extended at either end considerably beyond the mass of the frustules of Diatoma, and the cyst had thrown itself out beyond the usual limits, narrowing beyond the boundary of the mass of Diatoma so as barely from that out to cover the extremities of the Synedra (Fig. 6). Nor was this observation a solitary one, very many cases of the same nature having occurred. Also, several cysts of *Synedra radians* were noticed, in which frustules of *Diatoma vulgare*, in greater or less numbers, were included.

This fact seemed to indicate that if Smith's hypothesis concerning the case of *Cocconema cistula* were correct at all, it could not apply to the case of encysted *Diatoma vulgare* that had come under my notice, without supposing that different species might result from the conjugation of the same parent frustules. Such a view is so contrary to the analogy of nature, that nothing short of actual observation could warrant its entertainment.

I was, therefore, disposed to doubt the correctness of Smith's hypothesis, at least so far as it might apply to the case before me, and to consider that the encysted frustules of *Diatoma vulgare*, instead of being the product of a Sporangium, were the parent frustules in the conjugated condition, from which the Sporangium was to be the ultimate result.

According to this view, the inclusion of foreign forms within the cysts—a matter of very frequent occurrence—might be easily explained by supposing that when the frustules came into the state of conjugation, the foreign forms which chanced to be in proximity were drawn in with the mass, and ultimately included within the cyst which was formed

around it. This hypothesis appeared to be corroborated by the fact that, upon an accurate measurement of the encysted frustules, and comparison of them with such as were free, they were found to be of exactly the same dimensions. I may add here, that this view of the case was shown to be correct by subsequent observation.

In the course of the same evening (31st August) I noticed some long filaments of *Diatoma vulgare* which had folded together in the middle so as to form a compact mass. In some cases a few frustules at either end remained unattached, and these manifested in every case a strong tendency to connect themselves with the mass formed by the folding up of the remainder of the filament. One case of this kind particularly attracted my attention, in consequence of my noticing at one corner a gelatinous protrusion, with a clearly defined boundary (Fig. 7). On a very careful inspection of the mass all round, I satisfied myself that there was no appearance of this gelatinous matter, except at the point where I had first remarked it. The importance of this case could not be overrated, as it afforded some hope of a clue to a satisfactory solution of the phenomenon. Accordingly, I kept it under notice for some time, and the result was, that I clearly perceived the gelatinous matter pushing itself out, and from the point where I had first observed it, extending itself along the margin of the mass, until, in the space of one hour, the pack of frustules was entirely surrounded by a hyaline cyst (Fig. 8), which, with its included frustules, exhibited all the characteristics of variety marked A. This observation rendered it clear that cyst A was the first stage in the process.

At this stage of the investigation several sporange-like bodies, not seen before, were observed floating about in the water. They consisted of a pellucid envelope, enclosing a large number of granules, accumulated towards the centre. These I supposed were the Sporangia of the encysted Diatoma; but as yet this was merely conjecture, nothing having as yet come under notice to give to the conjecture the character of fact, or throw light on the process of development, until the evening of the 1st of September, when the investigation was advanced a stage by the observation of a cyst, of the variety described as C. The cyst gradually became more and more elongated, the wall meanwhile at the sides pressing more and more closely on the pack of frustules within as it pursed out at the ends. Into these produced extremities the granular contents of the cyst, which previously had been distributed equally

through it, were soon collected, and the mass itself exhibited the characteristics of cyst B. A constriction immediately took place, proceeding along the boundary of the mass of frustules at either extremity, until the produced parts of the cyst presented the appearance of a bag half closed at the mouth. These parts were obviously about to be cut off, so as to form two Sporangia, one at either end of the cyst (Fig. 11); but the process was obstructed by the evaporation of the water.

Previous to this I had noticed several cysts in which the granules exhibited evident determination towards the opposite extremes, without any sensible alteration in the general outline (Fig. 9); in others the wall projected forwards at one side; the produced part became full of granules, and the opposite side, having lost its granular contents, became perfectly pellucid, and exhibited so far the characters of variety C (Fig. 10).

These observations indicated with sufficient clearness the process of the formation of Sporangia, and if anything were wanting, it was supplied on the evening of the 3rd September, when I noticed a cyst with a fully developed Sporangium connected with it. No doubt could be entertained as to the Sporangium being attached to the cyst, for although great force was applied to effect a separation, no pressure I could apply was sufficient to disunite them (Fig. 12).

The result of the foregoing observations seems to be to confirm the impression previously expressed, that the frustules of *Diatoma vulgare* enclosed in cysts exhibit a peculiar phase of actual conjugation, instead of being an early stage in the development of the contents of a sporangium produced by a conjugation of a preceding generation of frustules. It is also apparent that in *Diatoma vulgare* the plant passes through the several stages of its existence in the following order,—first, the young frustules multiply by fission, and remain attached by their opposite angles so as to form long filaments, until the season for conjugation arrives; then the filaments become compacted into a dense mass, and secrete a hyaline cyst, into which the granular contents of the several frustules are discharged; next, the granules are collected, sometimes into one sporangium, sometimes into two; the sporangium next separates from the cyst that produced it; the cyst dissolves, and the withered frustules yield up their vegetable life.

Dr. E. Perceval Wright read the following, by the Rev. A. R. Hogan, A.M., Corresponding Member:—

ON A NEW BRITISH ONISCOID FOUND IN ANTS' NESTS.

Entomologists have of late years paid a great deal of attention to insects living in ants' nests, and long lists have been drawn up, including many that were mere accidental visitors. But the subject is still quite obscure, for it is neither certain which are, nor which are not, inhabitants, properly speaking, of the formicarium, nor how or why they come to be located there.

It is probable, however, that the new Oniscoid (*Platyarthrus Hoffmanseggii*) now found in England, and previously known on the Continent, will prove to be a true denizen of the ant's nest; and the reasons for this belief will be presently stated.

Lulworth Cove, in Dorsetshire, is the locality at which *P. Hoffmanseggii* was obtained by me. It is a most attractive spot for natural scenery, and well known to English naturalists and geologists. There are two ways of reaching it—by railway and by steamer. The South-Western line has a station at Wool—a little village about three miles distant; and those who like the walk, and desire to catch the "marbled-white" butterfly, which is to be had on the road to the sea, cannot do better than go by rail. But the favourite way of reaching Lulworth Cove is by sea from Weymouth; it is only an hour's sail; and all the summer through, a steamer plies, morning and evening, every Wednesday. The vessel is generally crowded with excursionists of the ordinary unscientific class; but, fortunately, they nearly all, immediately on landing, hurry off towards Lulworth Castle, which is between two and three miles away; so that the neighbourhood of the Cove is left undisturbed to those who would prefer the sight of *Pamphila Actæon* or *Platyarthrus Hoffmanseggii* to that of the finest painting the Castle or its Roman Catholic chapel can boast.

The sail across Weymouth Bay is beautiful. A fine view is obtained of the towering Isle of Portland, with its long artificial breakwater on one side, and natural sea-dyke, the Chesil Bank, on the other. The steamer makes almost straight for the "Burning Cliff" (which has of late years ceased to *burn*), and then, passing for some distance in front of a commanding chalk headland, reaches some outcropping rocks, form-

ing part of the Purbeck Beds. These latter break into several curious archways and inlets for the sea, and at length open wide enough to admit vessels into the lovely little bay, called Lulworth Cove.

In shape this natural harbour forms nearly a circle, about half a mile in diameter. Right opposite the entrance, a fine chalk cliff rises to the height of several hundred feet; its sides sloping, and covered with that short bright-green herbage so characteristic of the Downs in the south of England. On the left is the little hamlet of West Lulworth, through which the road leads to the Castle and East Lulworth. It is worthy of a visit, too, from any one who admires really picturesque cottages, tastefully ornamented and cleanly kept. A few fishing-boats are generally lying at anchor at the west side of the Cove, and a little crowd gathers on the shore to see the steamer enter with her gay-looking cargo, while she boldly advances till the forepart of her keel is firmly fixed among the large chalk pebbles of the beach. After having anchored in this primitive manner, a landing is easily effected by means of a gangway lowered from the prow, and the aid of boats quite dispensed with.

Once on shore, the naturalist and the sight-seer take divergent paths, and if the former wishes to secure *P. Hoffmanseggii*, he will turn to the right and follow the path at the foot of the great chalk cliff, until, having passed through a little wooden gate, he ascends the cliff which shelters the Cove at the eastern side. The highly contorted strata of this cliff cannot fail to have struck him on entering the bay; and it is well to attend to this difference in the geological formations here, because it is possible that the presence of the new Oniscoid may depend upon, or at least be connected with it.

The first time I visited this spot, I did not think of looking for Oniscoidæ; but the weather having turned out unfavourably for sun-loving insects, I resorted to the generally unfailing resource of turning stones. Having by this means found *Cyclostoma elegans* and *Pupa juniperi* in some abundance, I was induced to continue, till, on overturning a stone that concealed an ant's nest, I was much surprised by the appearance of a number of white Oniscoids, which seemed anxious to escape into the chambers of the nest as quickly as possible. The form of these animals was too elegant and striking to be overlooked; so, having captured a few, I transmitted them, on my return, to my friend, Professor Kinahan, as the best authority on British Oniscoidæ with whom I was acquainted. To him I owe the identification of the species, and

the information that it was new to Britain; and as he has also kindly undertaken to lay before the Association a scientific description, I will not attempt any minutiæ on that subject.

But questions regarding the economy of Platyarthrus, the observer alone can determine, and accordingly the following inquiries have been made of me:—

First Query. The species of the ant in whose nests it was found?

Unfortunately, I did not think of retaining specimens, which might have enabled me to speak with positive certainty. The nests were those of red, yellow, and black ants—the latter a much smaller species than either of the others, the workers of which were about equal in size. As far as memory would determine, they were severally *Formica rufa*, *F. flava*, and *F. nigra* of Smith. *P. Hoffmanseggii* was most numerous among the red ants, and in smallest numbers among the yellow.

Second Query. Are the Oniscoids found *in* the nest, or adhering to the stone?

In *most* instances they are seen in the chambers of the nest, when the overlying stone is removed; and the rapidity with which they dive into the subterranean galleries and disappear from sight shows that they are familiar with the internal portion of the formicarium. Sometimes it is impossible to find them again, even by digging. On two or three occasions, however, I found them on the under side of the stone, apparently in a state of repose (as some of them are in the nest itself also, when first exposed to light); and once a single individual occurred to me on the under side of a stone not covering a formicarium; yet even in this case there was a nest close by, and several ants running about beneath the stone.

Third Query. Do the ants ever carry off the Oniscoid, as they do Aphides?

This I have not seen done; but it is quite possible they may do it sometimes, for my observations were not sufficiently extended to prove the point either one way or the other.

Fourth Query. The number of Oniscoids usually found in each nest?

The largest number I have seen in a single nest is eight or nine, and that was in the first found, in which also were some of the finest specimens I saw. In some formicaria there are only two or three Oniscoids, so that the average probably lies between these numbers. But they are not by any means to be had in every nest in the locality—in fact, the

majority of ants' nests there will be found to contain none at all: nevertheless, when a fruitful one is opened, the nests near about it will generally have Oniscoidæ in them also.

Fifth Query. Is it possible that the Oniscoids might be only accidental visitors, falling into the nest when the stone is raised, from the edges of the latter?

From what has been mentioned before, it does not appear to me in the least degree probable that such is the case. The few specimens which I did find on the under sides of stones did not manifest the slightest inclination to drop off, but maintained their position until forcibly dislodged. If they could be discovered in the nests which are constructed of mounds of clay, it would probably settle this point; but there were none such in the places I searched.

Sixth Query. Are the Oniscoids to be met with more abundantly at one season than another?

I cannot answer this question, for my captures were all made on the 2nd and 8th September of this year. At that time most of the individuals were evidently immature, being very minute in size as compared with the apparently full-grown specimens. The latter were difficult to obtain in any plenty; but I have little doubt that they *were* mature, from the circumstance of my having found one dead in a perfect state, as though it had reached the natural term of its existence.

I do not wish an exaggerated idea to be formed of the data upon which the observations detailed in this paper have been based. The number of ants' nests in which I found *Platyarthrus Hoffmanseggii* was not much above *thirty;* those in which I failed to detect its presence being probably double that number, or more. At a future time I hope to be able to examine the locality more extensively. But I cannot avoid here raising the very interesting questions—What connexion can we suppose to exist between animals so diverse in nature as ants and crustaceans? and—Is their dwelling together a purely voluntary arrangement?

As regards the latter inquiry, I would answer in the affirmative. If the Oniscoids had been imprisoned by force or stratagem, they would naturally try to make their escape when the nest was opened; and if the ants feared this, they would seek to prevent it by carrying them off, as they have been seen to do with the Aphides and *Claviger foveolatus:* but in each instance I observed the Oniscoids endeavouring of themselves to

reach the most hidden and remote parts of the nest, while the ants, intent on their own safety alone, rushed hither and thither over them and one another. On the other hand, it is evident that the Oniscoids could not remain in the nest against the will of the ants, because most of those that I found were so immature as to be far inferior in bulk and strength to the ants, and thus wholly in their power.

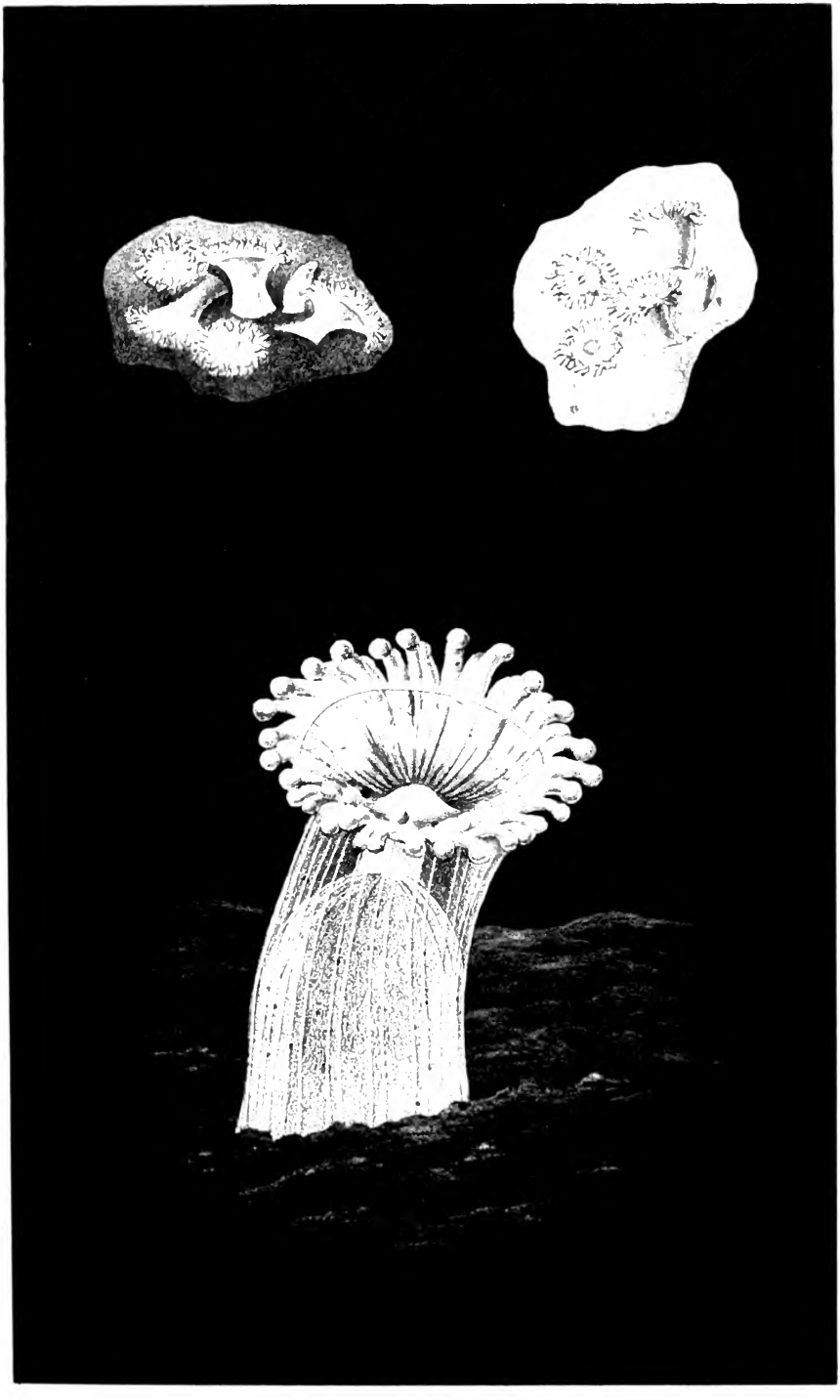
It is known that ants are in the habit of conveying to their nests, in spring, many different insects; and it has been suggested that "the aliment obtained from these insects may have some stimulating properties highly conducive to the development of the sexes." In connexion with this view, Mr. F. Smith remarks that he has never observed an ant conveying those insects subsequently to the development of the males and females. But it would seem that there must be some benefit other than this to be derived from *P. Hoffmanseggii*, because at the time of year I found it, the males and females had already appeared; which circumstance, together with that of its evidently making the formicarium a nursery for its young, may be taken to confirm the supposition that it is a *bonâ fide* inhabitant of the nest.

It is useless, however, to attempt to form any decided opinion as yet; all that can be done is to seek out and put on record additional facts, from which, after a time, we may hope to discover the nature of that divine law under whose all-powerful guidance we see the crustacean and the ant living harmoniously in their common dwelling, and mutually a benefit to each other.

Dr. E. Perceval Wright read the following—

NOTES ON THE IRISH ACTINIDÆ, ETC., WITH ESPECIAL REFERENCE TO THEIR DISTRIBUTION.

Having been engaged for some years in investigating the marine Fauna of Ireland, I find that I have accumulated some notes on the various species of Actiniæ which inhabit our coasts. The publication of Mr. Gosse's beautiful monograph of the British members of this group has induced me to pay more attention to them in my visits to the sea-shore for the last two years, and all the information that I have been able to acquire I have forwarded to him as a contribution to a knowledge of our Irish species. I have, however, thought it would not be amiss to place in our "Proceedings" a more detailed and particular account than it

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would be possible or convenient to give in the work referred to; and as I have never examined the north-west coast—which is likely to contain new, or at least strange forms—I may hope to be able to supplementalize this paper at some future period, and thus render it a more complete contribution to Science.

It will appear strange that I cannot record the occurrence of any—with a solitary exception—of the free-swimming Actinia, such forms as Arachnactis or Minyas. I rather suspect that this is due to the fact that sufficient attention has not been paid to the subject, and not to their actual absence from our coasts. That they do not, however, occur very commonly, is, I think, likely, as otherwise I can hardly account for the fact that they have to the present moment eluded all search by both myself and my friend, Professor J. Reay Greene; and this, too, when we have spent many a bright summer day in searching in the bays of western Ireland for oceanic animals. Those that live in the mud, as Edwardsia, &c., will, I can hardly doubt, yet be discovered. Of the Turbinolidæ I am sure that diligent search will reveal more Irish genera and species; and I even think Balanophylia has been passed over as young *Coryophyllia Smithii*. Unfortunately for marine investigations in the west and south of Ireland, some of the places that most abound in zoological rarities are those most difficult of access; and even when the zoologist has reached them, he finds that his place of temporary residence must be often at a good distance from the field of his labours, and that he will have to study under disadvantages as great as if he were on a foreign soil.

The only lists published on Irish Zoanthariæ, that I am aware of, are those by W. Thompson in his posthumous volume on the "Natural History of Ireland;"* in which, making allowances for synonyms, he records thirteen species, as follows:—1. *Actinia mesembryanthemum* and *A. margaritifera*, which is doubtless a variety of *A. mesembryanthemum*; 2. *Sagartia viduata*; 3. *S. coccinea*; 4. *S. bellis*; 5. *Actinilobia dianthus*; 6. *Tealia crassicornis*; 7. *Ilyanthos Scoticus*; 8. *Adamsia maculata*; 9. *Anthea cereus*; 10. *Zoanthus Couchii*; 11. *Corynactis viridis* (and *C. Allmanni*, only a variety); 12. *Coryophyllia Smithii*; and 13. *Turbinolia milletiana*. Next, a list published by Professor J. Reay Greene in the "Proceedings of the Natural History Society of Dublin," which is chiefly taken from Thompson's list, given above, with some few additions which had occurred to me on the south coast. This list, deducting

* Vol. iv., p. 461.

synonyms, as before, numbers seventeen species.* Since then our list has increased to number twenty-six or twenty-seven, and whole genera are still unrepresented. From the above I have purposely excluded any mention of the Lucernariadæ, not seeing how this family can be placed among the Actinozoa; and in this view I believe Professor J. Reay Greene coincides, although he has placed the three species which frequent our coast in his list. As an appendix, I shall briefly allude to them, as they are still, though erroneously, believed to have affinities with the Actinia. In nomenclature I shall adopt that of my friend, Mr. Gosse, so far as his synopsis of the Actinidæ goes; to the end of the Sagartia I have adopted his "Actinologia Britannica."

Before entering on a detailed list of the species, I think it better to allude briefly to the various marine provinces into which I think it most convenient and desirable to divide the sea-coast of Ireland. A division of this nature must be more or less arbitrary; but I trust the one that I now propose will be found sufficiently correct for general adoption by our Irish zoologists.

1st Province, *North.*—From Tory Island or Horn Head, on the mainland, to Rathlin Island or Fair Head, embracing the two extensive Loughs, Swilly and Foyle, and parts of the counties of Donegal, Londonderry, and Antrim.

2nd Province, *North-East.*—From Fair Head to Downpatrick, at the entrance of Strangford Lough, embracing Belfast and Strangford Loughs, and parts of Antrim and Down.

3rd Province, *East.*—From Downpatrick to Carnsore Point, in the county of Wexford, embracing Dundrum, Dundalk, and Dublin Bays, and parts of the counties of Down, Louth, Meath, Dublin, Wicklow, and Wexford.

4th Province, *South.*—From Carnsore Point to Cape Clear, county of Cork, with the fine harbours of Waterford, Dungarvan, Youghal, Cork, and Kinsale, and parts of the counties of Wexford, Waterford, and Cork.

5th Province, *South-West.*—From Mizen Head to Kerry Head, or the mouth of the Shannon, embracing Bantry, Dingle, and Tralee Bays, the Kenmare River, and parts of the counties of Cork and Kerry.

6th Province, *West.*—From Loop Head, county of Clare, to Erris Head, on Mullet Island, at the extreme north-west of Mayo, embracing Gal-

* "Natural History Review and Quarterly Journal of Science," vol. v., p. 36. 1858.

way, Clare, and Blacksod Bays, the Isles of Arran, Clare, Achill, and Mullet, and parts of the counties of Clare, Galway, and Mayo.

7th Province, *North-West.*—From Erris Head to Horn Head, embracing Killala, Sligo, and Donegal Bays, and parts of the counties Mayo, Sligo, and Donegal.

These seven Provinces might be easily subdivided, but I think this is not advisable; indeed, I am rather doubtful of the propriety of keeping either the 2nd or 5th Province: but still we find species peculiar to each of these localities, or at least occurring in them, and not generally found in the others: thus, *Echinus lividus* occurs in Province 5, but hardly if at all in Province 4. I need hardly justify the utility of making these Provinces; their convenience, when referring to geographical distribution, is obvious, as by saying in which of these Provinces an animal occurs, we at once arrive at an idea of its distribution in a much shorter manner than enumerating the counties it occurs in. I have hesitated to call the Provinces, Boreal, Lusitanian, &c., thinking the time has not yet arrived for so doing. The Dredging Committees on the east, north, and south-west of Ireland, will doubtless in time enable this to be done. I have only to hope this enumeration may be adopted, as it will render comparison so very easy.

CŒLENTERATA.

Actinozoa.

Zoantharia.

1. Actiniadæ.

Actinoloba dianthus.

This species is rather common all round the coast. It is very numerous in Dublin Bay in fourteen or fifteen fathoms; and the elegant variety, in which the Anemone is of a translucent white colour, is not unfrequently met with. While it is only by dredging that the large specimens (often 5 or 6 inches in height) are obtained; yet it is by no means confined to the Coralline Zone, and specimens can easily be had at low-water mark on the rocks near Salthill, county of Dublin. In Berehaven, county of Cork, it occurs in countless thousands depending from the roofs of several fine caves on the west side of Bere Island. At low water I have seen them in these caves of every shade of colour, from a rich salmon to a pure translucent white, and they in this habitat assume such a long, pendant form, as to appear, at first sight, very different from

their brethren from some oyster bed. All the varieties mentioned by Gosse, save Flava, occur in Ireland. Though on the east coast I have never met with large specimens between tide-marks, yet on the west coast, where the rocks are exposed to the swell of the Atlantic, I have taken individuals three inches in length some distance above low-water mark.

Scyphia (*Sagartia*) *bellis.* (*Ellis.*)

This species occurs from Londonderry, on the north, to Achill on the north-west, and will doubtless be found in the intervening district, when duly examined. In some parts it is found in great profusion, especially in the fissures of the Devonian slates on the south-west. In July, 1858, when at Roscarbery, county of Cork, Professor J. Reay Greene and I found a very pretty variety of this species, which, I think, is not described in the "Actin. Brit." For some time we imagined it was a new species. The expanded disk was divided into a series of compartments, six of which were of a white colour, and six of a dark brown, with a row of pure white spots around the mouth. It was very numerous, but exceedingly hard to detach.

Sagartia miniata. (*Gosse.*)

This fine species was first discovered by me as Irish in the autumn of this year in Crookhaven, county of Cork, and since then I have found it at Berehaven, county of Cork, and Dingle, county of Kerry. In this latter locality the variety Coccinea occurred. I think this species has been passed over by me in some other parts of Ireland as one of the varieties of *S. rosea.*

Sagartia rosea. (*Gosse.*)

This species occurs all around the south and west coast. The first locality I found it in was near the charming village of Adragool, county of Cork, on the borders of Bantry Bay—a pleasant day's excursion by water from Glengariff. I think it is quite a distinct species from Miniata; and though varieties of each approach each other very closely, yet I have not yet seen a specimen that I could not, without difficulty, assign to its proper species.

Sagartia ornata. (*Holdsworth.*)

Of this species, which would appear to be very rare in England, being only as yet recorded as occurring at the entrance to Dartmouth Harbour, I found several specimens at the mouth of Crookhaven Harbour

county of Cork, at extreme low-water mark. I was engaged in examining the large fronds of Laminaria, which in a quiet corner of the harbour were growing in great numbers, attached to pieces of stone of considerable size, when I discovered this Anemone nestling among the "roots" of the algæ. On comparing it with the description in the "Actin. Brit.," which I had with me, there could be no doubt of its being the true Ornata, and the two habitats are very much alike.

Sagartia venusta. (*Gosse.*)

This elegant species, to which I would be inclined to accord O. F. Müller's praise of being *Actiniarum pulcherrima*, occurs from Youghal, county of Cork, where Professor J. Reay Greene has found it, all along the south coast, and as far along the west coast as I have examined: it is also recorded as occurring abundantly in Belfast. I am inclined to think that this species does not occur on the east coast, that is, in District No. 1, and that it will be found, in all probability, to extend all along the north-west and north coast as far as Belfast, or perhaps Strangford Lough. Mr. Gosse seems to think South Wales the metropolis of the species. I think I could, with as much justice, claim the south of Ireland; for there is not a place where an Anemone could live on the sea-coast of the counties of Cork or Kerry that Venusta does not abound in myriads. I have also satisfaction in thinking that it would be practically impossible to destroy these enormous multitudes in the manner that some ruthless collectors have devastated the once fair metropolis in Tenby, South Wales.

Sagartia nivea. (*Gosse.*)

This species is very common, in suitable localities, in the west. I have never seen it left dry by the ebb of the tide, but have always found it inhabiting the sides of large caves which are constantly full of water. At Crookhaven, opposite some rocks, about a mile from land, called The Aldermen, there is a very fine cavern, easily approached in fine weather. I found the sides of this cavern studded with magnificent series of *S. nivea.* It was about half tide when I went through it, and it was curious to observe the different levels at which the Anemones seemed to dwell. Just out of the reach of the water was a long line of *Actinia mesembryanthemum;* then, in the water, another row of *S. nivea,* with a few *S. venusta;* and then, at the bottom of all, and clearly visible through the still water, a gay parterre of enormous *Tealia crassicornis.* I recollect

that a large shoal of herring-fry, pursued by some dog-fish, happened to rush through the cave as we entered, and immediately many of the unhappy young herrings were seized by the various Anemones, who had their tentacles expanded, and who, when we left, were actively engaged upon their repast.

Sagartia coccinea. (*Müller.*)

Of this species I know nothing, save from the descriptions and figures in the "Zoologia Danica." It is recorded by Thompson as taken by the late Professor E. Forbes on the west coast of Ireland, on rocks and sea-weeds. The Dredging Party to the west in 1840, accounts of which I have often listened to, consisted of Professor E. Forbes, W. Thompson, Dr. Ball, and G. C. Hyndman,—all but the latter have since left this world; and Mr. Hyndman, at this distance of time, has no recollection of this special species occurring among the numerous novelties and varieties that were then taken. If I might venture a surmise, I think it will be, in all probability, rediscovered as Irish on the coasts of Sligo or Donegal, and that it will prove to be a northern species. I am equally at a loss with Mr. Gosse to understand what Müller can mean by saying:—"Uti congeneres ope tentaculorum locum mutat." Mr. Gosse never found *S. coccinea* change its place by such means, and certainly I have never seen any of its tribe do so either. Is Müller's Fig. 2, Plate LXIII., meant to represent *S. coccinea* moving in this manner?

Cylista (*Sagartia*) *troglodytes.* (*Price.*)

I have seen specimens of this Anemone from Belfast, and think I have taken it near the Giant's Causeway and at Portrush; but, so far as my experience goes, it is very rare in Ireland: from the long list of localities given in the "Actin. Brit.," it would appear to be common in England and Scotland.

Cylista (*Sagartia*) *viduata.* (*Müller.*)

Has only been found by me in Dublin Bay; but is recorded by Thompson* as taken in Belfast and at Lahinch, county of Clare, by E. Forbes. I rather think there has been some confusion in our Irish list of localities between the two latter species; but those given above can be depended upon. I think there can be no doubt but that Mr. Price's Anguicoma is the Viduata of Müller. But perhaps I may be allowed to

* "Natural History of Ireland," vol. iv., p. 463.

suggest, that on reading over Müller's brief description, so different from those we are now accustomed to, I think his Undata is not a variety or a synonym of the present species.

Cylista (*Sagartia*) *parasitica*. (*Couch.*)

This species would appear to be quite absent from the eastern shores of Ireland, and I only know of its being taken once in Ireland, in Bantry Bay. The specimens then taken lived for a long time in one of the large aquaria in the Gardens of the Royal Zoological Society.

Sagartia (*Thoe?*) *hastata* (*n. s.*).

This, which is apparently a new species, occurred in some numbers off The Pipers, a dangerous cluster of rocks near the western entrance of Berehaven Harbour. I was struck by the curious arrangement of the tentacles, which put me in mind of a battalion of Roman soldiers armed with spears. They were, when fully expanded, arranged close to each other, showing but little of the disk, the orange-coloured mouth being all that was generally visible, and closely resembling a thicket of spears. They were attached to the sides of rock-pools, and it was not very difficult to detach them, in this resembling *T. sphyrodeta*. The following is a diagnosis of the species, of which, I am sorry to say, I am unable to give figures, as the specimens sent to Mr. Gosse died *in transitu;* the weather (August) was very warm, and from Berehaven it is three days' postage to Torquay.

Specific character.—Tentacles conical; thickly crowded; with two white bars across the base; tip also with a small white spot.

General Description.—*Base*—Adherent to surface of rock; not exceeding column. *Column*—Smooth; in height about equal to breadth; the latter about an inch. *Disk*—Hollow, hardly equalling diameter of column. *Tentacles*—Numerous; in from five to six rows, set close to margin; nearly all equal in size; very conical and short. *Mouth*—Set on a cone; lip tumid, and from 14 to 16 furrows.

Colour.—*Column*—*α*) Brown, of a sienna tinge; *β*) salmon colour; several specimens of both colours occurred. *Disk*—Of same colour as column. *Tentacles*—Light brown, with two white marks, and tips slightly white or translucent. *Mouth*—Lip orange or brick red.

Size.—About one inch in height, and expanded; flower an inch in diameter.

Locality.—As above.

I hope from the above diagnosis this species may be recognised, and I believe my friend Mr. Gosse knows of no species exactly like it.

Thoe (*Sagartia*) *sphyrodeta.* (*Gosse.*)

I have to add to the already widely scattered habitats for this species, Parkmore Head, Ventry Bay, in the county of Kerry. It differs very remarkably from the other species of the Sagartiadæ by its slight adherence to the rock, never attempting to burrow. I only found six or seven specimens. Like Mr. Gosse, I found it fond of floating on the surface of its prison, the base dilated at the top of the water, the body hanging downwards, and the tentacles widely expanded. I kept two specimens alive in an ounce phial for a week; then I carried them, apparently in the best of health, from Ventry to Dublin, three days' journey, the agitation of which did not seem to annoy them; but they very shortly died when I placed them in my aquarium, and I fancied the difference of the salt water might have been the cause of their death. The specimens I found were clinging to the smooth, perpendicular surface of a deep rock-pool: they were of various shades of colour, from a transparent white to a light yellow colour. The name Sphyrodeta is very happily chosen.

Thoe (*Sag.*) *pura.* (*Alder.*)

While shore-collecting from a boat at the western entrance of Berehaven, county of Cork, and on the Bere Island side, I first found this rare Anemone. It was attached to the expanded root of a small Laminaria, and I was at once struck by the transparent body, with its semi-opaque tentacles conspicuous on the dark ground of the Laminaria. It lived with me for a day or two, having attached itself to the bottom of a temporary aquarium. It freely expanded itself. The body appeared quite destitute of suckers, though occasionally I think these made their appearance when the upper portion became opaque. The tentacles were rather thick for their length, the outer row turning downwards, something like the outer row in *Corynactis heterocera.* This character is not represented, I think, as well in Fig. 6, Plate III., of the "Actin. Brit." as if Mr. Gosse had drawn it from a living specimen. In the plate it is too like *S. pellucida* (Holdsworth)—a species which, from the description of it by Mr. Holdsworth, it could never be confounded with. The tentacles consist, I should say, distinctly of two rows, and the edges of the septa are very plainly seen like white lines. The specimen was nearly half an inch high, and expanse nearly three-quarters. It is somewhat strange that

this species should have as yet occurred in England only on the coast of Durham and Northumberland, and in Ireland in this part of the extreme west. Only one specimen occurred to me, and this died in its transit through the post to Mr. Gosse.

Adamsia palliata. (*Bohadsch.*)

Strangford Lough and Belfast Bay—W. Thompson. Dublin Bay (?) —Dr. Ball. I have also taken the variety called Crinopis by Mr. Gosse in Bantry Bay; of a pure white colour, with a few minute pink spots; adhering to old shells of *Purpura lapillus*, tenanted, as usual, by *Pagurus Prideauxii*. I think this species will be found generally distributed around the coast. One specimen lived some days in confinement; it left the Purpura, and adhered to the edge of the glass. Sending it to Dublin at last killed it. I may here observe that all the species of the new genus Phellia—allied to Adamsia—are as yet unknown to Ireland.

Anthea cereus. (*Ellis.*)

Has occurred to me all along the coast from Portrush, county of Antrim, to Galway Bay. It appears to have two rather distinct habitats—one, the rock-pools which occur on our shores; and the other, adhering to beds of *Zostera marina*; *Himanthelia lorea*, or even in some cases to the different species of Laminaria. One corner of Crookhaven Bay was completely choked up with enormous masses of *H. lorea*, and every frond had dozens of *A. cereus*, mostly of the variety with rosy-tipped, greenish tentacles, as in Fig. 2, Plate V., of the "Actin. Brit." I have also observed this peculiarity in specimens in confinement: some never resting from their wanderings until they anchor themselves to the green ulva growing in the aquarium. I have witnessed the process of spontaneous division in this species; but this is now such a well-established fact as to be hardly worth recording.

Actinia mesembryanthemum. (*Ellis.*)

Occurs commonly all around the coast. I am inclined to think that some of the well-marked varieties may be restricted to certain provinces. Thus, the strawberry Anemone is rather a southern form; in some parts of the county of Cork the dark-green variety is even commoner than the liver-brown one, which latter may be regarded as the typical colour. I have little hesitation, from the description given, in placing *A. margaritifera* of Templeton as a variety, though I have never seen a specimen. Its localities, as given by Thompson, are the Copeland Islands,

Belfast, and Donegal, which latter is an unexplored region. Still, such is the accuracy of Professor E. Forbes, who found them, that I reserve my final judgment until I examine the locality. I fancy the *A. chiococca* of Cocks will also prove a variety, as the colour of the marginal spherules does not appear to be constant. Indeed, Mr. Gosse informs me of a variety from Cumbræ in which they are quite absent. In a large rock-pool near the Piper Rocks, Berehaven, county of Cork, I found a variety, the prettiest known to me next to the strawberry; the body and tentacles were of a rich scarlet, and the marginal spherules were like large globes of transparent crimson glass, they were of a large size, and some forty or fifty in number, all in full blow; being kept in confinement for a few days, the colour of the spherules lost its brilliancy, and became of a bluish tinge. I have taken in the west a specimen nearly white, with the slightest blue tinge, and forming a chaste and pleasing contrast with the base and tentacles, which still retained their azure-blue colour. W. Thompson would appear never to have observed any varieties of this species. The dirty estuaries of some of our large rivers, as the Liffey, seem to exterminate Mesembryanthemum from their immediate vicinity.

Bunodes gemmacea. (*Ellis.*)

So far as my experience goes, I would say that this is an essentially southern species, perhaps extending upwards on our south-west coast. It is also an inhabitant of the Littoral Zone. I first knew of its occurrence as Irish from specimens sent me from Cork Harbour by Professor J. Reay Greene, and have since found it rather sparingly on the south coast, and as far west as Bantry Bay; some of the finest specimens I have seen adhering to small pieces of slaty Devonian, not much below ordinary high-water mark.

Tealia crassicornis.

This is the *Actinia gemmacea* of Templeton, and is recorded by Thompson as occurring in deep water off the coasts of Down and Antrim. I know no portion of our coast on which, in suitable places, this species does not abound. It appears quite able to adapt itself either to the clear waters of the west, or to the dirty, muddy waves of such rivers as the Liffey or Lee. Along the North Wall, which, in Dublin, runs along the entrance of the Liffey, it abounds of a large size, and seems to wallow in all the filth of the river; but I have seen as large, and generally brighter coloured specimens, occurring off Howth.

Tealia Greenii (*n. s.*).

Of this form I have been unable to obtain fresh specimens. Mr. Gosse thinks it is a variety of the former species. At page 131, *ante*, I have given the reasons which have led me to consider it as perhaps distinct. At the same time, I am not anxious to lengthen the synonyms of our Anemones, if possible; I would, therefore, consider this name as merely provisional. It was forwarded to me from Cork by Professor J. Reay Greene. I lost a specimen of a Bunodes or a Tealia, taken at Parkmore Head, Ventry, which I would say was *T. Ballii*, as figured in Plate IV. of the "Actin. Brit." This Part was not published at the time of its discovery (July, 1858), so that I imagined my specimen new; but as I did not verify the species, this record must be taken for what it is worth.

Corynactis Allmanni. (*E. P. W.*) (With Plate XVIII.)

Corynactis viridis. (*Allman*, "Ann. of Nat. Hist.," vol. xvii. p. 417, Pl. II.)
,, ,, (*Johnston*, "British Zoophytes," vol. i., p. 205.)
,, ,, (*Gosse*, "Manual of Marine Zoology," p. 28.)
,, *Allmanni*. (*W. Thompson*, "Nat. Hist. Ireland," vol. iv., p. 462.)
,, ,, (*Gosse*, "Marine Zoology," p. 28, Fig. 29.)
,, ,, (*Gosse*, "Devonshire Coast," p. 422, Plate VIII.)

This beautiful species was first discovered by Professor Allman at Crookhaven, county of Cork; he called it Viridis from the bright grass-green colour of the specimens he found. The *C. Allmanni* of Thompson is nothing more than a red variety of the species. As the name Viridis is so likely to deceive—having done so, indeed, in the case of the Belfast specimens—and green being but one of a large variety of colours which this species assumes, I have ventured to substitute the name of its discoverer, an old pupil of whom I am privileged to regard myself, which, while it will not mislead, will at the same time identify him with this charming Anemone. The green variety I did not find so very common on the west or south as those of the various shades of red, crimson, and peach colour. In some spots it occurred in vast profusion, covering whole rock-pools on the Alderman Rocks, off Crookhaven Harbour. I also dredged it, adhering in numbers to the roots of Laminaria, in Bantry Bay; and some portions of the shore of Ventry Harbour are thickly studded with this pretty gem. Specimens of nearly one inch in diameter, when expanded, were not uncommon. It would seem, from my present

knowledge, to appear first in the south-west province, and it is also found in the north-east one. It is an interesting question to decide whether it is continued all along the west, north-west, and north coast. I am pretty certain it does not occur—though all negative testimony must be received with caution—in the east or south provinces. Plate XVIII. is from drawings kindly lent me for the purpose by my esteemed friend, P. H. Gosse, F. R. S.

Corynactis heterocera. (*W. Thompson.*)

This well-marked species occurred sparingly at Crookhaven, of a pale-yellow colour, adhering to the smooth surface of large stones. Anything more like a miniature crown can hardly be imagined than this species when expanded, the outer row of tentacles, as so well described by its discoverer, lying down, forming an acute angle with the disk. It would appear to be a rare species, but would at the same time be very easily overlooked, as it can assume an almost transparent appearance, which makes it very difficult to be perceived. It does not appear to be so gregarious in its habits as *C. Allmanni*, and, although I looked carefully for it, I did not find it in any other locality.

Ilyanthus Scoticus. (*Forbes.*)

Of this, the only detached Anemone that I find recorded as Irish, one specimen was found by Mrs. Hancock, in 1843, on the beach at Balbriggan, county of Dublin, after a storm. I have never seen a specimen.

ZOANTHIDÆ.

Zoanthus Couchii. (*Johnston.*)

Of this species I know nothing personally. It has been dredged in Strangford Lough, so long since as 1835, by the late Mr. W. Thompson, and again, in 1846, by Mr. G. C. Hyndman. It was found adhering to dead specimens of *Tapes aurea*, &c. The English habitat is the most southern parts of Cornwall.

TURBINOLIADÆ.

Turbinolia milletiana. (*Defranc.*)

This species has been dredged alive off the Isles of Arran, Galway Bay, by Mr. Barlee. I hope that in the exploration of this Bay next summer, the Dredging Committee will be fortunate enough to come across this interesting Madrepore.

Cyathina Smithii.

This would appear to occur as a rare species all round the coast. It has been taken alive in Belfast Bay; in Dublin it occurs off Lambay and Dalkey Sound. According to a note in Thompson, it has been taken in some numbers on the Nymph Bank of Waterford. This I regard as rather a strange locality, never having dredged them in deep water; and my own experience and that of Mr. Gosse (see "Devonshire Coast") would go to prove that it occurs at or near low-water rock, adhering to the perpendicular sides of rocks. Youghal: Miss Ball.—I have found it common in Bantry Bay, and Dr. Ball has taken it at Bundoran, a favourite watering-place in Donegal. I am rather inclined to think that the paucity of our Madrepores may be accounted for by their being all regarded as belonging to this species.

The annexed Table, though of course imperfect, will serve to show for the present the distribution of the previously mentioned species:—

	N.	N. E.	E.	S.	S. W.	W.	N. W.
1. Actinoloba dianthus,	*	*	*	*	*	*	?
2. Sagartia bellis,	*	*	*	*	*	*	?
3. „ miniata,	.....	.....	.....	*	*	.....	.....
4. „ rosea,	.....	.....	.....	*	*	.....	.....
5. „ ornata,	.....	.....	.....	.....	*	.....	.....
6. „ venusta,	.....	.....	.....	*	*	*	.....
7. „ nivea,	.....	.....	.....	.....	*	.....	.....
8. „ sphyrodeta,	.....	.....	.....	.....	*	.....	.....
9. „ pura,	.....	.....	.....	.....	*	.....	.....
10. „ coccinea,	.....	.....	.....	.....	.....	.....	* ?
11. „ troglodytes,	.....	*	* ?	.....	.....	.....	.....
12. „ viduata,	.....	*	*	.....	.....	*	.....
13. „ parasitica,	.....	.....	.....	.....	*	.....	.....
14. „ hastata,	.....	.....	.....	.....	*	.....	.....
15. Adamsia palliata,	.....	*	*	*	*	.....	.....
16. Anthea cereus,	*	*	*	*	*	*	.....
17. Actinia mesembryanthemum,	*	*	*	*	*	*	*
18. Bunodes gemmacea,	.....	.....	.....	*	*	.....	.....
19. Tealia crassicornis,	.....	*	*	*	*	*	.....
20. „ Greenii,	.....	.....	.....	*	.....	.....	.....
21. Corynactis Allmanni,	.....	*	.....	*	*	*	.....
22. „ heterocera,	.....	.....	.....	.....	*	.....	.....
23. Ilyanthos Scoticus,	.....	.....	*	.....	.....	.....	.....
24. Turbinolia milletiana,	.....	.....	.....	.....	.....	*	.....
25. Zoanthus Couchii,	.....	*	.....	.....	.....	.....	.....
26. Cyathina Smithii,	*	*	*	*	*	.....	.....
	1	2	3	4	5	6	7

Total number of species, 26, or about half the number recorded as occurring in England and Scotland. This difference will, I trust, be greatly diminished in a few years.

Lucernariadæ.

Lucernia auricula.—Occurs on various parts of the coast. It is mentioned as found in the county of Antrim by Thompson. I have taken it at Portrush, near the Giant's Causeway, and at different parts of the coasts of Cork and Kerry.

L. fascicularis.—Donaghadee (W. Templeton), along the shores of Ventry Bay. It is rather common.

L. campanulata.—Miltown Malbay (Professor Harvey); Bray (Dr. Ball); Kerry (E. P. W.).

Hydra tuba. Galway (Professor J. Reay Greene); Dublin Bay (E. P. W.).

The Lucernariadæ have such undoubted affinities to the Hydrozoa, that I could not include them in my list of Zoantharia. I hope on a future occasion to lay before the Association a more carefully compiled list of our Irish habitats, with an account of a new species that occurred to me on the shores of Ventry Bay.

Dr. Kinahan read the following paper—

ON THE GENUS PLATYARTHRUS (BRANDT); WITH NOTICES OF ALLIED UNDESCRIBED GENERA. (WITH PLATE XIX.)

The genus Platyarthrus, established by Brandt in 1833,* has been hitherto very imperfectly characterized. With the exception of Brandt's original and imperfect description given below (*vide* note), there is no published description of either genus or species, unless *Itea crassicornis* (*Koch*), described in Panzer's "Fauna Germanica." I, therefore, take the opportunity of the discovery of this animal in England, by the Rev. A. R. Hogan, to draw up a full description of it, and also of other imperfectly known or new genera of the same great family, Oniscoidea.

* Genus Platyarthrus (*Brandt*).—"Ultimus antennarum articulus, conicus, penultimus oblongus, dilatatus, compressus. Antennæ sexarticulatæ.

"Platyarthrus Hoffmannseggii (*nobis*). Patria. Germania. Conspectus monographiæ Crustaceorum Oniscodorum Latreillii. Mosquæ, p. 12."

Shortly after the communication of this species to me by its discoverer in England, the Rev. Mr. Hogan, M. H. Lucas showed me, at the Jardin des Plantes in Paris, specimens taken by him at Fontainbleau, with the remark that the species appeared to him to be undescribed. These specimens he had obtained from ants' nests; he also informed me that in Algeria he had met with an Oniscoid having the same habits, of which he kindly gave me specimens for description, and which I have named *Lucasius myrmecophilus* (*Lucas' sp*).

The singularity of the usual habitat of these animals may well excite attention. It is true that many other isopods are occasionally found in ants' nests. Thus, last month, in the nests of *Myrmica rubra*, *fusca* and *nigra*, at Bray Head, I met *Porcellio scaber*, *Philoscia muscorum*, *Oniscus fossor*, and *Armadillium vulgare*, but all appeared to be only accidental visitors, not regular denizens, as *Platyarthrus* is stated to be. On the occasion just noted, I searched upwards of seventy ants' nests, but unsuccessfully, for *Platyarthrus Hoffmannseggii*; the season may have been too late.

In Brandt's description, given before, the number of articulations in the tige of the external antennæ is incorrectly given, but this organ is so often inaccurately described by the older authors, that the discrepancy need not excite any surprise.

The affinities of the genus would lead me to place it near Porcellio, from which genus it differs chiefly in the shortness of the external antennæ, the shape of the fifth joint of that organ, the remarkable mode in which the posterior pleopods and the telson are articulated together, and in the form of the head. However, I think the genera may very judiciously be placed in the same family as I before suggested in my paper, read before the British Association in 1857,* forming, along with Oniscus, Porcellio, and Deto, a well-marked natural family.

The arrangements of the parts of the head and its lobes are unique in the family, though at first sight obscure, requiring a skilful manipulation of the light, &c., to make out; and in a short notice of this species, communicated by me to the "Zoologist" for 1858, I fell into the error of supposing that the same arrangement prevailed here as in Porcellio. The fact is, that in this genus these parts approach more closely in arrange-

* "An Analysis of certain allied Genera of Terrestrial Isopoda," &c., "Nat. Hist. Rev.," vol. iv., Proc. of Soc., p. 274, *et seq.*

ment to Armadillium, the lobes, both lateral and frontal, being derived from the cephalic or mandibular (i. e. fourth) somite, and not from the third, or second antennary. This latter is but badly developed here, and small; but at the same time, the distinctions between it and the fourth somite are distinctly appreciable on a careful examination.

The articulation between the posterior pleopod and the telson (last ring) is very remarkable. The telson is totally devoid of coxæ, and the ring continued beneath the body terminates abruptly on either side in a rounded lobe, so that the central portion of the body underneath is unprotected, the ring being wanting in the median line. The posterior pleopods are articulated to the superior border of the inferior (sternal?) part of the ring, a little internal to the external lateral angle, by a well-marked ball and socket joint, so that at first sight it appears as though these appendages were derived from the penultimate (fifth) somite, and not from the telson.

The internal antennæ are three-jointed, i. e. a peduncle and a two-jointed filament. I find this arrangement of parts in nearly all the Oniscoids I have examined, and therefore conclude that it is the normal arrangement of parts in this group, and characteristic of them.

Family.—PORCELLIONIDÆ.

Genus 3.—Platyarthrus (*Brandt*).

(Πλατυς αρθρος.)

Telson (cingulum ultimum) coxis obsoletis. Pleopoda posteriora (pedes spurii) sub nuda, ad *telson* angulum superiorem externo-lateralem, articulata, basis subrotundus; *Ischium* trigonum, satis appendiculatum. Antennæ internæ 3-articulatæ. Antenn. extern. basis, articulus 2dus minute-lobatus, articulus 5tus dilatatus compressus. Filamentum 2-articulatum. Abdominis cingulûm, coxæ 1mi et 2di obsoletæ, 3tii, 4ti, 5tique magnæ. Carapax frontaliter et lateraliter lobatus. *Species*, una, P. Hoffmannseggii.

1.—*Platyarthrus Hoffmannseggii* (*Br.*).

Corpore omnino dense scabro; cingulûm marginibus tuberculis scabris crenulatis. Fronte arcuato, lobato; lobis lateralibus, prominentibus; lobo frontali arcuato setis crassis ornato. Antennis ut *genus*, scabris et hirtis. Cephalothorax: cingulûm coxis bene productis.

Abdominis coxis ut *genus*. Telson (cing. ult.) triangulare; lateribus excavatis, superne sub-sulcato; setis tuberculisque marginato.

Habitat: in formicariis ad "Lulworth Cove, Sussex," Angliâ, Rev. A. R. Hogan. Et Gallia in formicariis ad Fontainbleau, Paris, M. H. Lucas.

Platyarthrus (*Brandt*).

Body flattened; head transverse; lateral and rontal lobes strongly marked, arising from frontal margin, which passes deeply down into the third ring. Third ring reduced to a small triangular plate on each side.

Internal antennæ three-jointed.

External antennæ: peduncle five (5) jointed, second joint slightly lobed internally, fifth broad and flattened. Tige two-jointed, rounded, scabrous.

Cephalothorax: coxæ well developed, somewhat squared. Abdomen: coxæ of first and second somites obsolete; coxæ of third, fourth, and fifth well developed, curved downwards. Telson (last somite): coxæ obsolete.

Posterior pleopods (false feet) attached to superior external lateral angle of ventral portion of telson, which is incomplete beneath. Peduncle (basis) nearly completely uncovered, sub-rotund (?), sides parallel. Accessory lobe well marked, soldered to peduncle for two-thirds of its length. Accessory filaments well marked, slender. Ischium flattened, trigonal, terminating in a filament. Species, *Pl. Hoffmannseggii*.

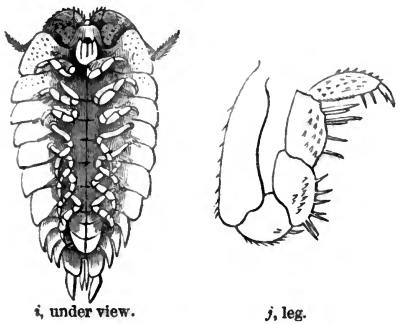
Species 1.—*Plathyarthrus Hoffmannseggii* (*Brandt*).

Body scabrous, covered with compressed, scale-like, club-shaped prominences. The posterior margins of the cephalothoracic and abdominal somites edged with similar prominences, so as to appear crenulated; on the lateral borders of the coxæ these become converted into curved bristle-like hairs, best marked on the abdominal somite.

Head densely scabrous, somewhat triangular, deeply embedded in the fifth ring of the cephalothorax, arched in front. Lateral lobes prominent. Frontal lobe continuous across forehead, arcuate, fringed with coarse hairs. Internal antennæ inconspicuous. External antennæ densely scabrous. Peduncle: 1st joint short; 2nd, with a small lobe on

inner edge; 3rd, triangular and short; 4th, superior border deeply emarginate, lobed; 5th, at its origin narrow, then suddenly enlarging its sides, becoming parallel. Tige two-jointed, equal in length to the fifth joint of the peduncle, which nearly conceals the basal articulation of tige, which is very short; terminal articulation conical, terminating in a bristle, and densely hairy.

Coxæ of cephalothoracic rings well developed, and, except that of head, quadrate, the posterior angles directed downwards. Coxæ of abdominal rings well developed. Telson triangular, excavate at the side, a shallow pit on its upper surface, the posterior border margined with hairs and tubercles. Posterior pleopods scabrous. Peduncle subrotund, somewhat quadrilateral, sides parallel, the inferior articulation crenulated on its margin. Accessory lobe well marked, though small, arising from inferior border of peduncle. Accessory appendage slightly curved, rounded, scarcely attaining to apex of peduncle. Ischium flattened. Trigonal scabrous, equal to peduncle in length.



i, under view. *j*, leg.

Pl. Hoffmannseggii.

Colour: dead white, the intestinal band showing through.

Habitat: nests of ants.

Localities: Lulworth Cove, Sussex; Rev. A. R. Hogan. Fountainbleau; Paris, M. H. Lucas.

This interesting animal has much the aspect of a Porcellio; the character of the antennæ, however, easily distinguishes it generically, as well as the mode of attachment of the false feet of the last pair.

From Mr. Hogan's description (*vide* p. 170, *ante*), its habits appear to resemble those of Porcellio.

The only detailed description that I can find at all approaching the

species here given is Henrich Schæffer's continuation of Koch's "Fauna Germanica,"* and is here quoted :—

Itea crassicornis.

"T. alba, dorso subflavescens, antennis pedibusq; crassis, Koch Dtschl. Crust. Myr. u. Arachn. h. 36. n. 5.

"Nearly the shape and size of *Itea rosea* (*Philougria rosea*), but the last ring of the tail (telson) short, and the tail appendages (schwanzgabel) shorter and thicker. The surface of the body-rings dull, and very finely rippled, that of the last ring (schwanzringe) somewhat glossy; the three front (anterior ?) (vordern) joints of the antennæ short and narrow at the base; *the fourth, thick, somewhat long, enlarged into a belly behind* (das vierte dick, ziemlich lang, hinten bauchig erweitert). The filament (Endglied) somewhat shorter than the fourth articulation; conical, passing into a point, small, bristle-like, and point much drawn out.

"The head and antennæ, body, tail, and legs, white, streaked on the back with yellowish; the track of the intestine brown.

"Found in the neighbourhood of small water-cisterns, and other wet places,—the borders of castle ponds, where it is somewhat common."

The figure which accompanies this description is characteristic, and, as has been before observed in treating of the genus Philougria,† differs altogether from the other forms associated as Itea. The description of the antennæ is very characteristic, bearing in mind that Koch has overlooked the existence of the first joint of the peduncle of the external antennæ; so that the joint described by him as the fourth is really the fifth, or that on the form of which Brandt has founded the genus. The habitat assigned to this species alone makes me hesitate, though perchance it will be found that this discrepancy is more apparent than real.

Itea crassicornis, or, at least, a species under this name, is also described by A. M. Stein in his "Catalogue of the Crustacea and Myriapoda of the Grisons," published in the "Annual Report of the Natural History Society of the Grisons," 1855. I have not seen this notice, and

* "Deutschlands Crustaceen, Myriapoden u: Arachniden herausg: von Herr-Schäffer, 186, 5."

† "Proc. Nat. Hist. Soc. Dublin," vol. ii., p. 112.

am indebted to my friend, A. H. Haliday, Esq., for the note of its occurrence. Fifteen species of Oniscoids are there described, including this species and *Trichoniscus roseus*. This last, I suspect, is *Itea rosea* of Koch—my *Philougria rosea*—a species, by the way, which, although wanting in the Museum of the Jardin des Plantes, I found (August, 1858) to be exceedingly common on the quays, and in other places in the neighbourhood of Dieppe, replacing, in a great degree, *Philougria riparia* of the British shores. Possibly this species may have been introduced from some of the French ports into Plymouth.

In the "Revue et Magazine de Zoologie, 1853," in some "Observations on two new Genera of Coleoptera, inhabitants of Ant-hills," by M. H. Lucas, mention is made of an Oniscoid found by M. Lucas, according to a note he kindly furnished me with, "in the neighbourhood of Medeah, in Algeria, under moist stones in ant-hills of *Myrmica testaceo-pilosa*," and which M. Lucas, but without description, has named *Porcellio myrmecophila*. Examination of specimens kindly communicated to me by the discoverer proves that the species belongs to a genus nearly allied, in some characters, to Trichoniscus, as described by that author. I have therefore constituted for it a genus, to which I would, from the discoverer of the species, append the name of Lucasius.

Family.—LUCASIDÆ.

Genus.—Lucasius (*n. g.*) (*a M. H. Lucas*).

Telson (cingulum ultimum) coxis obsoletis. Pleopoda posteriora (pedes spurii), duas partes longitudinis *telson* celata, ad *telson* marginem exteriorem articulata, basis quadrilateralis. Ischium trigonum nudum, lobus accessorius satis magnus. Appendix crassus. Antenn. extern. terarticulata. Antenn. extern. basis lobatus, filamentum bi-articulatum; articuli inter se valde inæquantes. Abdominis cingulûm coxæ, 1mi et 2di absunt, 3tii, 4ti, 5tique satis magnæ. Carapacis lobi laterales magni, lobus frontalis abest. *Species una.* (*Lucasius myrmecophilus.*)

1.—*Lucasius myrmecophilus* (*Lucas' sp.*).

Corpore, toto sub piloso, carapace granulato. Fronte arcuato. Telson triangulare subsulcato apice acuto, nitido. Pleopodis posterioribus setis sparsis obsessis. Ischio trigono. Appendice accessorio pilis validis

ornatis; vix basis longitudinem æquante. Habitat in formicariis. *Myrmicæ testaceo-pilosæ, ad Medea Algeriam in Africam (teste M. H. Lucas).*

The affinities of this genus are not so easy of solution as those of the last; for whilst in the characters of its antennæ it approaches somewhat the Philougridæ, in those of the telson and its appendages it comes nearer to the Porcellionidæ. Unwilling to include in that family a genus having no frontal lobe to the carapace, and the absence of coxæ to the first and second abdominal rings, separating it from Philoscidæ, for the present I prefer to refer it to the same group as Trichoniscus, which, as I find by examination of the specimens in the Paris Museum, has the same peculiarities. Whether the species to which I refer has been correctly referred by M. H. Lucas, in his "Exploration Scientifique de l'Algerie," to Brandt's genus, it is impossible to tell, as Trichoniscus, like all the genera established in the "Conspectus Oniscodorum," is most imperfectly described; whilst the species in M. Lucas's work is both described and figured in detail, and may therefore justly stand for the type of the genus.

Trichoniscus pusillus of Brandt, the original type species, appears to be hitherto undescribed, and unfigured, at least under this name. In one respect there is a discrepancy between Brandt's generic description and the species described by M. Lucas—viz., in the characters of the tige of the external antennæ, which are thus given by Brandt:—"Antennæ *six-jointed*, last joint setaceous, penultimate, cylindrical, slender."—*Conspectus*, p. 12. But as Brandt has also, and most incorrectly, as shown in a former part of this paper, included under his Hexarthrica the genus Platyarthrus, he is probably in error here also, especially as in M. Lucas's type specimens of Trichoniscus, which the authorities of the Jardin des Plantes liberally permitted me to examine, I found that the basal joint of the tige was minute, and easily overlooked by the naked eye. I question the existence of an Oniscoid with a single joint *only* in the tige; for though such, doubtless, might exist, none is at present known.

The genus Trichoniscus, as thus established, differs from my new genus Lucasius in having the lateral lobes of carapace less prominent and continuous in front of the orbits, though not prominently so. The form of the body and posterior pleopod resembles Porcellio. The telson approximates that of Lucasius, with which other characters point out a close affinity.

LUCASIUS (*n. g.*).

Body flattened; head transverse; no frontal lobe; lateral lobes well marked, arising from third segment beneath orbits.

Internal antennæ three-jointed.

External antennæ: peduncle, second articulation squared, lobed; fifth, scarcely broader than filament; tige two-jointed; articulations *conical*, very unequal in length.

Cephalothorax: coxæ well developed.

Abdomen: coxæ of first and second somites obsolete; coxæ of third, fourth, and fifth, narrow, curved backwards. Telson (last somite): coxæ nearly obsolete.

Posterior pleopods (false feet) arising from inner margin of telson. Peduncle nearly completely concealed by last ring; quadrilateral. Accessory lobe well marked, arising from base of peduncle. Accessory filament slender; blunted at the apex. Ischium trigonal, uncovered for two-thirds its length. Species: *L. myrmecophilus*.

Lucasius myrmecophilus (*Lucas' sp.*).

Synonyms: *Porcellio myrmecophilus* (Lucas, "Revue de Zoologie").

Body covered sparingly with tufts of hair shining, head granulated. Granulations continued down on first, second, and third cephalothoracic segments. Internal antennæ inconspicuous. External antennæ: peduncle hairy, five-jointed. First articulation short and linear; second, squared, twice the length of first; third, short and triangular; fourth, triangular; fifth, nearly twice the length of fourth; the superior margins of all the articulations deeply emarginate. Tige: first joint extremely short; second joint equal to second, third, fourth, and fifth of peduncle, conical, surrounded by regular circlets of hairs.

Telson triangular, apex acute, sides straight, a shallow pit marking its upper surface. Sparsely covered with hairs, but shining. Posterior pleopods covered with scattered hairs. Basis flattened, quadrilateral, hairy. Accessory lobe short. Accessory appendage scarcely attaining apex of basis, stout, hairy, blunt-pointed. Ischium trigonal, hairy.

Habitat: the nests of *Myrmica testaceo-pilosa* (Luc.).

Locality: Medeah, Algeria, Africa, where it was discovered by M. H. Lucas, Membre de la Commission Scientifique l'Algerie, after whom I have named the genus.

For the means of describing the following genera I am indebted to the courtesy of Adam White, Esq., of the British Museum, who kindly permitted me to take the necessary notes and figures from specimens in that collection.

Family. ———————— (?)

Genus.—ACANTHONISCUS (*A. White; Gosse's "Jamaica"*).

Body somewhat globose; head rounded; no true median or lateral lobes; a pair of small spurious lateral lobes beneath orbits, arising from production of antennary ring; external antennæ (?); internal antennæ three-jointed.

Cephalothorax: coxæ well marked. Abdomen: coxæ of first and second somite obsolete; third to fifth narrow.

Telson: coxæ obsolete; posterior pleopods (false feet) nearly uncovered; peduncle (basis) somewhat triangular, broad; accessory lobe badly marked; accessory appendage inserted nearly on same line with ischium, flattened, rounded at the extremity; ischium long subulate. Species, *A. spiniger*.

Acanthoniscus spiniger. (*A. White*, "Brit. Mus. Cat.," p. 99.)

Body covered over with long spines arranged in a double longitudinal row, one spine to each ring. In cephalothorax a second row of shorter spines (two to each ring) on each side at junction of coxæ and body.

Head covered with coarse knobs; two minute spines behind; a raised emarginate ridge marks out front.

Coxæ of first cephalothoracic somite expanded into a circular lobe; coxæ of second to sixth somite narrow; seventh, somewhat quadrilateral.

Abdominal somites: coxæ, first and second, obsolete; third, fourth, and fifth, narrow, curved, triangular.

Telson cordato-panduriform, apex deeply notched, its extremities triangular, produced, acuminate; sides of telson deeply incurved at base, and then broadly convex. Posterior pleopods: accessory filament somewhat flattened; rounded at the extremity, about half length of ischium, and arising from a point distant from apex about a third of total length of peduncle. Ischium long and subulate. Peduncle prolonged as a spine external to origin of ischium.

Colour: deep chocolate brown black, with lighter patches.

Locality: Jamaica.

The specimen in the British Museum, the only one I have seen, wants the external antennæ; but from the fragments of those that remain, and other characters, an affinity can be traced between this genus and the Porcellionidæ. See remarks on Deto, *infra*.

The form of the telson is unique; the posterior pleopods show an approximation to Deto; but in the absence of the antennæ it is impossible to speak positively.

Family.—PORCELLIONIDÆ.

Genus.—Ourachærus (*A. White*, "Brit. Mus. Cat.," p. 100.)

Body flattened; head transverse; lateral and frontal lobes well developed. Internal antennæ three-jointed. External antennæ: peduncle five-jointed; tige two-jointed, conical. Cephalothorax: coxæ well developed. Abdomen: coxæ, first and second somite obsolete; third to fifth, narrow, curved, and long. Telson: coxæ obsolete. Posterior pleopods: peduncle quadrilateral. Accessory lobe extremely minute, arising from posterior margin of peduncle. Accessory filament minute, subtrigonal. Ischium long, flattened, and spathulate. Species, *O. caudatus*.

Ourachærus caudatus. (*A. White*.)

Body oval, shining, covered with smooth granules. Head transverse, faintly tuberculated. External antennæ: peduncle longitudinally sculptured; first articulation, short; second, broader, its margins produced, and angular; third, same length as second, but somewhat narrowed; fourth, three times length of second, its upper margin furnished with a moderate-sized tooth; fifth, twice length of fourth, slender and narrow. Tige two-jointed; basal articulation, four times length of terminal, which is conical.

Telson triangular, acuminate. Posterior pleopods as *genus*. Accessory filament barely attaining to apex of peduncle. Ischium lamellar, spoon-shaped, flattened, nearly six times as long as peduncle.

Locality unknown.

The general outline and appearance of the surface of the body of this strange species closely resembles *Oniscus murarius*, as well as the form and development of the coxæ and telson. The characters of the

ischium of the posterior pleopods, as regards form, separate it from all known genera, but the agreement in characters of the posterior pleopods (this alone excepted), telson, and arrangement of parts of the head, induce me to place it in the Porcellionidæ, as an osculant genus to Scyphax of the Philoscidæ. *Porcellio Wagneri* (*Brandt*) shows an approximation to the form of the posterior pleopods.

Family.—PORCELLIONIDÆ.

Genus.—Deto (*Guerin Meneville*).

Body convex. Head: lateral lobes well developed. Internal antennæ three-jointed. External antennæ: peduncle five-jointed; second articulation rounded, unlobed; tige four-jointed. Posterior pleopods: peduncle triangular, lamellar; accessory lobe well marked, arising from base of peduncle. Ischium compressed, trigonal, acuminate. Accessory appendage trigonal, slender. Species, *Deto echinata* (*Guerin Meneville*) *Deto Whitei* (*n. s.*).

1. *Deto echinata* (*Guerin*) ("Mag. Zoolog." Cl. VII., Plate XXIV., Figs. 1-4).—Head and cephalothorax granular, and clothed with a double longitudinal line of strong spines. *Abdomen smooth*; telson triangular-acute at the apex.

2. *Deto Whitei* (*n. s.*).—Cephalothorax spined: abdomen: *first somite smooth; second to fifth spined.* Telson smooth, rounded at the apex. The spines on the second and fifth abdominal rings are sometimes replaced by rounded granules.

I have named this well-marked new species after Adam White, Esq.

The examination, through the kindness of that gentleman, of the typical specimen on which M. Guerin Meneville founded this genus, enables me to refer this genus positively to the family Porcellionidæ, the number and form of the joints in the tige, and the spiny armature of the body, alone separating it. *Porcellio echinatum* (*Lucas*) approaches it very closely in this last character. It also displays considerable affinity to the genus Acanthoniscus, (*White*), but at present it would be unadvisable to unite the two in the one family.

Genus.—Pyrgoniscus. (*A. White in lit.*)

Body flattened. Head transverse; frontal lobes cleft in centre, arising from cephalic ring, broad, squared, passing out on each side, and

concealing lateral lobes and peduncle of external antennæ. Lateral lobes small, arising internal to external antennæ. Internal antennæ three-jointed. External antennæ (?). Cephalothorax: coxæ well developed. Abdomen: coxæ of first and second somite obsolete; coxæ of third to fifth well marked. Telson: coxæ obsolete; posterior pleopods uncovered; peduncle triangular, truncate at apex; accessory lobe minute, arising from superior border of peduncle. Accessory appendage subulate. Ischium arising from inner margin near apex of peduncle, short and conical.

SPECIES.—*Pyrgoniscus cinctutus.*

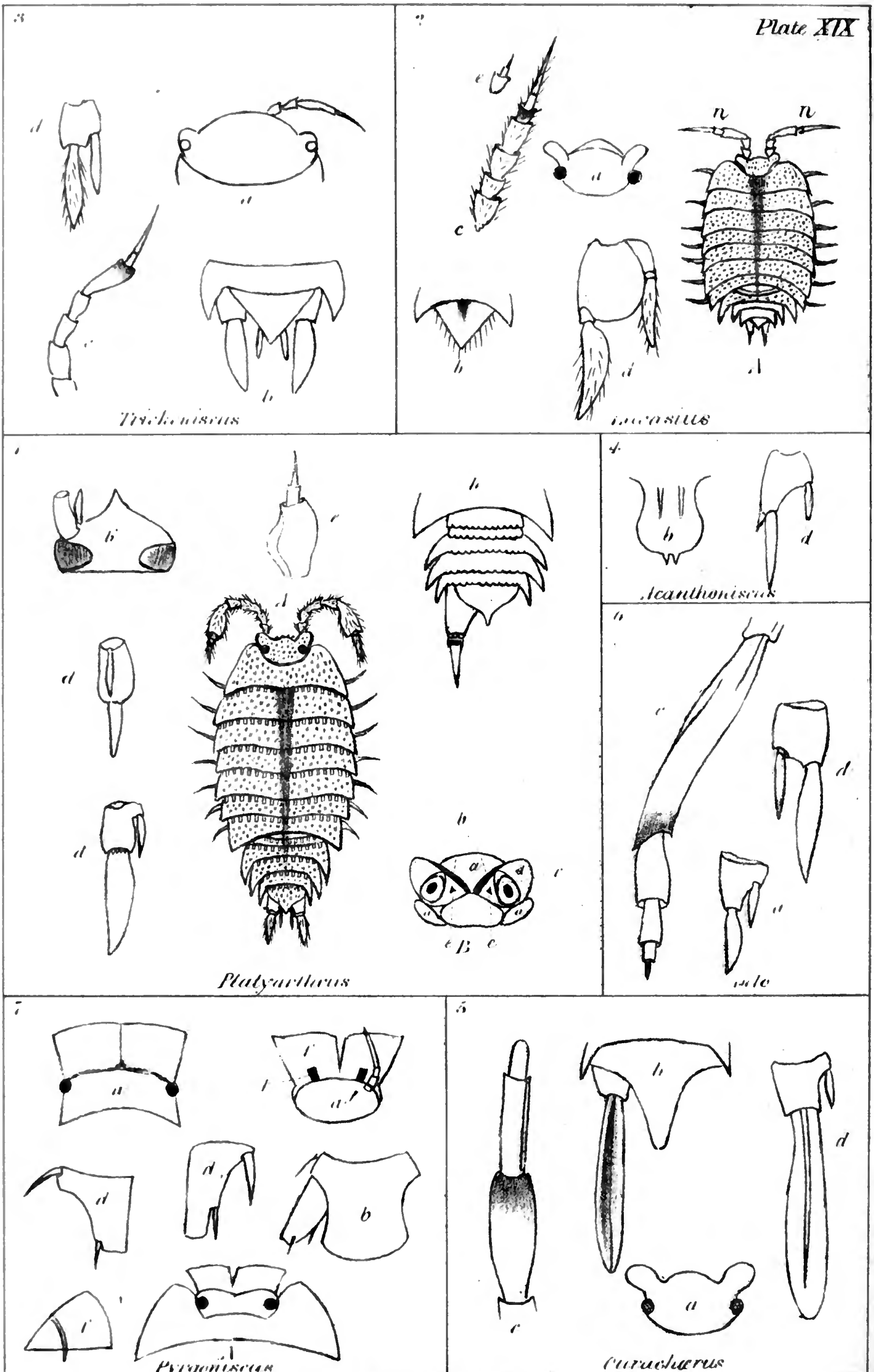
Body broadly oval, smooth. Head deeply embedded in coxæ of first cephalothoracic ring; frontal lobe cleft in the median line, broad, flattened, and squared, completely concealing lateral lobes; lateral lobes small, quadrilateral. Cephalothorax: coxæ of first somite irregularly quadrilateral, expanded in front, and touching produced frontal lobes; coxæ of second to seventh somites quadrilateral, a raised transverse median ridge marking each somite. Abdomen: coxæ, third to fifth somite curved backwards. Telson deeply excavate at sides; apex broadly, truncately rounded. Posterior pleopods: peduncle broad, filling space between telson and fifth somite, inner border excavate at base, outer border straight, apex rounded, the whole representing a right-angled triangle, with truncate apex. Accessory appendage about one-third length of peduncle, which conceals it. Ischium arising from inner margin of peduncle a little below its apex, subulate, minute, scarcely attaining apex of peduncle, which is squared.

A narrow raised ridge marks insertion of legs beneath cephalothoracic somite, this is produced backwards, as a tooth, passing beyond posterior margin of somite.

Locality: Eastern Seas.

In many of its characters this genus approaches the Armadillidæ, near which family it should doubtless stand. The characters of the lobes of the head are but an exaggeration of the form of arrangement prevailing in some of that group. Unfortunately, in the specimen shown me the external antennæ were injured. Mr. White informs me it was procured in the Eastern Seas during the exploration of H. M. S. Herald.


NATURAL HISTORY.



Forster & Co Lith. Dublin

DESCRIPTION OF PLATE XIX.

No. 1.—*A. Platyarthrus Hoffmannseggii, much enlarged.*

B, details of under side of head; *a*, frontal ring; *b*, suture; *c*, external antennary plate; *d*, lateral lobes; *e*, internal antennary plate.

b, abdominal rings ♂, showing absence of coxæ in first and second rings.

b', under view of telson, showing attachment of posterior pleiopod.

d, *d*, back and lateral view of posterior pleiopods.

e, internal antennæ.

No 2.—*A. Lucasius myrmecophilus, enlarged.*

a, back view of head; *b*, telson; *c*, external antennæ; *d*, posterior pleiopod; *e*, internal antennæ.

No. 3.—*Trichoniscus.*

a, back view of head; *b*, last abdominal ring, telson, and appendages; *c*, external antennæ; *d*, posterior pleiopods.

No. 4.—*Acanthoniscus spiniger.*

b, telson; *d*, posterior pleiopod.

No. 5.—*Ourachœrus caudatus.*

a, head; *b*, telson; *c*, fourth and fifth joint and tige of external antennæ; *d*, posterior pleiopods.

No. 6.—*Deto Whitei.*

c, fourth and fifth joint and tige of external antennæ; *d*, *d*, front and back view of posterior pleiopods.

No. 7.—*Pyrgoniscus cinctutus.*

A, head and first ring; *a*, back view of head, showing frontal lobes; *a'*, under view of head, showing—(1) lateral lobes, and (1') frontal lobes and external antennæ.

b, telson and posterior pleiopods.

d, *d*, frontal and back view of posterior pleiopods.

f, under view of coxæ of cephalothoracic ring, showing transverse ring and process.

The ballot having opened, the following were declared duly elected as—

Ordinary Members:—1. Charles Churchill, *Jun. Fresh.*; 2. Sir Richard Griffith, Bart., LL. D.; 3. Professor M'Dowel, M. D.; 4. Rev. W. Pakenham Walsh, A. M.; 5. George Orr Wilson, A. M.

Corresponding Members:—1. W. King, Professor of Geology in the Queen's College, Galway; 2. N. B. Ward, F. R. & L. S. S., London.

The Rev. Professor Haughton gave notice of the following Motion:—That in Section IX. of the Rules of the Association the word "three" be substituted for the word "five."

The Meeting then adjourned.

FRIDAY EVENING, DECEMBER 17, 1858.

Professor W. H. Harvey, M.D., M.R.I.A., F.L.S., F.R.S., President, in the Chair.

The Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

Dr. E. Perceval Wright read the following paper by J. Grainger, A. M., Corresponding Member:—

ON THE SHELLS FOUND IN THE POST-TERTIARY DEPOSITS OF BELFAST.

There has been, at least as far as I am aware, but little published respecting the shells found in the alluvial deposits in the neighbourhood of Belfast. In the preface to Mr. Bryce's "Tables of Simple Minerals, Rocks, and Shells," it is stated that contributions were made to his "List of Shells found in the Counties of Down, Antrim, and Derry," by Dr. M'Gee, from the excavation made in 1830 for the basin which is at present called the Prince's Dock. There is, however, no distinction made in the list between those dead shells and the rest which had been met with in the living state. Another notice is contained in a paper read by Mr. Mac Adam on 12th June, 1850, before the Geological Society of Dublin, and published in their Journal, in which there is given a list of the shells found up to that period. This, which was but a bare list of names, was kindly acknowledged by Mr. Mac Adam as having been furnished to him by me, and contained names of no species which had not been met with by myself. The species enume-

rated amounted to seventy. In 1852 I read notes of what had been observed up to that period at the Belfast Meeting of the British Association, an abstract of which is published in the Report.

In 1857 Mr. Hyndman reported to the British Association the proceedings of the Belfast Dredging Committee, and alluded to the occurrence of a large number of the species of the alluvial beds. The present paper treats the subject in detail, and includes a number of additional species which I have met with this year.

The greater part of the town of Belfast is built upon alluvial deposits of bluish-coloured sand and silt, owing their presence there to the slow but sure instrumentality of that river especially, which is now called the Lagan. It is not many years since a tributary of this stream ran, uncovered, through High-street, which was then, as it still is, the principal thoroughfare of the town. The memory of this is perpetuated by the name Bridge-street being yet given to a locality where no water is to be seen, although the rivulet still wends its way beneath the adjoining pavement. The reclaiming and occupying of much of these beds is within the memory of many besides "the oldest inhabitant;" and one rather extensive area, composed of mud raised in forming a new channel, within the last few years, and designated the Queen's Island, has been converted into a sort of park for public resort, and is fast becoming a favourite promenade. The depositions extend far into the bay, and are extensively exposed, at low water, as far as Holywood, upon the county of Down side, and to White Abbey, upon that of the county of Antrim. They thus occupy at least a space, the boundaries of which, speaking generally, are not unlike the sides of an isosceles spherical triangle, as it is usually represented upon a plane. The length of each side is four miles, and that of the base about six miles. The localities which were most examined by myself were the embankments raised for the two railways which run along the sides of the bay, and which may be considered as the sides of the triangle, and the cutting made during the progress of the harbour improvements. The latter is in the direction of a straight line from the vertex where we suppose the town to be, bisects the triangle, and is nearly two miles in length. The embankments on which the railways lie are formed almost entirely of the sand and mud raised on the spot, and leaving numerous shallow excavations. The cuttings, however, made to afford a straight channel, instead of the old tortuous course of the tidal river, presented shells

from much deeper levels, which may be estimated from the fact that vessels drawing ten feet at low water, and eighteen feet at high water, can by this means now easily reach the town. It affords an example of the importance of seizing opportunities for prosecuting scientific researches, presented by the progress of altogether different operations, when we consider that these localities will never again be accessible to inspection, the channel being now occupied with water, and the railways completed and ballasted over. The deposits appeared to have the shells rather scattered everywhere throughout them than lying in regular beds. This, together with the fact that the same shells were found at almost every depth, made it useless as well as impossible to observe levels to which the species should respectively belong. Besides, the shells, no matter at what depth found, were all of recent species. Thus the whole formation appears to be of one geological age. In addition to those localities, may be mentioned the foundations of the town generally.

The order and nomenclature I shall use are those which appear in Professor Forbes' and Mr. Hanley's "History of British Mollusca."

Teredo Norvegica (*Spengler*).

Of this species, which was so long confounded with the *Teredo navalis* of Linneus, but the merit of whose restoration to its original distinctness is due to Messrs. Forbes and Hanley, three portions of tubes have been met with by myself. They were merely embedded in the clay, as if the wood in which their inhabitants had pursued their operations had decayed away from about them; and since the valves were not found, and the tubes were only fragmentary, they had experienced the mercies of currents and waves. Their presence in the deposits appears to me corroborative of the evidence adduced to prove the indigenousness of the species, in opposition to the prevalent opinion among British naturalists, since it is not likely that at the period of their existence, Belfast, which is a town of extremely modern growth, was at all visited by foreign ships. Two of the fragments bore the distinctive semi-concameration of the species, and were, therefore, from the narrow end of the tube; one of them being three inches in length and half an inch in diameter at the widest part, while the third had attained the maximum breadth of three-fifths of an inch. They were covered with the remains of that olivaceous epidermis which is more

observed in foreign than in native examples of the present day. This mollusc is not now an inhabitant of the harbour; nor indeed do I know any habitat nearer than Portpatrick, in Wigtonshire, a harbour presenting geological features corresponding to some of those of Belfast Bay. In both these places there is an identically similar formation of grauwacke, containing the same minerals. I do not know whether this would have any effect in favouring the presence of the Teredines. Mr. Hyndman has also met with the species in wood dug up in making sewers in Belfast.

Pholas dactylus (*Linneus*).

A single valve of this species was found by myself in the sand which had been raised near Holywood for the construction of the railway. It still exists in some numbers at Cultra, about a mile farther down the bay, where I have met with it boring into the sandstones of the curious series occurring there, about which there has been so great a controversy as to whether it should be referred to the Permian or Carboniferous system.

Pholas parva (*Pennant*).

This species has not been met with in the deposits by myself or by any one else of whom I inquired, but I am informed that Dr. Drummond found it in the submerged peat in the dead state, which is its only appearance in the bay.

Pholas crispata (*Linneus*).

Several extremely fine examples of this species were found in the silt by myself, one measuring four and a half inches in length, and two and a half in breadth, by much exceeding the largest recent specimen measured by Messrs. Forbes and Hanley. It is not now common in the bay, and it attains but a comparatively diminutive size.

Pholas candida (*Linneus*).

A tolerable number of single valves of this species occurred in the clay with a few perfect specimens, all of which were so large as to suggest the thought that they "died of old age." The best specimen measured three inches in length, and one and a quarter in breadth. It is at the present day abundant in the harbour, burrowing in the sandstones and variegated marls on both sides of the bay.

Saxicava arctica (*Linneus*).

A valve or two was all that occurred of this likely species, which, with its congener Rugosa, was much more abundant in former times than at present, if we may judge from their frequent occurrence in raised sea-beds in so many places. It is still an inhabitant of the bay.

Mya truncata (*Linneus*).

Occurred plentifully in the blue clay. One example measured two and three-quarter inches in breadth, and three inches between its lateral extremities. It is still an exceedingly common species in the harbour.

Mya arenaria (*Linneus*).

Was found everywhere in the silt. One specimen was four inches in length, and two and a half in breadth. It is now a favourite food with the poor along the neighbouring shores, and is known among them by the name Cocklebrillion.

Corbula nucleus (*Lamarck*).

Was met with but sparingly in the clay, and generally with separated valves. It occurs still in the bay.

Thracia phaseolina (*Lamarck*).

A number of specimens of this species were found, but generally in single valves. It is common enough in the harbour at present, in a fresh state, but dead.

Thracia pubescens (*Pulteney*).

One rather fine specimen occurred to myself. It has been taken also, but not in the living state, in the bay.

Thracia convexa (*Wood*).

A large number of this species, so rare in the living state, was obtained in the clay. From the great fragility of the shell, however, not many with both valves could be preserved in the attempt to extricate them from the tough substance in which they were embedded. The specimens were almost all of a fine size. Dr. M'Gee informs me that it occurred to him also abundantly in the excavation for the Prince's Dock. It is noted by Mr. Thompson as having been taken near Belfast, not alive, but with ligament fresh.

Solen marginatus (*Pulteney*).

Occurred in the sand of the deposits rather frequently, the most so of any of the larger Solens, although at present it is not an inhabitant of the bay, while the other species are common. It has been dredged, however, in the dead state, at Bangor, near the mouth of the harbour, in eight fathoms, by Mr. Patterson.

Solen ensis (*Linneus*).

The variety Magna was present, and was represented in the sandy deposits by one or two poor examples, while *Solen siliqua*, which is extremely abundant in the bay, was not met with at all. Both the typical form of Ensis, and the variety Magna, occur in the living state in the harbour.

Solen pellucidus (*Pennant*).

Was found rather locally in some numbers in the sand, and was also embedded in the blue clay, where there appeared to be no sand, contrary to what we should expect. The length of a good specimen was an inch and a half; its greatest breadth three-eighths of an inch. It is dredged commonly enough in the bay.

Solen siliqua (*Linneus*).

Since the proof-sheets of the foregoing passed my hands, I met with several fragments of this species in a large heap of the sandy mud which has been raised by the steam-dredges from the bed of the present channel near the light-house. At the same time, during a search of one hour, the number of species I observed amounted to no less than sixty-two.

Ceratisolen legumen (*Linneus*).

A single valve of this species was found by Mr. Millen in the light-house deposits. It has never been obtained before from the bay, either living or dead.

Solecurtus coarctatus (*Gmelin*).

A single rather fine example of this scarce species was met with in the clay by E. Aikin, Esq., of Dublin. It has not been discovered in the bay as a living species; but it has been taken in some of the neighbouring estuaries, Larne Bay especially.

Psammobia vespertina (*Chemnitz*).

One valve only occurred in the sandy mud. It is of the full-grown size. This species is likely still an inhabitant of the harbour, if I may conclude so from a fine fresh specimen of the shell, with valves united, which I found at low-water mark at Dalepoolin; but it has not been dredged in the bay, as it is not mentioned in Mr. Hyndman's Report.

Psammobia Ferroensis (*Chemnitz*).

Was not scarce in the deposits, but occurred only in single valves. The full ordinary size of the species in the recent state was nearly reached. It is now dredged in the bay, in the dead state, but with valves united.

Tellina tenuis (*Da Costa*).

Was represented in the sandy deposits by rather fresh-looking specimens, in some degree preserving their glossy and tinted surface. It is one of the mollusca found off the harbour at present.

Tellina fabula (*Gronovius*).

Occurred in the light-house bed. Has not been taken living, though a likely inhabitant, from the freshness of the shells met with on the shores of the bay.

Tellina solidula (*Pulteney*).

This species was distributed everywhere in great abundance throughout the beds, and many of the individuals preserved their bright internal colouring. It is still a common shell among those living in the neighbourhood.

Syndosmya alba (*Wood*).

The shells of this species, so long known by the subsequently bestowed epithet Boysii, were very common in the sand and mud, being well distributed, and occurring in large numbers in company. They were generally of good size, the measured length of one specimen being $\frac{1}{1}\frac{4}{6}$ths of an inch, and its breadth $\frac{7}{1}\frac{}{6}$ths of an inch. It is in the recent state also an inhabitant of the bay.

Scrobicularia piperata (*Gmelin*).

This species, the *Lutraria compressa* of Lamarck, has left ample memorials of itself in the blue clay of the deposits. The samples were

more numerous and much finer, the nearer to the course of the river they were found. The size attained was sometimes remarkable, the length of one being $2\frac{1}{8}$ inches, and its breadth $1\frac{2}{8}$. Mr. Hyndman records it in his report:—"At a depth of 30 feet in sinking a well at Durham-street mill; at 18 feet at Linfield mill; on the muddy banks of the River Lagan, nearly as far up as the tide now flows. It has not been found living." I have also remarked it in abundance in the post Pleistocene beds of Clontarf, near Dublin.

Donax anatinus (*Lamarck*).

This species has been met with by Mr. Millen in the light-house deposits, and is at present an inhabitant of the bay.

Mactra elliptica (*Brown*).

Occurred pretty often in the sandy deposits, and preserved its glossy epidermis in a striking degree. No examples of more than average size were found. It is still enumerated amongst the inhabitants of the harbour.

Mactra subtruncata (*Da Costa*).

A large number of fine examples of this species was found in the sandy mud of the beds, with their regular concentric grooves and yellowish tinged cinereous epidermis in good preparation. One example, selected rather for its fine appearance than for its size, measured more than one inch and a quarter in length, and in breadth exactly one inch. Shells of this species were brought up in the mud raised by the steam-dredges in clearing the bed of the river opposite the site of the former Harbour Office between the foot of High-street and Waring-street. It was here that a sandy ford across the Lagan existed for many centuries, and gave name to the town, Belfeirste, "town of the ford." There is a continuous chain of notices of this ford in the records of the neighbourhood, extending from the year 667, in which a battle was fought between the Ulidians and Picts *upon the Ford.* As it became an impediment to the navigation of the modern sea-port in 1786, it was mostly removed, and was found to consist of a finished work of stones and wood, upon the substratum of a sandy bar formed by the confluence of the Lagan and High-street river with the tidal sea-water. It was lately completely obliterated by the Harbour Commissioners; and it was after clearing away the sand that they came upon the mud, which must,

therefore, have been deposited before the formation of the ford twelve hundred years ago. The Subtruncatæ appeared exactly similar to those of the present day. The species is still abundant in the sand of the bay, and from its being found in company with *Cardium edule*, obtains commonly the epithet of "Lady-cockle."

Lutraria elliptica (*Lamarck*).

Was embedded everywhere in the sand and mud in numbers, retaining in some degree its thin olive-coloured epidermis. One example measured five inches in length, and three in breadth. Another had a curious accumulation of shelly matter inside one valve, very hard, and nearly half an inch in thickness. It is yet a not unfrequent species in the harbour, in a fresh, but not a living state.

Lutraria oblonga (*Chemnitz*).

A remarkably fine specimen of this now absent species occurred to the late James Lemon, Esq., a graduate of your University, and a much esteemed, though youthful Member of your Association.

Tapes decussata (*Linneus*).

Appeared pretty often in the bluish sand of the deposits, generally preserving its decussation of concentric sulci, and radiating striæ. No remains of colouring could be detected. Some examples were of a large size. I suppose I should refer to the post-tertiary deposits a remarkably perfect specimen which I took from the mortar of the wall of the orchard of a very ancient ecclesiastical building giving name to the townland of Monkstown, which has been identified by the Rev. Dr. Reeves with Killana-manach, a name current in 1643, when the origin of the edifices was a mystery, and there were only ruins even then to give a clue. It has been dug out of the sand opposite Jordanstown in the living state.

Tapes pullastra (*Wood*).

Was met with very abundantly in the sandy mud in remarkable preservation. Its variety Perforans did not occur, perhaps because there were no stones to afford it a habitation. One specimen measured an inch and three-quarters in length, and an inch and a quarter in breadth, and had by no means reached the maximum size of its fellows. It is extremely abundant at present along the shores of the harbour.

Tapes aurea (*Gmelin*).

This species was locally abundant in the sand of the deposits. Some examples had the ligament and colouring, by no means the worse for their having been embedded, perhaps owing this high state of preservation to the presence of some antiseptic principle. In various spots in the bay nothing could be more plentiful than this species is at the present day.

Venus striatula (*Donovan*).

Three varieties of this species occurred in some numbers in the sandy mud. First, the regularly laminated, elongated, and compressed Laminosa, then typical specimens of the Gallina of British writers, and a decidedly ventricose variety, with crowded and not very regular costellæ. The variety Gallina did not attain to anything like its usual size in the recent state. It still lives in the harbour.

Artemis exoleta (*Linneus*).

Single valves occurred to me in the light-house deposits; also a prominent species in the former sea-beach, four feet above high-water mark, at Jordanstown. It is now commonly enough thrown up, with separated valves, by the tide.

Artemis lincta (*Pulteney*).

Was found in the deposits very sparingly in single valves, still presenting a glossy appearance. It is not uncommonly met with valves united in the bay.

Lucinopsis undata (*Pennant*).

Distributed in vast numbers throughout the sandy mud. One specimen measured an inch and a half in length, and almost an inch and three-eighths in breadth. I have met with it thrown on the neighbouring shores in a recent, though not living state.

Cyprina Islandica (*Linneus*).

A fragment of this species, with very fresh epidermis, occurred in the light-house bed. It is rarely taken living in the dredge.

Cardium echinatum (*Linneus*).

Fine examples of this long known species were extremely numerous in the blue clay. One specimen occurred, of a rather obliquely elongated

shape. Another had one of its radiating ribs surmounted by a double row of the prickly spines. It is still dredged in the bay in the living state.

Cardium edule (*Linneus*).

Vast numbers of the shells of the common cockle were embedded in the sands of the deposits. One example, found in a raised sea-bed called the Kinnegar, at Holywood, about 10 feet height above high-water mark, measured an inch and five-eighths in length, and an inch and three-eighths in breadth. It is found abundantly in the living state on both sides of the harbour.

Cardium Norvegicum (*Spengler*).

I have found a single valve of large size of this species in the deposits. I have a fresh, but dead specimen which was thrown up on the strand. I believe living individuals have not been dredged.

Cardium pygmæum (*Donovan*).

This species, to which Gmelin gave the well-known epithet, Exiguum, but, on account of inadequate definition, lost his claim to precedence, occurred not unfrequently in the beds. It is still met with in a dead state in the bay.

Lucina borealis (*Linneus*).

Shells of this species, the *Lucina radula* of Lamarck, which Messrs. Forbes and Hanley have discovered to have been previously determined by "the illustrious naturalist of the north," were found in a finely developed state, and in some numbers. The yellowish epidermis was not entirely decayed. It is still dredged in Belfast Harbour, but not in the living state.

Lucina flexuosa (*Montagu*).

Fine examples of this delicate species were found in great numbers in the blue clay. They generally measured seven-sixteenths of an inch in length and breadth; and one individual attained half an inch in length. It is among our present inhabitants of the bay.

Montacuta ferruginea (*Montagu*).

I have found a single valve of this species in the light-house deposits. It does not occur in a living form in the bay.

Montacuta bidentata (*Montagu*).

I have met a few of this species in the light-house deposits. Only dead specimens have been taken in the bay.

Turtonia minuta (*Otho Fabricius*).

A few specimens of this minute shell (the well-known *Montacuta purpurea*) were met with, having their purple hue in perfect preservation. It is sometimes found living in abundance in the harbour.

Mytilus edulis (*Linneus*).

Several varieties of this variable shell occurred in vast numbers in the bluish clay. The size was generally above the average of recent specimens, one individual measuring three and a half inches in length, and two and three-quarter inches in breadth. There was often a great accumulation of nacreous matter inside the valves, in consequence of *Buccinum undatum* piercing the outer coat of the shell. It is an inhabitant of the bay to such an extent that it was put forward as a prominent item of likely traffic when the Belfast and Holywood Railway was in contemplation.

Modiola modiolus (*Linneus*).

A fragment of this species occurred in the former beach of Jordanstown, four feet above present high-water mark, along with twenty-two other species regularly deposited in a thin bed; common as a living form in the bay.

Modiola tulipa (*Lamarck*).

Was found pretty frequently in single valves, of a size rivalling those of its congener Edulis. The coloured rays were almost obsolete. The species still inhabits the harbour.

Nucula nucleus (*Linneus*).

This species, so well known by the Lamarckian designation, Margaritacea, appeared somewhat frequently in the sandy mud, of large dimensions. Most of the individuals exceeded half an inch in length, and were nearly as much in breadth. It still belongs to the Fauna of the neighbourhood.

Leda caudata (*Donovan*).

A single valve was all that was met with of this species, perhaps better known by the Turtonian synonym, *Nucula minima*. It has not been found in the living state in the bay.

Lima hians (*Gmelin*).

A single valve was found by Dr. M'Gee in the blue clay, during the construction of the Prince's Dock. It has also been dredged in the living state in the bay.

Pecten varius (*Linneus*).

Occurred frequently in the deposits, generally of a whitish colour, but sometimes retaining the remains of tinting. It is now not commonly met with as a living inhabitant of the harbour.

Pecten maximus (*Linneus*).

Was diffused abundantly throughout the beds, and presented examples of all ages, from the most delicate fry, a quarter of an inch in length, to gigantic individuals of the amplitude of six inches and a half. We still have it living in the neighbourhood.

Pecten opercularis (*Linneus*).

Occurred in large numbers of fine size. One individual had an indentation on the outside, which caused a corresponding protuberance inside, but this, whether it was the result of accident or of disease, did not appear to have produced much annoyance to the creature. Excellent samples are still dredged, in the living state, in the bay.

Ostrea edulis (*Linneus*).

Was embedded in innumerable myriads. The size attained was much greater than that of maximum examples in the recent state. There were several beautiful specimens of the variety Parasitica, one measuring four inches in its extreme length, and three and a half in its breadth, with the upper valve of a pure white colour, lustrous, and surrounded by a deep border of the lower valve. Another reminded one, by its produced shape, of the Virginia oyster; while a third had the beak of the lower valve very protuberant and hollowed out. As to whether the species still occurs in the bay, I suppose every one has heard already of the size and flavour of Carrickfergus oysters.

Anomia ephippium (*Linneus*).

This species appeared abundantly, and presented some of its more common varieties, Squamula especially, which obtained a size that almost threw a doubt upon the hypothesis that it was merely the young allowed to develop itself freely upon a smooth surface. The nacre of the interior had generally preserved its original brilliancy. The bay still contains living examples in numbers.

Anomia aculeata (*Müller*).

An individual of this species occurred in the raised beach at the Kinnegar, Holywood. It is also found in the living state in the bay.

Patella vulgata (*Linneus*).

One specimen only of the common limpet was found. Its paucity is easily accounted for by the entire absence of rocks or stones. In uitable localities in the neighbourhood, nothing could exceed the abundance of this mollusc, which is a very favourite article of food amongst the poor.

Trochus cinerarius (*Linneus*).

Was distributed in some numbers throughout the sandy clay of the deposits, and the bay is still favoured with its presence in abundance.

Trochus magus (*Linneus*).

This species, which Messrs. Forbes and Hanley note as "not having been found fossil in our tertiaries," occurred sparingly in the post-Pleistocene beds of Belfast. One specimen, whose base was one inch and three-eighths in diameter, had attained the vertical height of seven-eighths of an inch. It is an abundant species in the bay at present.

Littorina littorea (*Linneus*).

Was diffused in vast quantities throughout the beds. It still exists in innumerable numbers on the surface of such beds as are covered by the sea even only during the period of high water.

Littorina rudis (*Donovan*).

Occurred but seldom. All along both sides of the harbour it at present lives in abundance.

Littorina tenebrosa (*Montagu*).

Was met with rather frequently. We cannot still enumerate it among the Fauna of our neighbourhood, being only found in the dead state.

Littorina littoralis (*Linneus*).

This species, designated so long by the Linnean epithet Neritoides, which was really bestowed upon a distinct shell, occurred pretty frequently, but in nothing like the numbers that one should expect of a mollusc so prolific in the bay at present.

Lacuna crassior (*Montagu*).

Was distributed in some numbers throughout the deposits. In the bay it is still found in the living state.

Rissoa labiosa (*Montagu*).

Was found very frequently in the beds in company with *Cerithium reticulatum*. In the harbour this species still abounds.

Rissoa ulvæ (*Pennant*).

Common in the deposits. Many individuals attained a length of five-sixteenths of an inch. It is thrown upon the shore in a living state in multitudes.

Turritella communis (*Risso*).

This species, perhaps better known under the appellation Terebra, was scattered throughout the deposits in countless myriads. In gardens within the town it occurs constantly in the soil. One extremely large example, found by David Grainger, Esq., of Liverpool, measured $2\frac{3}{4}$ inches in length, and $\frac{5}{8}$ths of an inch in its greatest breadth. I am sorry to say that at the Meeting of the British Association in 1852, this beautiful specimen was abstracted from a drawer-full of examples of the post tertiary shells of Belfast which I had been exhibiting to Section D. If this should meet the eye of the delinquent, I hope that, conscience-stricken, he will return the shell to the owner, and "no questions shall be asked." It occurs in abundance in the harbour at present.

Aporrhais pespelicani (*Linneus*).

Was a very abundant shell in the blue clay. It is still an inhabitant of the neighbourhood.

Cerithium reticulatum (*Da Costa*).

Was perhaps the most abundant of the smaller shells in the beds. One somewhat distorted specimen was met with.

It is still a member of the Fauna of the neighbourhood.

Scalaria Trevelyana (*Leach*).

A tolerable number of this species was collected. It is one of the species which are not present in the bay in the living state, nor indeed do I know any habitat nearer than Magilligan on the north coast of Ireland.

Eulima subulata?

An individual of this genus was met with, but having been lost, I refrain from referring it to any species by the aid of memory merely. As far as I can recollect, however, it most resembled Subulata, a species which still occurs in the neighbourhood in the dead state.

Odostomia eulimoides (*Hanley*).

Was met with sparingly, not at all corresponding to the numbers in which it at present exists in the bay, if we may judge from the dead specimens cast up and dredged.

Natica monilifera (*Lamarck*).

Several individuals of this species occurred to me. It is now cast up on the shores of the bay in the dead state.

Natica nitida (*Donovan*).

Was found frequently in the sand of the deposits. We have it in the harbour as a living species.

Murex erinaceus (*Linneus*).

Was constantly met with. The length of the largest individual found was one inch and five-eighths.

It occurs in the harbour at present.

Purpura lapillus (*Linneus*).

Two varieties of this species occurred in considerable numbers, one rather the typical form than a variety, and the other of rather produced shape.

It lives in great abundance in the bay in company with *Littorina littorea*.

Nassa reticulata (*Linneus*).

Fine examples of this species were very common in the blue clay of the deposits.

It is still a prolific inhabitant of the harbour.

Nassa incrassata (*Müller*).

Was found in exceeding abundance everywhere in the beds. It is at present still diffused throughout the bay.

Buccinum undatum (*Linneus.*)

Was a very abundant shell in the deposits. One specimen occurred of the curious ventricose and carinated variety.

The harbour still contains the species as an inhabitant.

Fusus antiquus (*Linneus*).

Occurred sometimes, and attained a fine size. The length of one example was almost five inches. It is still found in the bay in the living state.

Mangelia turricula.

I met with several of this species, which is now common in the dead state in the bay.

Mangelia costata (*Pennant*).

A specimen of this species was met with by Miss Rea. It now occurs in the dead state only.

Mangelia rufa (*Montagu*).

An individual of this species occurred in the raised beach of Jordanstown. It has been identified in the living state in the neighbourhood, by Edward Waller, Esq.

Cyprœa Europœa (*Montagu*).

A single imperfect example of this species was met with. It now dwells at the mouth of the harbour, a considerable distance from its old station.

Tornatella fasciata.

Several shells of this beautiful species were found by Miss Rea. One individual measures an inch in length. It occurs in the dead state in the bay.

Akera bullata (*Müller*).

Was represented by a specimen or two only, perhaps on account of its extreme tenuity. It is sometimes thrown upon the shores of the bay in vast numbers.

Scaphander lignarius (*Linneus*).

A portion of a full-grown shell of this species, the well-known *Bulla lignaria*, was found in the clay. It is still an occupant of the harbour.

Philine aperta (*Linneus*).

The shells of this species, the *Bullæa aperta* of Lamarck, were abundantly present in the deposits. The largest individual met with measured three-fourths of an inch in length, and five-eighths in breadth. We still have it in our harbour.

Helix nitidulus.

Two specimens of this species were met with by Miss Rea, doubtless brought down by the river from its banks, where it may now be found in the living state under stones, and also in suitable localities in the neighbourhood.

Helix rotundata (*Müller*).

This species, the radiata of Da Costa, was found once. It is at present in its usual abundance in the immediate neighbourhood of the town.

Helix nemoralis (*Linneus*).

Also occurred once. It was of the single-banded variety. The species is common near the town.

Limneus pereger.

A few individuals were found embedded on the marl of the Three-milewater in such a manner that they could not be suspected of having

been introduced by the present river, in which it is a living species. There were found near them some rolled Lias fossils and a few marine shells, the names of which are detailed below.

Of the shells of non-molluscous animals, the following may be noted:

Creusia verruca (*Leach*).

Two or three specimens of this Cirrhiped occurred on a *Pecten opercularis*. It is enumerated amongst the Fauna of the neighbourhood.

Balanus.

Two species of this genus occurred not unfrequently. I do not know their specific appellations. They are both found recent in the bay.

Terebella conchilega.

I met with a number of the habitations of this species in the light-house deposits. It is distributed in the living state in the bay.

Pectinaria belgica (*Pall*).

The agglutinated sandy habitation of this Annelid was met with on one occasion. The species is a common one in the harbour.

Serpula vermicularis.

One or two clusters of this species occurred to me in the light-house deposits. It is one of those which live in the bay at present.

Serpula triquetra (*Linneus*).

A mass of shells of this species was found attached to a Pecten. It is constantly met with, recent, in the bay.

Gastrochæna modiolina (*Lamarck*).*

Two portions of the curious flask-like tubes of this species were found in the deposits. It is not known as living in the bay; but I have

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* This species added in the Press.

met with a fine specimen, in the dead state, in a piece of limestone, in a garden in the neighbourhood, which could not be traced as to whence it came; but possibly it was brought from the rolled stones of the shore, on account of its being burrowed so extensively as to appear like a curious piece of fret-work.

The following is a Table showing the distribution of such species as have been found in beds above the level of high-water, in the neighbourhood of Belfast. It is the result of a few careful examinations of the localities indicated, and is given for the purpose of stimulating further research. Attention was drawn to the presence of recent shells in these raised sea-beds by Mr. Mac Adam, in his paper read before the Geological Society of Dublin, before alluded to, where he adverted especially to meeting with them in the cuttings for the County Down Railway from Belfast to Comber, at various levels, to the maximum of 80 feet above high-water. I have obtained from him the names of the species he found, and have included them below. Mr. Hyndman, in his Report, has also recorded the occurrence of *Littorina littorea* in the sandy beach of the River Blackstaff, two miles above the present highest reach of the tide. The species found at the raised beach of White Abbey have been furnished me by Louis Valentine, Esq. I owe my thanks also to John Owden, Esq., for the opportunity of recording the species of the former beach at Sea-Park.

There have been enumerated 103 species in all, typical specimens of nearly every one of which are preserved in my cabinet. Among the specimens are a number of remarkable individuals, in consequence of their inveterately retaining the surrounding matrix, which envelops them so firmly that it has assumed the consistence of stone, and would require a hammer to disengage it; but this, again, would be certain to injure the enclosed shells, which are very friable, and in some instances have dropped away, leaving beautiful casts. Many pieces of this hardened clay and sand occurred scattered through the deposits, generally containing one or more enclosures, and had the appearance of being rolled; but whether this had occurred during their deposition, or was the result of weather after being thrown up in the embankments where I found them, as I had not the good fortune to meet with any *in situ*, I cannot determine. They certainly presented a very distinct appearance

from the general condition in which the great mass of the shells of the deposits occurred.

	60 to 80 feet elevation, Co. Down Railway cuttings.	20 feet elevation at White Abbey.	20 feet elevation at Greencastle.	10 feet elevation Banks of Threemilewater.	10 feet elevation, Kilnegar, Holywood.	3 feet elevation, Jordanstown.	1 foot elevation, Whitehouse.	1 foot elevation, Seapark.	Mortar of ruins of Greencastle and Kill-na-manach.	40 feet elevation at Carrickfergus.
Mya truncata,	....	....	....	....	....	*	....	....	....	....
Tellina solidula,	....	*	*	....	....	*	*	....	*	....
Mactra subtruncata,	....	....	....	....	*	*	*	*	*	*
Tapes decussata,	....	....	....	....	....	*	....	....	*	....
—— aurea,	....	*	....	....	....	....	....	*	....	....
Venus striatula,	....	....	....	....	....	*	....	....	....	....
Artemis exoleta,	....	....	....	....	....	*	....	*	....	....
Cardium edule,	*	*	*	....	*	*	....	*	*	*
Mytilus edulis,	*	*	....	*	....	*	*	....	*	*
Modiola modiolus,	....	....	....	....	....	*	....	....	....	*
Pecten opercularis,	....	....	....	....	....	*	....	....	....	*
—— varius,	....	....	....	....	....	....	....	....	....	....
—— maximus,	....	*	....	....	....	....	....	....	....	....
Ostrea edulus,	*	*	....	....	*	....	*	*	....	*
Anomia ephippium,	....	....	....	....	....	*	....	....	....	*
——— aculeata,	....	....	....	....	*	....	....	....	....	....
Patella vulgata,	....	....	....	*	....	*	....	....	....	....
Trochus cinerarius,	....	*	....	....	....	*	....	....	*	*
Littorina littorea,	....	*	*	....	*	*	*	*	*	*
——— rudis,	....	*	*	....	....	*	....	....	....	*
——— littoralis,	....	*	*	....	....	*	*	*	*	....
Turritella communis,	....	....	....	....	*	*	....	....	....	....
Aporrhais pespelicani,	....	....	....	....	....	*	....	....	....	....
Cerithium reticulatum,	....	....	*	....	*	*	*	....	....	*
Purpura lapillus,	....	*	....	....	....	*	*	....	*	....
Nassa reticulata,	....	....	....	....	*	*	....	....	....	....
—— incrassata,	....	....	....	....	....	*	....	....	....	....
Buccinum undatum,	....	....	....	....	....	*	....	....	....	*
Fusus antiquus,	....	....	....	....	....	*	....	....	....	....
Limneus pereger,	....	....	....	*	....	....	....	....	....	*
Rissoa ulvæ,	....	....	*	....	....	....	....	....	....	....
Mangelia rufa,	....	....	....	....	....	*	....	....	....	....
Helix nemoralis,	....	....	....	*	....	*	....	....	....	....
Balanus,	....	....	....	*	....	....	....	....	....	....
Serpula vermicularis,	....	....	....	....	....	*	....	....	....	....
——— triquetra,	....	....	....	....	....	*	....	*	....	*

The ballot was then opened, and the following declared elected:—
Ordinary Members:—J. K. Barton, M. B., and A. Hudson, M. B.

APPENDIX.

No. I.

LIST OF MEMBERS, CORRECTED TO FEBRUARY 19, 1859.

[Corrections of any Names in this List to be sent to the Hon. Secretaries before the 1st October, 1859.]

HONORARY MEMBERS (*ex officio*).

Richard Mac Donnell, D. D., Provost of Trinity College.
Charles William Wall, D. D., S. F. T. C. D., Vice-Provost.
Humphrey Lloyd, D. D., S. F. T. C. D., F. R. S.
J. Lewis Moore, D. D., S. F. T. C. D.
Thomas Luby, D. D., S. F. T. C. D.
James Henthorn Todd, D. D., S. F. T. C. D., President R. I. A
Andrew Searle Hart, LL. D., S. F. T. C. D.
John Tolcken, M. D., S. F. T. C. D.

ORDINARY MEMBERS.

[*Vide* Rules VII. and IX.]

[Marked thus † Life Members; thus * elected under the latter half of Clause 2, Rule VII.]

Elected.
1857. Anderson, S. L., B. A., *Roebuck.*
1857. *Andrews, William, M. R. I. A., *Leinster-street.*
1857. †*Archer, William (Botan. Com. & Coun.), 50, *Upper Sackville-street.*
1855. Armstrong, H. B., B. A., *Eccles-street.*
1857. Babington, W. D., B. A., 25, *Pembroke-road.*
1857. †Ball, Robert, Sen. Fresh., 3, *Granby-row.*
1858. Banks, J. T., M. D., 10, *Merrion-square, East.*
1857. Barker, J., M. B., Director of the Museum of the Royal College of Surgeons, Ireland, 48, *Waterloo-road.*
1858. Barton, John K., M. B., 16, *Upper Pembroke-street.*
1856. Beauchamp, H. C., M. B., 115, *Lower Baggot-street.*
1859. Bevan, Philip, M. A. & M. B., F. R. C. S. I., 21, *Lower Baggot-street.*
1858. Brenan, S. A., A. B., *Kingston Lodge, Golden Ball.*
1856. Brownrigg, W. B., Science Sch. T. C. D., 18, *Adelaide-road* (Hon. Librarian).
1857. *Burchall, Edwin, 1, *Sandford-terrace.*
1857. *Callwell, Robert, M. R. I. A., *Herbert-place* (Botan. Com.).

Elected.

1854. Carmichael, Rev. R. B., A. M., F. T. C. D., 5, *College.*
1853. Carte, A., M. B., A. M., Director of the Museum of the Royal Dublin Society, *Royal Hospital, Kilmainham* (Zool. Com.).
1858. Churchill, Charles, Jun. Fresh., 15, *Stephen's-green, North.*
1856. Daniel, Robert T., M. B., L. R. C. S. I., 30, *Lower Baggot-street.*
1859. Dixon, Rev. R. Vickers, A. M., Ex F. T. C. D., *Dungannon.*
1857. Ellis, John, M. B., Sch. T. C. D., 17, *College.*
1857. *Frazer, W., L.K. & Q.C.P.I., L.R.C.S., 124, *Stephen's-green, W.*
1853. *Furlong, Alfred, M. R. I. A., 4, *Wilton-terrace* (Zool. Com.).
1857. Galbraith, Rev. Professor, M. A., F. T. C. D., 8, *College.*
1859. Glennon, James, Sen. Fresh., *Dolphin's-barn.*
1859. Gough, Hon. G. S., A. M., F. L. S., *Loughcooter Castle, Galway.*
1854. Greene, J. Reay, B. A., Professor of Natural History, *Queen's College, Cork* (Hon. Sec.).
1858. Griffith, Sir Richard, Bart., LL. D., 2, *Fitzwilliam-place.*
1853. Haffield, Cooper, A. B., *Auburn Villa, Rathgar.*
1854. Haliday, A. H., M. A., F. L. S., 23, *Harcourt-street* (Vice-President).
1858. Hamilton, A. H., *College Observatory, Dunsink.*
1853. Harvey, Professor W. H., M. D., F. R. & L. S., 40, *College* (President).
1855. Haughton, Rev. Professor, A. M., F. T. C. D., F. R. S., 40, *College* (Vice-President).
1858. Hudson, Alfred, M. B., 2, *Merrion-square, North.*
1853. Ingram, Professor J. K., LL. D., F. T. C. D., 40, *College* (Coun.).
1854. Jukes, J. Beete, A. M. (Cantab.), F. R. S., 72, *Upper Leeson-street.*
1855. *Kift, F. D., *Minnow Brook, Rathgar.*
1856. Kinahan, J. R., M. D., F. L. S., *Seaview-terrace, Donnybrook* (Zool. Com. & Coun.).
1859. Law, Robert, M. D., 25, *Upper Merrion-street.*
1859. Lee, Rev. William, D. D., F. T. C. D., *Trinity College.*
1854. *Malahide, Lord Talbot de, F. R. S., *The Castle, Malahide.*
1856. Mac Dermott, R. M., M. B., *Great Denmark-street.*
1859. Mackay, J. T., LL. D., A. L. S., *College Botanic Gardens.*
1859. M'Donnell, Robert, M. D., F. R. C. S. I., 11, *Lower Pembroke-street.*
1858. M'Dowel, Professor B. G., M. D., F. R. C. S. I., 10, *Great Denmark-street.*
1857. *M'Clintock, Capt. R. A., *Rotundo Hospital.*
1858. Montgomery, R. J., A.M., Assistant Secretary, Royal Zoological Society of Ireland, 43, *Leinster-road, Rathmines.*
1858. Napier, Lord Chancellor, LL. D., *Merrion-square, North.*
1858. Nicholson, J. H., M. A., 139, *Lower Baggot-street.*
1852. O'Mahony, Rev. Thaddeus, B. A., 28, *College* (Treasurer).
1856. O'Meara, Rev. Eugene, M. A., *Great Brunswick-street* (Botan. Committee).
1855. Shaw, G. F., LL. D., F. T. C. D., 34, *College.*
1858. Smith, H. Lees, Sen. Soph., 9, *College.*

Elected.
1854. Smith, Professor R. W., M. D., F. R. C. S. I., 63, *Eccles-street* (Council).
1853. *Smith, Captain W., *Frankfort-terrace, Rathgar.*
1856. Smyly, Philip Cecil, Sen. Soph., 13, *Merrion-square, N.*
1856. Stokes, Professor W., M. D., 5, *Merrion-square, N.* (Council).
1858. Swifte, E. G., Sen. Fresh., *Rathfarnham.*
1858. Walsh, Rev. W. Pakenham, M. A., *Sandford Parsonage.*
1856. Warren, J. W., Sch. T. C. D., B. A., *Rutland-square.*
1853. *Warren, T. W., 42, *Blessington-street.*
1859. Whiteside, Right Hon. James, M. A., M. P., *Mountjoy-square.*
1858. Wilson, George Orr, M. A., *Thornhill, Belfast.*
1857. †Whitty, John Irwin, LL. D., *Lower Baggot-street.*
1856. Wright, Edward, LL. D., *Floraville, Eglinton-road.*
1852. Wright, E. Perceval, M. B., F. L. S., Lecturer on Zoology, and Director of the Museum of the University of Dublin (Hon. Sec.), 5, *Trinity College.*

ASSOCIATE MEMBERS.

[*Vide* Rule VII.]

1858. Baily, W. H., Paleontologist to the Geological Survey, *Museum, Stephen's-green* (Paleontology).
1856. Bain, John, Curator of the College Botanic Gardens, *Ball's Bridge* (Botany).
1858. Byron, Ryland, General Valuation and Boundary Survey of Ireland, 2, *Fitzwilliam-place* (Paleontology).
1858. Du Noyer, G. V., M. R. I. A., Geological Survey, *Museum, Stephen's-green* (Paleontology).
1859. Good, John, *City-quay* (Zoology).
1859. Jones, Rear Admiral, *Harcourt-street* (Botany).
1857. M'Nally, Vere Webb, *Old Mountpleasant* (*at present at Bonny, W. Africa*) (Zoology).
1858. Moore, David, A. L. S., M. R. I. A., Director of the Botanic Garden of the Royal Dublin Society, *Glasnevin* (Botany).
1859. Porte, George, *Brunswick-street* (Microscopic Research).
1856. Walpole, W. White, *Suffolk-street* (Irish Conchology).
1855. Watters, John, *Crow-street* (Irish Ornithology).

CORRESPONDING MEMBERS.

[Marked thus * were formerly Annual Members.]

Ireland.

Allman, R. L., *Bandon, Co. Cork.*
Burkitt, Robert J. B., M. B. T. C. D., 5, *Lady-lane, Waterford.*
Carroll, Isaac, *Cork.*
Clarke, Rev. Benjamin J., A. M., *Tuam, Galway.*
Dickie, George, M. D., A. L. S., Professor of Natural History, *Queen's College, Belfast.*

Dowden (Rd.) Richard, *Sunday's-well, Cork.*
Enniskillen, Right Hon. the Earl of, F. R. S., *Florence Court, Enniskillen.*
Hodges, J. F., Professor of Agriculture, *Belfast.*
Humphreys, John, *Cork.*
Hyndman, G. C., *Howard-street, Belfast.*
King, W., Professor of Geology, Queen's College, Galway, Corresponding Member of the Nat. Hist. and Medical Soc. of Dresden, *Galway.*
Knox, Rev. Thomas, A. M., *Lurgan, Co. Armagh.*
Lane, P. W., M. D. Glas., M. R. C. S. E., *Newtownlimavady, Co. Londonderry.*
M'Adam, James, F. G. S., *Belfast.*
M'Gee, William, M. D. Edin., *Donegal-square, Belfast.*
M'Ilwaine, Rev. W., M. A., Ex. Sch. T. C. D., *Hampton, Belfast.*
Melville, Alexander, M. D. Edin., M. R. C. S. E., Professor of Natural History, Queen's College, Galway, Swiney Lecturer, *Galway.*
Ogilby, William, F. R. S., &c., *Lisclean, Dunamanagh, Co. Tyrone.*
O'Kelly, Matthias J., *Rochestown House, Dalkey.*
Patterson, Robert, M. R. I. A., &c., *College-square, Belfast.*
Robinson, Rev. G., M. A., *Tartaraghan, Co. Armagh.*
Thompson, Wyville, LL. D., F. R. S. E., Professor of Geology, Queen's College, *Belfast.*
Waller, Edward, J. P., *Lisinderry, Aughnacloy, Tyrone.*
Warren, Robert, Jun., *Sligo.*

Scotland.

Allman, G. J., M. D., F. R. S., F. R. C. S. I., Regius Professor of Natural History, *University of Edinburgh.*
Bryce, James, Jun., F. G. S., *Glasgow.*
Gordon, Rev. George, *Elgin.*
Jardine, Sir W., Bart., F. R. S. & L. S., *Jardine Hall, Dumfrieshire.*

England.

Alder, Joshua, F. L. S., *Newcastle-on-Tyne.*
Babington, C. C., M. A., F. R. & L. S., *St. John's College, Cambridge.*
Baikie, W. Balfour, M. D., *Haslar Hospital, Gosport.*
Barrett, Lucas, F. G. S., *Woodwardian Museum, Cambridge.*
Bean, William, *Scarborough.*
Bowerbank, J. S., LL.D., F. R. & L. S., *Highgate. London.*
Browne, Captain Thomas, F. L. S., *Manchester.*
Braid, James, *Manchester.*
†Crozier, Lieutenant, B. A., R. E., *Woolwich.*
Dale, J. C., F. L. S., *Glanville Wootton, Sherborne, Dorset.*
Douglas, J. W., 6, *Kingswood-terrace, Lea, Kent.*
Garner, Robert, F. L. S., *Stoke-upon-Trent.*
Gosse, P. H., F. R. S., *Sandhurst, Torquay.*
*Grainger, John, B. A., *Belfast* and *Liverpool.*
Greene, Rev. Joseph, M. A., *Cubley Rectory, Doveridge, Derby.*

Henslow, Rev. Professor, M. A., F. L. S., *Hitcham, Bildestone, Suffolk.*
Hincks, Rev. Thomas, A. B., 6, *Woodsley-terrace, Leeds.*
*Hogan, Rev. A. R., M. A., *Shaftesbury, Dorsetshire.*
Hooker, J. D., M. D., R. N., F. R. & L. S., *Royal Gardens, Kew.*
Huxley, T., M. D., F. R. S., Lecturer on General Natural History at the Government School of Mines, *Jermyn-street, London.*
Janson, E.W., Secretary, Entomological Society, 61, *Gracechurch-street, London.*
Jeffreys, J. Gwynn, F. R. S., *Swansea.*
Lankester, Edwin, M. D., LL. D., F.R. & L. S., 8, *Saville-row, London.*
Lea, John Walter, *Shepperton, near Chertsey.*
Meade, R. H., *Bradford, Yorkshire.*
Morris, Beverley R., M. D., *Bishopswearmouth, Durham.*
Mac Andrew, Robert, F. R. & L. S., *Allhallows Chambers, Lombard-street, London.*
Owen, Richard, D.C. L., F. R. & L. S., *British Museum.*
Phillips, John, M. A., LL. D., F. R. S., Reader in Geology, University of Oxford, *Magdalen College, Oxford.*
Portlock, Major-General J. E., R. E., LL. D., F. R. S., 38, *Queen's Gardens, Hyde Park.*
Redfern, P., M. D., Lecturer on Anatomy and Physiology in the University of Aberdeen, 2, *Crown-place, East, Aberdeen.*
Sabine, Major-General Edward, F. R. & L. S., *Victoria-street, Westminster.*
Sclater, Philip Lutley, A. M., F. L. S., 49, *Pall Mall, London.*
Smith, Frederick, *British Museum, London.*
Spence, William, F. R. & L. S., 18, *Lower Seymour-street, Portman-square, London.*
Stainton, H. T., F. L. S., *Mountsfield, Lewisham, Kent.*
Ward, N. B., F. R. & L. S., *Clapham Rise, London.*
Westwood, J. O., A. M., F. L. S., *Taylor Institute, Oxford.*
Wollaston, T. V., A. M., F. L. S., 10, *Hereford-street, Park-lane, London.*

FOREIGN CORRESPONDING MEMBERS.

Agassiz, D. L., F. R. & L. S., Professor in the Harwardian University, *Cambridge, U. S.*
Brien, E. A., Staff Surgeon, L. R. C. S. I., &c.
Gray, D. Asa, M. D., Professor of Botany in the Harwardian University, *Cambridge, U. S.*
Haliday, Lieutenant-Colonel W. R., 36th Regiment.
Kelaart, E. F., M. D., F. L. & G. S., Medical Staff, *Ceylon.*
Leidy, Joseph, M. D., Philadelphia.
M'Coy, Frederick, F. G. S., Professor of Natural History, Melbourne University.

No. II.

RULES OF THE DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

I. Object.

The Dublin University Zoological and Botanical Association is instituted for the advancement and diffusion of Zoological and Botanical Science in general, and to encourage and promote the study of Natural History among the Students of the University, drawing special attention to the power, wisdom, and goodness of God, as displayed in the works of Creation.

II. Constitution.

The Association consists of Honorary, Ordinary, Corresponding, and Associate Members.

III. Management.

The affairs of the Association shall be conducted by, and its property vested in, a Council, consisting of the President, Vice-Presidents, Treasurer, Librarian, Secretaries; a Member of the Botanical, and a Member of the Zoological Committees; of three Ordinary Members, elected annually at the Anniversary Meeting in October. Three Members to constitute a quorum.

IV. Officers.

The Officers of the Association shall consist of a President, two Vice-Presidents, Treasurer, Librarian, and two Honorary Secretaries: all to be elected by a majority of votes, at the Anniversary Meeting in each year, from among the Ordinary Members. If any office falls vacant during the year, it shall be filled up by the Council.

V. Duties of Officers.

PRESIDENT AND VICE-PRESIDENTS.

The duty of the President shall be to preside at the Meetings of the Association, to regulate all discussions therein, and to see to the execution of the Rules. In the absence of the President, one of the Vice-Presidents shall take his place.

TREASURER.

It shall be the duty of the Treasurer to receive for the use of the Association all sums of money payable thereto, and to disburse all its debts. No Account shall be paid by him, or cheques drawn, without the order of Council. Bank cheques must be signed by the Treasurer and

one of the Honorary Secretaries. He shall also furnish the Council every three months with a List of the Members in arrear.

LIBRARIAN.

It shall be the duty of the Librarian to take care of the Library of the Association; to keep a Catalogue of it, and also a List of Donors, and times of Donation. No Member shall be allowed to borrow any book from the Library without leave of the Librarian. No book is to be lent for a longer period than one fortnight. If any books borrowed are torn, injured, lost, or not forthcoming when demanded by the Librarian, full compensation shall be made for the same by the borrower. All Donations shall be acknowledged by him at the General Meeting, and it shall be his duty to forward the vote of thanks passed at the Meetings to the Donors; also, to forward the Proceedings of the Association to all the various Societies with whom it may exchange.

HONORARY SECRETARIES.

To keep a List of all the Members of the Association, with the names of their places of residence, &c. To transmit notices of all General Meetings, to the Honorary, Ordinary, and Associate Members; and of Council Meetings to all the Council Members, and to receive and acknowledge the communications of Corresponding Members upon all subjects in connexion with the objects of the Association. They shall see that the Proceedings of the Association be published in a proper form, and forwarded to all the Ordinary Members at the close of each year. One or other of the Secretaries shall be present at each of the Meetings of the Association, whose duty it shall be to take Minutes of the Proceedings, and register the same in a Minute-book.

To their care shall also be intrusted the various matters of detail in connexion with the Association.

VI. Committees.

There shall be two Committees, one of Botany and one of Zoology, each consisting of five Members, to be selected from among the Ordinary or Associate Members, of whom the senior (provided he be not a Vice-President of the Association) shall be ineligible for re-election for the succeeding year. Each Committee, on its first meeting, shall elect one of their number as Chairman, and another, who must be an Ordinary Member, to represent them on the Council. One of the Honorary Secretaries shall be Secretary of the Botanical, and the other of the Zoological Committee, as the President shall appoint. The President and Honorary Secretaries shall be *ex officio* members of both Committees.

To the Committee shall be intrusted the care of providing Papers on their respective subjects for the General Meetings of the Association. They shall also suggest to the Council whatever plans they shall deem fit for the furtherance of the objects of the Association in so far as their Committees are concerned.

VII. Members.

The Honorary Members are limited to the Rev. the Provost, the Rev. the Vice-Provost, and the Senior Fellows.

Ordinary Members shall be Graduates of Trinity College, Dublin, or of the Universities of Oxford and Cambridge, and Undergraduates of Trinity College, Dublin, having their names on the College Books. This Rule not to apply to any Members elected before the 1st of December, 1857, all of whom shall enjoy the same privileges.

Associate Members shall consist of those who have distinguished themselves in some special branch of Botany or Zoology, and who are not connected with the University of Dublin. They must reside in or near Dublin.

Corresponding Members shall be selected from such distinguished Naturalists as may reside at a distance from the neighbourhood of Dublin, and who are desirous of being connected with the Association.

VIII. Privileges of Members.

Ordinary Members may attend and read papers at all the General Meetings of the Association, may propose Candidates for admission either as Ordinary, Corresponding, or Associate Members, may vote at the election of the Officers of the Association, at the Anniversary Meeting held in October, may appoint the Members who are to constitute the Committee of Botany and Zoology, and may select three Ordinary Members to represent them on the Council.

They have also the power of borrowing Books from the Library.

They are eligible to any office in the Association, and obtain its Proceedings free of expense.

The Rooms of the Association are open during the week to the Ordinary Members.

Members three months in arrear are not entitled to vote at the Election of Members, &c.

Associate Members are entitled to attend and read papers at all the General Meetings of the Association, to obtain Books from the Library, and to be eligible for election as Members of the Botanical or Zoological Committees; on payment of 5*s*. per annum they may obtain the Proceedings of the Association.

Corresponding Members may attend and read papers at all the General Meetings, or may forward such papers to the Secretaries, in order that they may be laid before the Association. They may obtain the Transactions of the Association on the same terms as Associate Members.

IX. Election of Members.

The election of Ordinary Members may take place at any of the General Meetings. A Paper, on which shall be stated the name, residence, and College standing of the Candidate, must be sent to the Secre-

taries fourteen days previous to the time of election. Forms for this purpose may be obtained from the Secretaries. The Subscription for the first year must be lodged with the Treasurer, or one of the Honorary Secretaries, seven days previous to the day appointed for election. Candidates must be proposed by one Member, and seconded by at least two others. Elections of Ordinary Members shall be by ballot, one in three to exclude.

The Secretaries shall place, seven days before the next General Meeting, in a conspicuous part of the rooms of the Association, the names of such Candidates as have complied with the above conditions.

Honorary Members are elected *ex officio*.

Associate and Corresponding Members can be proposed and seconded at one General Meeting, and elected at the next, provided the Council, on due examination of the names proposed, shall see fit to have them presented for Ballot.

X. Subscriptions.

Ordinary Members who are of A. M. standing pay £1 per annum.

All other Ordinary Members pay 10*s.* 6*d.* per annum. The Life Composition for the Association is £10.

All the Members of the Association can obtain from the Secretary tickets to admit visitors to the Evening Meetings, at 6*d.* each.

XI. Meetings.

The Anniversary Meetings shall be held on the third Friday in October, at 8 o'clock, P.M. The Election of Officers, Council, Members of Committees, shall then take place, previous to which the Report from the retiring Council shall be read; also the Treasurer and Librarian's Reports for the year.

The Council shall cause lists of Officers, Members to serve on the Council and on the Committees, to be printed for election in each year. These Lists to contain all names of Members proposed for said offices by Members of the Association (not in arrear of subscription) at the June Meeting in each year, and whatever number shall be required to fill up the blanks.

The General Meetings shall be held on the third Friday in each month during Terms (except on Good Friday, Christmas Day, and Christmas eve, and then on the day previous), at the same hours. Cards of these Meetings shall be forwarded to all the Members at the commencement of each session, and Notices of all Papers to be read and Candidates to be balloted for shall be sent to all Members, except Corresponding, at least three days before the day of meeting.

The Rules of the Association cannot be altered, annulled, or added to, except at a General Meeting, and cannot become law until approved of by the Board.

No. III.

LIBRARIAN'S REPORT.

I HAVE to announce many additions to the Library within the last year, a list of which, with those presented on former occasions, will be found appended. I trust that the funds of the Association will enable me to provide a fitting Bookcase before the close of this Session, as the present one is quite inadequate for the number of volumes in the possession of the Association; and large additions may be expected in the course of this and following years from the exchanges with the Journal.

When the funds of the Association will permit, I would strongly urge that a small sum should be laid apart annually for the purposes of binding some of the more valuable Periodicals, &c., as also for the purchase of some of the Elementary Treatises on Zoology and Botany, or of some of the well-known Dictionaries of these Sciences, for the more especial use of the Undergraduate Members. The Catalogue of the Books has been brought down to the latest date, and will be found appended. The Works added each year will in future be acknowledged in detail at the opening of each Session. The expenses of the Library for the last Session have been nothing, save the postage, which has been charged for in the General Secretaries' account.

W. B. BROWNRIGG, *Science Sch.*,
Hon. Librarian.

CATALOGUE OF BOOKS IN THE LIBRARY.

[Marked thus *, purchased; thus †, from the authors.]

Zoology.

*Agassiz and Gould: Comparative Physiology.
*Blainville, D. de: Manuel de Malacozoologie et de Conchyliogie. 8vo, and 8vo Atlas of 109 Plates.
*Ditto: Manuel d'Actinologie et de Zoophytologie. 8vo, and 8vo Atlas of 100 Plates.
†Bouwstoffen voor eene fauna van Nederland, J. A. Herklots. Vol. i. *Leiden*, 1853.
Buffon: Suite des (Latreille's), 110 vols.
Burmeister: Manual of Entomology. From A. H. Haliday, A. M.
*Carpenter, W.: Zoology. Ed. by Dallas. 2 vols.
Ditto, Animal Physiology. From Dr. E. Perceval Wright.
Chenu, Dr.: Encyclopedie d'Histoire Naturelle Papillons diurnes et Coleopteres; bound in one volume, half-calf. From A. H. Haliday, A. M.
Dallas, W.: Natural History of Animal Kingdom. From A. H. Haliday, A. M.
*Gosse, P. H.: Manual of British Marine Zoology. 2 vols.

†Gray, Dr. J. E.: Guide to Mollusca, Part 1.
†Gray, Mrs.: Figures of Mollusca. Vol. V.
Huber on Bees. From the late Dr. Ball.
Introduction to Entomology, by James Duncan; with volumes on Coleoptera and British Moths and Butterflies. From Dr. E. Perceval Wright.
Jenyns, Rev. L.: Manual of British Vertebrata. From the late Dr. Ball.
*Kirby, W.: Bridgewater Treatise. 2 vols.
Kirby and Spence: Introduction to Entomology; 7th edition. From A. H. Haliday, A. M.
Linneus: Systema Naturæ. 10th edition. From A. H. Haliday, A. M.
Megen, J. M.: Systematic Description of European Lepidoptera. First three Parts, and Plates 1 to 125. Half calf. From A. H. Haliday, A. M.
Mudie: Brititish Birds. 2 vols. From Rev. W. R. Tagart.
Redi de Insectis: 2 vols. From Dr. E. Perceval Wright.
Rennie: Alphabet of Insects.
†Rondani: Diptera Italica. Several Essays in one 8vo vol.
*Schlegel, H.: Essai sur la Physionomie des Serpens. 2 vols., 8vo, and 4to Atlas.
†Smith, Frederick: Manual of British Bees (Apidæ).
Stainton, H. T.: Entomologist's Annuals, 1855–59, and Entomologist's Companion. From Dr. E. Perceval Wright.
*Thompson, W.: Natural History of Ireland. 4 vols.
Walton's Complete Angler.
Watters, J.: Irish Ornithology. From Dr. E. Perceval Wright.
*Westwood, J. O.: Natural History of Insects. 2 vols.
†Wollaston, T. V.: Insecta Maderensis-Coleoptera. Large 4to, with Plates, coloured and plain.
Woodward: Manual of Mollusca; recent and fossil. From Rev. W. R. Tagart.

Botany.

*Balfour, T. H.: Introduction to Botany.
†Cocconi: Flora di Foraggi. 2 vols.
†Dowden, Richard: Walks after Wild Flowers.
†Harvey, Dr. W. H.: Nereis Boreali America. Three parts in one vol., bound.
Henfrey: Rudiments of Botany. From A. H. Haliday, A. M.
Henslow, Rev. Professor: Descriptive Botany.
Lightfoot: Fauna Scotica. From J. H. Lamprey.
Linneus: Fauna Suecsica.
Sowerby, J. E,: Exotic Botany. 2 vols., bound in one.
†Ward, N. B.: On the Growth of Plants in closed Cases.
†Wirtgen, Dr. Ph.: Flora der Preussischen Rheinprovinz, 1857.
Unger, F., Botanical Letters. From A. H. Haliday, M. A.

Miscellaneous.

Crosse, A., Memorials of. From W. Spence, Esq.
Daubies on Basalt.
Delabeche: The Geological Observer. From J. Beete Jukes, A. M.
†Garner, Robert: Natural History of Staffordshire.
†Jukes, J. Beete: Excursions in Newfoundland. 2 vols.
†Pamphlets on Natural History. 2 vols.
Richardson: Geology and Palæontology.
White, Rev. Gilbert: Natural History of Selborne.

BRITISH.

[Marked thus ‡ means from the Society.]

Periodicals and Proceedings of Societies.

Geological Society of Dublin, vol. i., part 1. From Earl of Enniskillen.
Ditto, vols. i. (minus part 1), ii., iii. From Dr. E. Perceval Wright.
‡ Ditto, vols. iv., v., vi., vii., and viii.
‡Linnean Society of London, Journal of. Vols. i. and ii., bd.; vol. iii., parts 9, 10, 11, and Supplement.
‡Royal Dublin Society, Journal of. Vol. i., 1856–58; vol. ii., parts 9, 10, and 11.
Tyneside Naturalist's Field Club. Vol. i., from Dr. Harvey.
Ditto, Vol. ii., from Dr. E. Perceval Wright.
Ditto, Vol. iii., from J. Reay Greene.
‡ Ditto, Vol. iv., part 1, from the Club.
‡Royal Irish Academy, Proceedings of. Vol. vii., parts 1 to 6.
‡Royal Society of London, Proceedings of. Vol. ix., parts 28 to 32.
‡Dublin Natural History Society, Proceedings of. Parts 3 to 9, from Dr. E. Perceval Wright; parts for 1855–56, 1856–57, 1857–58, from the Society.
*Zoological Society of London. Vol. i., 1830, to vol. xxiii., 1857.
‡ Do., Vols. xxiv. to xxv.
‡Liverpool Literary and Philosophical Society. Vols. i. to xii., bd.
‡Berwickshire Naturalists' Club. Vol. iii. parts 1, 2, 3, and 6; vol. iv. No. 1, 1857.

AMERICAN.

‡American Philosophical Society. Vol. vi., No. 56; and Transactions, vol. xi., part 1.
‡Boston Society of Natural History. Vol. v., Nos. 12 to 21.
‡Canadian Journal of Industry, Science, and Art Vol. iii.; New Series; wanting part 15.
‡Canadian Naturalist and Geologist. Vol. ii., bd.; vol. iii.
‡Philadelphia, Proceedings of the Academy of Natural Sciences of. Vol. viii., 1856; vol. ix., 1857; vol. x., 1858, to p. 128.
‡Smithsonian Institution, publications for 1857.
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CONTINENTAL.

France.

‡Mémoires de la Societé Imperial des Sciences de l'Agriculture et des Arts de Lille. 2nd series, vols. 1 and 2.

‡Mémoires de la Société de Sciences Physique et Naturelle de Bourdeaux. Vol. i., parts 1 and 2.

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‡Archiv. für wissenschaftliche Kunde von Russland, Heraus. von A. Erman. Vol. xiv., 1855; vol. xv., 1856; vol. xvi., part 1.

‡Verhandlungen des Naturhistorischen Vereines der Preussischen Rheinlande und Westphalens. Vol. xii., 1855; vol. xiii., 1856 (*wanting* part 4); vol. xv., 1858.

‡Jahrbücher des Vereins für Naturkunde in Herzogthum Nassau. Vols. iii., iv., v., vi., vii., viii., ix., xi., xii., and xiii.

‡Zeitschrift für Entomologie Breslau. Nos. 1 to 9.

‡Gesellschaft Isis in Dresden. Vol. i., 1855; vol. ii., 1856; vol. iii., 1857.

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‡Jahrbuch der Kaiserlich-Koniglichen geologischen Reichsanstalt. Vols. i., ii., iii., iv., v., vi., vii. (*wanting* No. 4), viii. (*wanting* No. 1): all quarto.

‡Verhandlungen des zoologisch-botanischen Vereins in Wien. Vols. i. and ii., 1852; vol. iii., 1853; vol. iv., 1854; vol. v., 1855; vol. vi., 1856; vol. vii., 1857.

‡Correspondenz-Blatt des zoologisch-mineralogischen Vereines in Regensburg for 1849–1852, to 1856.

‡Verhandlungen und nuttheilungen des subenburgischen Vereins für Naturwissenschaften zu Hermannstadt, 1850, 1851, 1852, 1853, 1854, 1855, and 1856.

‡Wurttembergische naturwissenschaftliche jahreshefte, Herausgegeben, vom H. v. Mohl, H. v. Fehling, O. Fraas, F. Kraas, and W. Menzel, Stuttgart. Vol. xii., 1856; vol. xiii., 1857; vol. xiv., 1858 (*wanting* part 1); vol. xv., 1859, parts 1 and 2.

‡Abhandlungen der Naturforschenden gesellschaft zu Halle. Vol. iii., parts 1, 2, 3, and 4; vol. iv., parts 1, 2, 3, 4.

‡Abhandlungen, Herausgegeben von der Senckenbergischen naturforschenden gesellschaft Frankfort. Band I., Lief 1–2; Band II., Lief 1–2.

‡Bericht über die österreichische Literatur der Zoologie, Botanik und Palæontologie aus den Jahren, 1850, 1851, 1852, and 1853. *Vienna*, 1855. Herausgegeben von dem Zool-Botan. Verein in Wien.

‡Flora; or, a General Botanical Intelligencer, conducted by Members of the Botanical Society of Regensburg, for 1856.

‡Botanische Zeitung, Heraus. von H. von Mohl, and D. F. von Schlechtendal, for 1854.

‡Lotos: Zeitschrift für Naturwissenschaften, Heraus. vost Natur-hist-Vereine, Lotos in Prague. *Prague*, 1856: 1857, December; and 1858, January to June.

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‡Bulletin de l'Academie Imperiale des Sciences (Physico-Mathematique) de St. Petersburg. Vols. i., ii., iii., iv., v., vi. (wanting vii.), viii., ix., x., xi., xii., xiii., xiv., xv., and xvi. Small folio.

‡Bulletin de la Société Imperiale des Naturalistes de Moscou. 1856, 1 to 4; 1857, 1 to 4.

Holland.

‡Handelingen der Nederlandsche Entomologische Vereeniging. 1st Deel. Stuk. 1, 1854, and 4, 1857, minus 2 and 3. *Leiden.*

Belgium.

‡Bulletin de l'Academie Royale des Sciences de Belgique. Tome xxiii., 1856; xxiv., 1857, Nos. 1, 2, 3, and 4; tome ii., 2nd serie, No. 7; tome iii., Nos. 8, 9, 10, 11, and 12; tome iv., Nos. 1, 2, and 3; tome v., Nos. 7, 9, 10, 11, and 12.

‡Annuaire de l'Academie, a 1857, 1858, and 1859.

‡Memoirs of the Royal Society of Science, Liege. Vols. i. to xiii., 1843 to 1858, with 1 Atlas of 17 plates.

Sweden.

‡Nya Botaniska notiser för ar 1852, 1853, 1854, 1855, 1856, and Nos. 1, 2, 3, and 4, for 1857. *Stockholm.*

Norway.

‡Nyt Magazin för Naturvidenskaberne. Christiania, 1852, 1853, 1854, wanting parts 1 and 2, 1855. 1856, part 1.

‡Aws-Berättelse om Botaniska arbeten och upptäckter under ar, 1852, och 1854, af N. J. Andersson. 2 vols. *Stockholm*, 1856, 1857.

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Zoologisch-Mineralogischen Verein in Regensburg.
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Canadian Journal of Industry, Science, and Art.
Canadian Naturalist and Geologist.
Academy of Natural Sciences of Philadelphia.
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The Council have decided, for the present, to publish only one Part of the Proceedings each year. The Papers, or abstracts thereof, will be published as usual, each quarter, in the pages of the "Natural History Review and Quarterly Journal of Science."

Part III., Vol. I., it is hoped, will be published in November, 1859, and will contain about 130 pages and 12 Lithographs (two coloured).

Plates I. & II., omitted in last Part, are now given.

Part I., Vol. I., containing 130 pages and 9 Plates, July, 1858, price 5*s.*, can be obtained by Members from the Honorary Secretaries, 5, Trinity College, Dublin.

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E. PERCEVAL WRIGHT, M.B., F.L.S.,
Lecturer on Zoology, Dublin University,
J. REAY GREENE, A.B., M.R.I.A.,
Professor of Natural History, Queen's College, Cork,
} *Honorary Secretaries.*

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PROCEEDINGS

OF THE

DUBLIN UNIVERSITY

Zoological & Botanical Association.

VOLUME I.—PART III.

NOVEMBER, 1859.

With Eleven Plates.

DUBLIN:

PRINTED AT THE UNIVERSITY PRESS,

BY M. H. GILL.

LONDON:] [WILLIAMS & NORGATE.

FRIDAY EVENING, JANUARY 21, 1859.

PROFESSOR W. H. HARVEY, M.D., F.R. & L.SS., M.R.I.A., PRESIDENT, in the Chair.

THE Minutes of the previous Meeting having been read, were signed by the Chairman.

PROFESSOR J. REAY GREENE read the following paper by ROBERT GARNER, F.L.S., Corresponding Member:—

ON THE ANATOMY OF THE BRAIN IN SOME SMALL QUADRUPEDS.
(WITH PLATES XXIII., XXIV.)

THE comparative anatomy of the brain—little studied in England (Professor Owen having been almost the only labourer in the field)—has on the Continent met with more attention. Witness the accurate researches of Tiedemann, Desmoulins, and Leuret. As the importance of the subject to Zoology and Physiology cannot reasonably be doubted, the writer of this short paper will make no further apology for offering the description of the brains of a few small but interesting quadrupeds, dissected by himself.

The two genera constituting that very peculiar division of quadrupeds called Monotremes, similar in some respects, as far as the brain is concerned, in others differ as remarkably. The *Ornithorhynchus paradoxus* has a bony process in the interior of the skull, which separates the right and left hemispheres. This is deficient in the *Echidna hystrix*. In both the brain has much of the bird-like form, as is also seen in the skull. The Echidna has well-developed convolutions to its brain; that of the Ornithorhynchus is only marked by the rather deep grooves of its vessels. The former has the olfactory bulbs greatly developed; the latter, much less so. The Echidna has not the little side lobules of the cerebellum, which in the Ornithorhynchus are remarkable, occupying cavities in the temporal bone, and encircled by the three semicircular auditory canals; whilst in the Echidna these last exist, but deep in the solid bone. The Ornithorhynchus has the two posterior prominences of the corpora quadrigemina very little developed, less than in any other quadruped, as far as we know, making a gradation, therefore, to their disposition in birds. Both have that peculiarity—general, it would ap-

pear, in Marsupialia—absence of the corpus callosum. The two principal commissures are the anterior and the fornix, both well developed, the latter being continuous behind with the hippocampus major—itself much developed in such animals as have large olfactory bulbs and tracts with which it is connected. The difference constituted by the existence of convolutions in the one, and none in the other, is remarkable. The remaining parts do not much differ from other quadrupeds, and may be understood by glancing at the accompanying drawings.

With respect to the organs of sense and the cerebral nerves, we may commence (having already noticeed that the olfactory organs are enormously developed in the Echidna) by observing, that the eye of the aquatic Ornithorhynchus has a third valvular eyelid, the lens also being more convex than in the Echidna. There is a lachrymal apparatus and duct in the usual place. The nerves generally are upon the normal plan, but the fifth nerve in the duck-billed creature is enormous, to supply its curious mandible, which must possess extraordinary sensibility, though of a subdued kind, from its leathery covering, similar to that of a delicate hand in a close-fitting glove. The large nasal branch of the first division runs in a peculiar canal, but generally the distribution is as in other mammals, and it is sufficient if we say that six nervous fasciæ, generally very large, are distributed to the upper, and four to the lower mandible, on each side. I am not sure that mention is made in authors of two little organs or sacs, situate in the mouth, upon the palate, and answering to the situation of the nostrils without; they must be palatal nares. Four rudimentary anterior teeth exist, in addition to those commonly described, and are figured by Home. The origin of this great fifth nerve, approaching in width to the nerve supplying the lower extremity in man, is from the medulla oblongata, evidently below the pons. The external auditory canal is long and winding in both animals, with a very wide opening in the Echidna. The drum of the ear looks downwards in this animal, a little forwards and outwards in the Ornithorhynchus, in which, too, it is smaller and longer; and it is stretched in both on a separate rim of bone like a tambourine. Home and Blainville give only two bones to the internal ear, but we also find the incus, which is four-sided, attached to the malleus, and supporting the stapes, which is like a straight trumpet or neat nail in form. The malleus is connected with the frame of the tympanum, and also with its membrane. In the Echidna the Eustachian tube, also

overlooked, opens just within the posterior nares; it is narrow, but wider in the allied animal. A vidian nerve and other twigs, a tensor tympani muscle, &c., may also be found in the tympanum. The cochlea makes only a single turn in both; the semicircular horns have been mentioned before; in the Ornithorhynchus, one surrounds the opening of the side cavity of the skull, this giving origin to a second, which descends to the vestibule, just outside the condyle; whilst the third lies horizontally in the floor of the said cavity. The eighth and ninth nerves in the Ornithorhynchus leave the skull by a large opening before the condyles, principally closed by membrane; in the Echidna by small openings in the temporal bone.

Whilst the Ornithorhynchus may be considered a four-legged and wingless duck, the Echidna is, as is well known, an ant-eater, having a very long, extensile, and viscid tongue, and its mouth situated at the end of a tubular and callous muzzle, which of course must want the extraordinary nerves of the former animal. My two specimens of Echidna had evidently been amongst the ants, and the friend who forwarded them said that the strength of the animals, when dug up, was enormous, that they burrow in banks, and can roll themselves up into a ball. How beautifully the Ornithorhynchus or Platypus, as the colonists call it, is adapted to obtain its food, consisting of insects and molluscs found at the bottom of rivers in the mud or sand, must strike any observer.

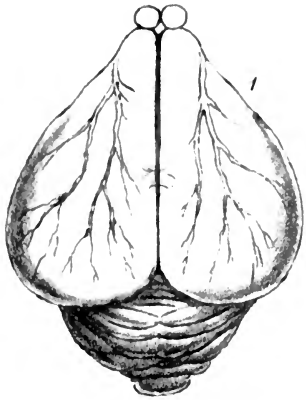
In three or four species of Hypsiprimnus and Phalangista, Tasmanian Marsupials, the Potaroos and Opossums of the colonists, the brain was principally remarkable for the peculiarity mentioned above, the absence of a corpus callosum, the fornix somewhat taking its place, and having in front four processes, two going forwards above the anterior commissure, and two downwards behind it. The cerebrum in all was perfectly smooth, the cerebellum laminated. There were moderate-sized olfactory bulbs in front, the cerebellum having the small side lobules, the corpora quadrigemina well marked, equal, and a little exposed; the hippocampus large. In fact, with the exception of the absence of the corpus callosum, leaving the third ventricle exposed between the hemispheres, or only covered by the velum and the posterior part of the fornix, these brains may well be compared with that of a hare or a rabbit.

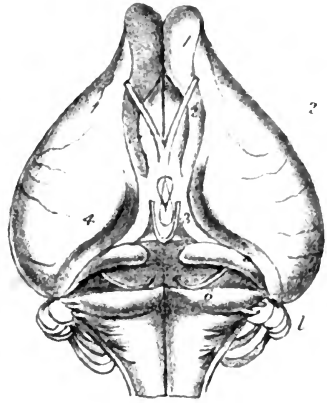
A few words on the brains of those curious little animals, the moles, two or three species of which I have examined, including the curious

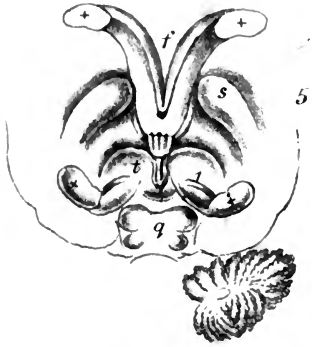
condylura with its star-like muzzle, to supply which enigmatical part the supermaxillary nerves are greatly developed, the scallops, &c., all, however, being very similar in organization to the common mole. This curious creature is admirably furnished with an organ of smell, and with an ear as perfect in its essentials as that of man; but, as is well known, only endowed with a very minute eye, a mere dot, in fact, in all the species. However, this eye we believe to have a true but minute optic nerve, as described by Carus and Treviranus, and which appears to whiten under the action of alcohol. The brain of the mole, in many respects like that of the Echidna, has, on the other hand, a well-marked corpus callosum. The olfactory bulbs and tracts are ample, and connected posteriorly with large hippocampi and the fornix. The anterior commissure is bifurcated on each side, and with extensive connexions. The optic lobes or corpora quadrigemina are fairly developed, though the posterior ones are not so well marked, but still more so, apparently, than they would be, if they were only related to the sense of light.

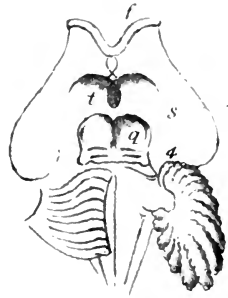
An account of the habits of animals should follow the structure of their cerebral organs. The mole, as appears from many observations, is not blind: there is a crystalline lens in the eye of our common species. Much has been written on the habits of this curious little labourer. A captured one was tied by one of its hindlegs, and allowed a longish tether, when it worked its way into the soil with almost as little effort as a fish swims in water. When it found a worm, it commenced most heartily to eat it. When a live one was placed before it, it certainly did not at first notice it, but it soon became aware of its presence, examined it, and then bit it about half an inch from its head, and lastly, beginning at that extremity, took it in gradually, in different lengths, by a sort of suction, carefully cleaning each portion with its curious paws. In central England this animal is only known to the people by the Saxon name Mouldiwarpe (turner up of the soil), whilst its curious little long-snouted congener, the Shrew, is always called Nusrow, also Saxon (nose-shrew).

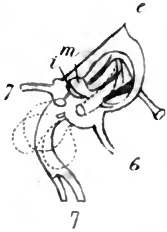
A few words, in conclusion, may follow on the habits of two other little animals, the pretty water vole, and the more disagreeable Norway rat. With respect to the former, a friend, who is an antiquary, sent me a quantity of its bones, which abound in ancient British barrows, the one from which these specimens were taken being at least a mile from any water: the conclusion therefore is, that the animal (perhaps

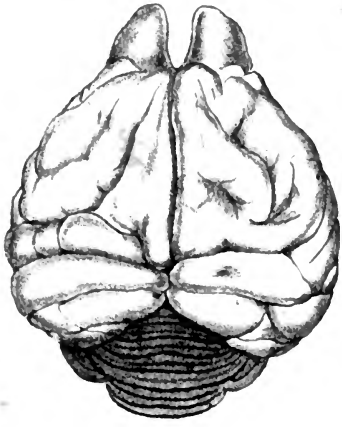


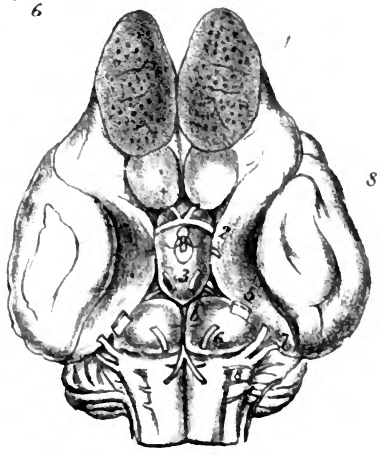












1 to 4 Ornithorhynchus

5 to 8 Echidna

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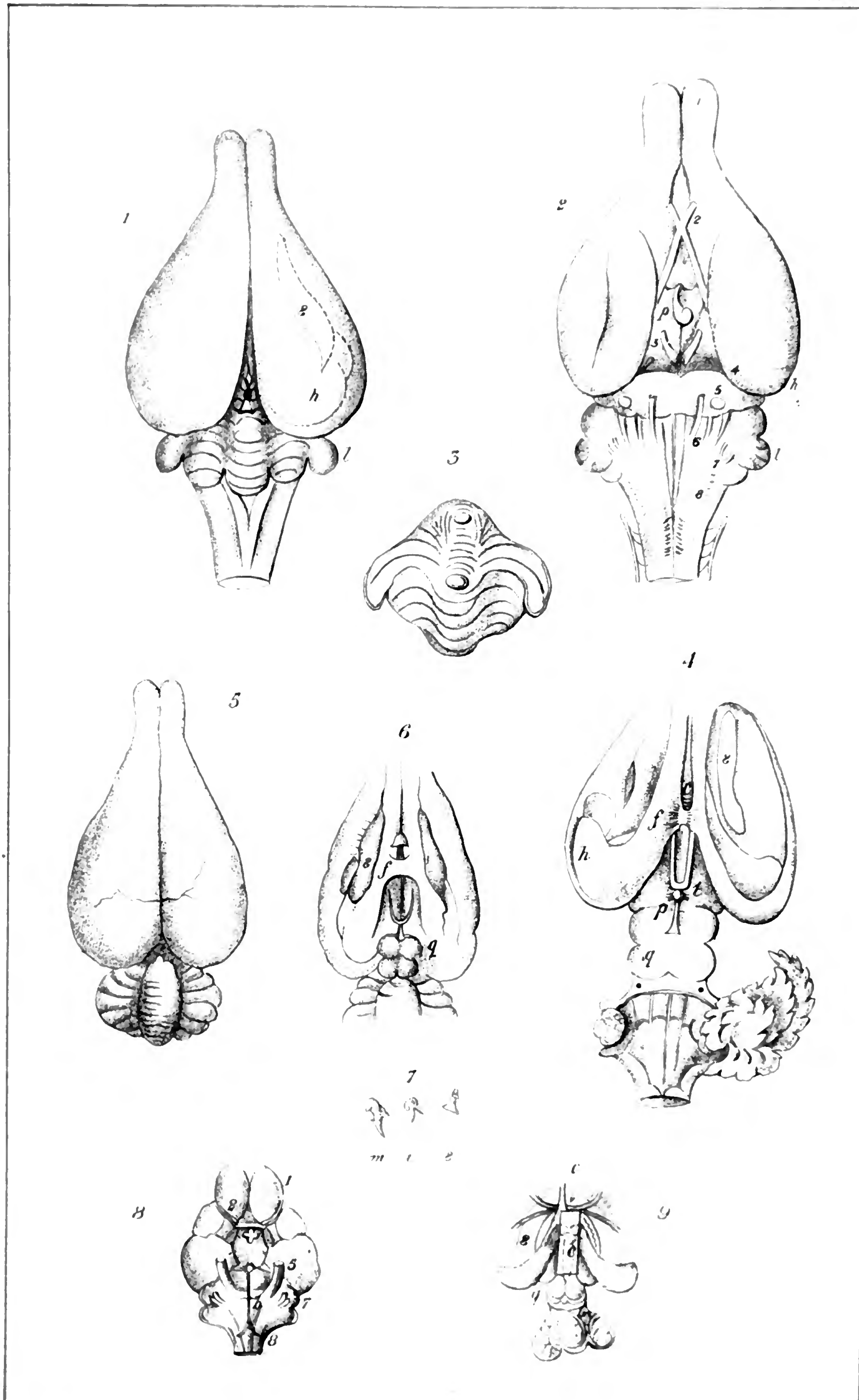

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in winter) often wanders inland, and seeks refuge in such places. On the other hand, the common rat does not confine its excursions to the land. Thus a gentleman hooked a rat by an artificial fly, and it was probably this species, though he calls it a water rat; at any rate it is, doubtless, the common rat to which are due the heaps of shells of the Anodon and Paludina, which may often be seen on the banks of rivers with the sides of the shells broken away, in order to get at the soft parts; they always abound in these places, but how they manage to fish the shells out, I cannot say.

For details of Plates XXIII. and XXIV. see the Description of Plates, which will be given as an Index at close of volume.

David Moore, A. L. S., Associate Member, read a paper—

OBSERVATIONS ON SOME PLANTS CONSIDERED BY M. DE CANDOLLE TO BE ALIEN AND INTRODUCED INTO BRITAIN. ALSO NOTICES OF SOME NEW SPECIES TO THE IRISH FLORA, WITH ADDITIONAL HABITATS OF OTHERS, HITHERTO SUPPOSED TO BE RARE.

In no other department of British Botany have so great advances been made of late years as in that known by the term "geographical distribution;" a term which, those acquainted with the subject know, comprises several considerations connected with the habitats of plants, which to the ordinary reader it does not fully convey. It is not only the geographical area over which a species spreads, and its prevalence within that area, but also the geographical position on the configuration of the earth's surface, climatial influences, causes, and effects in the establishment of species, whether spontaneous to the soil or only there naturalized, along with many other important facts. In short, it might not be too much to say of it, as has been said of the introduction of the natural system of classification to Botany at large, that in relation to historical botany it renders it a science.

I need hardly state here, before so many distinguished naturalists, that in these countries Hewit Cottrell Watson has led the way, which M. de Candolle, in his great work, "Geographie Botanique," states he has done judiciously and well. In Ireland comparatively little progress has been made in that direction, and a wide field yet remains to be explored by industrious collectors of materials, to be subjected to a generalizing mind, before a good history of the geographical distribution of the plants of this country can be given to the public. Mr. Watson

in his "Cybelle Britannica" has excluded Ireland, where, as he states, sufficient data have not been accumulated for such a work; and De Candolle, in his chapter on the species naturalized in Great Britain, only considers those of England, Wales, and Scotland. Ireland and the Channel Islands he contrasts with those countries, as proof for or against the species under review being *ab origine* natural, or naturalized at some subsequent epoch.

On studying this chapter in the "Geographie Botanique," and having my attention again directed to it, on reading a very able article which appeared in the "Phytologist" of last June, I was led to consider the conclusions come to respecting several plants attentively, in so far as concerns Ireland.

Articles 4 and 5 of the chapter treat respectively on the plants which have been naturalized from short distances, and plants naturalized from great distances. Among the latter, at page 714, *Stratiotes aloides* is placed, and is evidently considered an alien, introduced from the east. Java, the Moluccas, and Malabar are given as its natural homes. Another singular circumstance stated, which is said to be on the authority of M. Adrien de Jussieu, is, that all the plants examined in France, where it is supposed to be only naturalized, are of one sex. In order to satisfy myself in how far these statements are reconcilable with the Stratiotes being truly a native of Ireland, I made a journey last June to the principal habitats in the counties of Fermanagh and Cavan, where it abounds. On searching the shores of Lough Erne, from near Drumgown, in the former county, to near Belturbet in the latter, I observed it, in less or more quantities, all the way, being a distance of some fourteen miles or so, but in the greatest profusion near to where the canal joins Lough Erne. From Belturbet I observed it in many of the lakes through the county of Cavan, on to within three miles of that town. I was rather early, and consequently did not see many plants in blossom, though quite enough to convince me that both sexes are there. These facts I consider alone sufficient to establish this plant a genuine native of Ireland. Besides, another habitat is given in "Flora Hibernica," near Portumna, but I never saw it there, nor anywhere else in this country, unless at Ballywhehane Bog, near Cork, where, I believe, it is well known to have been put by the hands of man. It does not appear that any of the authors of British Floras doubt its being a true native of two of the eastern counties of England, which is probably the nearest real habitat to that in the centre of Ireland. Mr. Bentham, in

his "Handbook," recently published, gives Lancashire and Cheshire also as habitats, and the geographical range over Europe and Russian Asia.

Narcissus biflorus is the next plant I claim to be truly indigenous in Ireland, though M. de Candolle considers it a doubtful native of Britain, and places it in the list of species which he supposes may have been introduced between the time of the Roman dominion in these countries and the discovery of America. In his special observations on it, the Dublin habitat is mentioned, where to all appearances it is truly wild. It must, however, be taken into consideration, that in this country it never grows far from houses and demesnes, where it is just possible it may have been originally cast out from gardens, being a plant of frequent and easy culture, which seldom dies out in any soil after having been once planted; hence it is found growing at the present time in nearly every old garden in the country. M. de Candolle states that Italy and the South of France are the countries where it is truly indigenous, but Mr. Bentham in his "Handbook" gives it a wider range over "Western Europe, chiefly Spain and Western France." Now those positions on the Continent and peninsula of Europe afford strong grounds for supposing this species of Narcissus to be at least truly indigenous to the extreme west of Ireland. On the great Island of Arran I found it growing in the fissures of rocks, at a short distance from *Allium Babingtoni* ("Engl. Bot. Suppl."), now supposed by some to be a variety of *Allium Ampeloprasum*, which, with *Helianthemum canum* and *Adiantum capillus-veneris*, have all their chief centres in Southern and Western Europe, and grow in company with *Narcissus biflorus* on the Island of Arran. I may further observe that I once saw it growing in considerable quantities in a pasture-field in the Queen's County, about six miles from Portarlington, at a considerable distance from any house or garden, and apparently wild, thus establishing a connecting link of habitats through the centre of Ireland from east to west.

The foregoing are the two principal plants I have to remark on in connexion with this country, but there are some others that require to be briefly noticed, most of which are admitted to be natives by the authors of our Floras, who probably did not give the matter much consideration previous to the question having been raised. For example, in the list of ten species which M. de Candolle supposes to have been introduced to Britain from North America, we have *Senebiera didyma*

and *Anachris alsinastrum*. Here again the centres of distribution favour the hypothesis of the former having extended to the south-west of Ireland, where it occurs abundantly in several parts of the county of Cork, and as far to the eastward as Clonmel, and westward as Corofin, in the county of Clare, near to where it is met by other outlying types of the North American Flora, viz., *Eriocaulon septangulare*, *Naias flexilis*, &c.

The Anachris is certainly a plant of very recent introduction to these islands, through which it has spread to a greater extent and with more rapidity than any other colonist plant has done, with which I am acquainted, not even excepting *Veronica Buxbaumi*. I observed it in Ireland during the same year it was first noticed in England and Scotland; and though I then obtained only a small portion of it from a pond in the garden of the late I. M. D'Olier, Esq., of Booterstown, which I brought to Glasnevin, it now abounds in the River Tolka from the Botanic Garden to the sea, and in the Royal Canal for miles, both up and down, from this known centre of distribution, as well as through other parts of the country.

In the list of seventy-three European species supposed to be naturalized in Britain, *Mercurialis annua* and *Geranium pyreniacum* are placed, both of which I consider truly wild in this country. The Mercurialis is well known to be one of the common weeds through the county of Dublin, but it is very local in Ireland. *Geranium pyreniacum* I have collected specimens of in the following counties:—Dublin on the east, Antrim on the north, Mayo in the west, and Waterford in the south.

Such plants as *Myrrhis odorata*, *Saponaria officinalis*, *Sylibum marianus*, *Cheiranthus cheiri*, *Antirrhinum majus*, *Anchusa sempervirens*, *Sedum dasyphyllum*, *Sedum album*, and *Veronica Buxbaumi*, are all met with plentifully in some parts of the country, but the habitats are generally in such suspicious places as will hardly warrant their being considered truly indigenous. The Silybum, Virgin Mary's Thistle, as it is called, is supposed to have been brought from the East to Britain by the Crusaders, whence it has probably also come to Ireland.

The introduction to Britain of eighty-three species enumerated by M. de Candolle is not considered by him to have been owing in a great degree to what are usually termed natural causes, such as currents of the sea, prevailing winds, the agency of birds and beasts, but rather by man alone, not accidentally by the seeds adhering to clothes, or trans-

ported along with merchandise, ballast of ships, &c., but voluntarily, for specific purposes. He supposes that the prevalence of gardens in the south-eastern counties of England which are nearest the Continent favour that view, most of the naturalized species being found in that district.

With respect to this country, he remarks that Ireland, so far as can be judged from modern Floras, has received few species by naturalization, though her climate may be favourable in the southern counties. The reason of this, he considers, is explained by the small number and recent date of Gardens—above all, Botanic Gardens (p. 702). As affording proofs of his views, he instances the paucity of leguminous species which are known to have seeds capable of resisting the action of salt water better than those of many other plants among the number; and also how comparatively few there are among them belonging to Compositæ and Valerianaceæ, which have seeds with downy pappus, capable of being wafted to great distances by winds. It may be that he has underrated the agency of birds, if the following instance be correct, which, at the risk of being considered discursive, I shall here mention.

About four years ago I received a parcel of seeds from a valued correspondent residing at Buenos Ayres (Mr. Tweedie), to whom our Gardens are so much indebted for many beautiful plants. On one of the papers was written:—"I took these seeds out of the stomach of a wild duck lately shot.—J. T." On looking at them, I saw they were leguminous, and apparently sound. They were sown in the ordinary way, and soon produced plants of a small-flowered annual Vicia! I simply record the circumstance here, however, without attempting to draw any inference from it bearing on the naturalization of plants in Britain.

Whilst on the subject of geographical distribution, I have the pleasure of laying before the Association some plants which I am not aware of having been previously recorded as Irish, and also to mention a few additional habitats of rare species, which possess some interest in that point of view. *Lycopodium inundatum* was sent to me last year by Mr. Isaac Carroll, of Cork—a very zealous Irish botanist, from whom much may be expected. It was found by Henry Lubohm on the margin of a small lake on the property of James Ellis, Esq., near Letterpack, Connemara. This, it will be admitted, is a highly interesting addition to our Irish Flora, affording, as it probably does, another instance of the outlying types of the North American plants. It occurs only in a few

localities in England and Scotland, and can hardly be supposed to have come from that quarter, thus passing over the whole of Ireland; unless, indeed, it be considered one of those which Mr. Watson formerly called his Hebridean typical plants, a few of which reach the west coast of Ireland—e. g., *Ajuga pyramidalis*, *Eriacaulon septangulare*, and also the curious Alga, *Palmella montana*. The "Handbook" gives the range "in the Western States and North America, but not recorded from Asia or the Arctic regions. Not common in England and Scotland, and not known in Ireland."

Hypnum megapolitanum is another important addition in its way, which has not before been admitted to the rank of a species in any work on British mosses, though Mr. Wilson, in "Bryologia Britannica," alludes to it as a variety of *Hypnum confertum*. The continental bryologists have mostly held it to be a good species, and as such have described it. Mr. Wilson, after seeing the specimens I sent to him, as well as other good English judges, are now convinced they are right, and henceforward, he informs me, it will rank as such in British lists. *Hypnum megapolitanum* (*Webr* and *Mohr*) grows in several places among the sand-hills between Malahide and Portrane, where I collected it in fruit last November, and Mr. D. Orr collected it near the "Strawberry Beds." Previous to this it had only been known to grow in Britain near Shoreham, Sussex, and sparingly near Liverpool.

Galium elongatum (Presl.) grows in considerable quantities in ditches and on damp meadows by the side of the River Boyne, a little below the bridge which crosses the river to Slane. Whether this be a good species, or only a variety of *Galium palustre*, as some suppose, the form is rare in Ireland. I am not aware that any notice has been previously taken of it, though its great size and marked appearance could hardly fail to attract the attention of persons not very well acquainted with Irish plants. It retains all its characters under cultivation, to which I have subjected it during the last three years. Mr. Babington, to whom I am obliged for identifying it among my specimens, has also, I believe, found it in the south of Ireland.

Blysmus compressus has been lately found in considerable abundance in the county of Cork by Mr. John Sullivan, of the Queen's College there, who sent specimens to Mr. I. Carroll, and communicated the circumstance verbally to myself a short time ago. The geographical distribution of this plant, as given in the "Handbook," is—"Europe and Russian Asia, not extending to the extreme north, and yet a mountain plant in

Southern Europe and the Caucasus. Occurs in many parts of England and possibly Southern Scotland, but not recorded from Ireland."

I am aware that some other additions have lately been made to the Flora of this country, but they have not come under my own notice, nor have I been authorized to mention them, but no doubt they will soon be made known. The additional habitats I wish to record are for *Allium scorodaprasum* and *Lathyrus palustris*. It is now known that the *Allium arenarium* of the Irish Floras, which is stated to grow at Portmarnock (*Allium scorodaprasum*, Linnæus), is not that species, but only a state of *Allium vineale*, as I have satisfied Dr. Mackay. The true plant does not occur on the eastern or northern coasts, so far as has yet been ascertained, but only on the southern. I saw it last April in great profusion at Foate, in the county of Cork, where it had been previously observed by the botanists of that neighbourhood, and Mr. Carroll informs me it has been also found near Berehaven.

Lathyrus palustris is another interesting plant, which requires to have the claims it has hitherto held to be a genuine Irish plant strengthened. In the "Flora Hibernica" the author states:—"A plant, which the late Mr. Templeton supposed to be this, was found by him in a moist meadow a little north of where the Lagan Canal enters Lough Neagh, but I have not seen any Irish specimens." Again, the author of the "Handbook," when stating the geographical range of this species, mentions that it is found "in Northern and Central Europe, Russian Asia, and Northern America. Disposed over a few localities in England, but only a very doubtful inhabitant of Scotland or Ireland." Now, it is by no means a doubtful inhabitant of this country. I have collected it abundantly in Mr. Templeton's original habitat in the county of Antrim, where two varieties occur, one larger in all its parts than the other; also, in moist meadows at the Murrogh of Wicklow; near Portumna, county of Galway; and in almost every moist meadow on the shores of Lough Erne, in the counties of Fermanagh and Cavan. Besides, Mr. Carroll has observed it in the south.

I might go on much farther, contributing to the geographical distribution of our rarer plants; but this communication having already extended to a greater length than I intended it to do, I shall conclude for the present. What has already been stated may probably serve as useful hints to some of the young naturalists who will no doubt speedily emerge from this Association.

Professor J. Reay Greene read a paper on the "Subdivision of the Soft-bodied Zoantharia."

The ballot was then opened, and the following were declared duly elected:—

Ordinary Members:—Rev. R. Vickers Dixon, A.M., Ex-F.T.C.D.; Hon. G. S. Gough, A.M.; R. M'Donnell, M.D.; and P. Bevan, A.M., M.B.

Associate Members:—Rear-Admiral Jones, and George Porte, Esq.

Corresponding Members:—Isaac Carroll, Cork; Professor Huxley, F.R. & L.SS., London; and P. Lutley Sclater, F.L. & L.SS., London.

The Association then adjourned.

FRIDAY, FEBRUARY 18, 1859.

Professor W. H. Harvey, M.D., F.R. & L.SS., President, in the Chair.

The Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

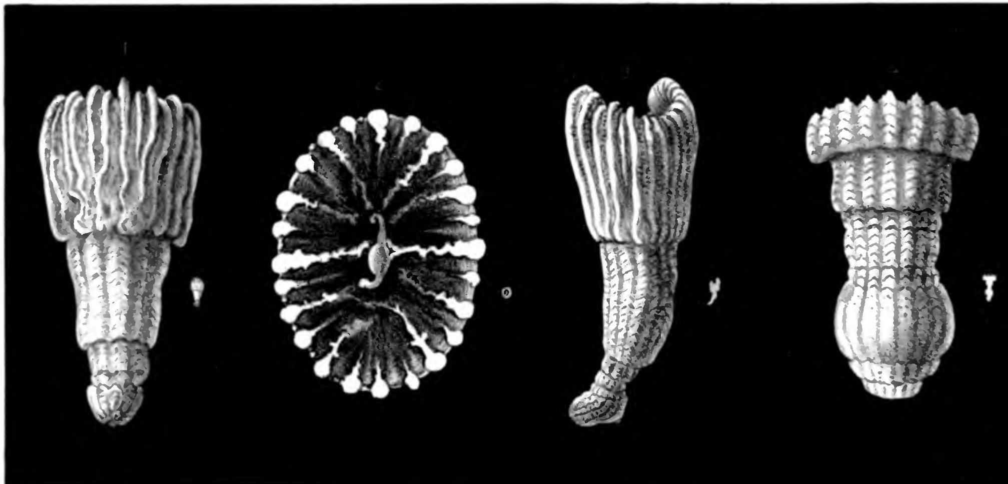
Dr. E. Perceval Wright, F.L.S., read the following paper by Philip H. Gosse, F.R.S.—

ON SPHENOTROCHUS WRIGHTII: A NEW IRISH MADREPORE.

Specific Character.—Corallum pedicellate: costæ papilliferous, on the body, and crossed with zigzag folds on the pedicel; pedicel nodose.

General Description.—*Corallum* simple, straight (or else with the base considerably curved laterally), compressed above (the axes of the disk being 60 : 42 in general; in one example, however, 60 : 50), but rounded in the lower two-thirds, pedicillate; the body and the pedicel varying exceedingly in their relative proportions, the former being to the latter as 1 : 5 in one example (Fig. 4); in another, as 1 : 1; in another, as 1 : 1·2 (Fig. 1),—no two of the four specimens in my possession being alike in this respect. The pedicel is surrounded by four to six constrictions, varying greatly in their relative distance; these separate nodes more or less swollen, of which one, a little above the base, is usually more ventricose than the rest; the pedicel generally enlarges upwards, but its distinction from the body is marked by an abrupt shoulder.

Costæ about as wide as the interspaces, distinctly traceable only as far down as the termination of the body; their course is irregularly an-



P.H.G. ad nat. del.

Forster & Co. Lith.

Sphenotrochus Wrightii.


BRITISH MUSEUM

gular; the primaries and secondaries terminate at the shoulder in prominent knobs. On the pedicel only the six primaries are distinguishable, and these are then crossed by numerous strongly indented zigzag folds, of which the higher angle is on the costa, the lower in the interspace. All the costæ of the body-region are studded with irregularly projecting points or papillary eminences.

Base, a small but distinct circular cavity, into which the extremities of the six primary costæ project.

Calice considerably arched, the short axis being much the higher.

Fossula rather deep.

Septa in three cycles, twenty-four in all; the lateral primaries and secondaries more developed than the terminal ones; moderately close-set, irregularly bent in their planes, thick exteriorly, suddenly diminishing just within the wall, and thence gradually becoming thinner. The primaries and secondaries equal in height and breadth; the tertiaries much lower; all exsert, the upper edge obliquely truncate, sloping down from the margin inward. The two septa which form the short, axis are united to the columella by diverging laminæ; but this structure appears to be wanting in the others. The surfaces of all the septa are rough, with scattered papillary points.

Columella bent at each end towards one (the same) side; its upper edge thickened in irregular swellings. In some specimens it is not visible from above.

DIMENSIONS OF FOUR EXAMPLES.

No.	Long Axis. Inch.	Short Axis. Inch.	Height. Inch.
1,	0·08	0·062	0·155
2, (Fig. 1–3),	0·06	0·042	0·140
3, (Fig. 4),	0·06	0·050	0·110
4,	0·06	0·422	0·144

This species resembles *S. crispus* in its zigzag folds, but has more agreement with *S. mixtus* in its general characters. In its tendency to a curved form, however, as well as in its pedicellate character; and especially in the presence of a well-formed basal area, which appears to have been a point of adhesion, it displays so much affinity with *Ceratotrochus* (according to the diagnosis of M. Milne Edwards*) that I was at first disposed to assign it to that genus.

* "Brit. Foss. Cor.," xvii.; "Hist. des Corall.," ii., 73.

The four specimens that I have above described have been intrusted to me by my kind friend, Dr. E. Perceval Wright, of the Dublin University, with whose name I have honoured the species. They were dredged by G. C. Hyndman, Esq., among shell sand, from a turbot bank off the coast of Antrim, in 1852.

It is an interesting question, particularly to myself, whether these specimens belong to a fossil or a still existing species. If the latter alternative prove to be true, it further augments the already rich and constantly enriching zoophytology of our insular coasts. Professor Milne Edwards, indeed, considers the *Sphenotrochi* with papillate and crisped costæ to be in no case later than the Eocene deposits; while those with smooth costæ as invariably belong to higher strata, and reach to the present period: but this is a canon which a new species may at any moment overturn, if it be not already subverted by the *S. nanus* (*Lea*) of the Eocene of Alabama. Dr. E. P. Wright mentions as a suspicious circumstance that many *Pleistocene* shells do exist in the bed of shelly sand, where these specimens were found. But this does not confirm Professor Milne Edwards's rule; for, so far as that could decide the question, it would prove not only that the coral is not recent, but that it is certainly as old as the Miocene.

Dr. Wright says:—"I have reason to think, however, that they are not fossil;" and the same is my own impression, though I can scarcely assign any definite grounds for it, except the fresh appearance of one or two of the specimens. Some of them are rubbed; and one (Fig. 4) is polished externally.

The uniformity in size of the individuals, and the full development of the septa, indicate a probability that, minute as they are, they have attained adult age.

Explanation of Plate XXV.

Fig. 1. *Sphenotrochus Wrightii*, magnified 12½ diameters; view of the broader side.

Fig. 2. Ibid., magnified 25 diameters; vertical aspect of the calice.

Fig. 3. Ibid., the same specimen as Fig. 1, similarly magnified; view of the narrower side.

Fig. 4. Ibid., another example, magnified 12½ diameters; the broad side.

C. Spence Bate, F.L.S., Corresponding Member, Dublin University Zoological and Botanical Association, sent the following paper—

ON THE GENUS NIPHARGUS (SCHIÖDTE).

When the study of Carcinology was yet in its youth, Leach found, in a well attached to St. Bartholomew's Hospital, a small shrimp-like crustacean. This he took to be of the genus Gammarus, and called it *subterraneus*. The specimen has, I believe, not been preserved, and we know no more about it than what he tells us in the "Edinburgh Cyclopædia." The name has been perpetuated in catalogues. But that a crustacean of so high a form should be found in a dark well in the centre of London, has been considered more in the light of a stray and accidental occurrence than that such should be the normal abode of a race of beings so high. Little attention had the subject attracted in England until Mr. Westwood's very capital discovery, in 1853, of considerable numbers of a similar animal, which he procured by pumping from a deep well near Maidenhead, from which time until the discoveries of young Mr. Mullins, at Corsham, Wiltshire, and those of the Rev. A. R. Hogan, at Ringwood, Hampshire, I am not aware that any has been made in England.

Between the years 1835 and 1842, Koch published a series of papers, in which appeared some figures of Amphipoda, which he procured from the draw-wells about Reigensburg and Zweibürücken; these he considered to be one species, and named them *Gammarus Puteanus*.

About 1851 Schiödte found in the grottoes in Carniola a similar crustacean, which he described and figured in the "Danish Royal Society's Transactions." He appears to have been the first that recognised the true character of these subterranean Amphipoda.

Schiödte very properly placed them in a genus by themselves; but I question whether he is quite as correct in separating the Maidenhead species from his own, to which position Mr. Westwood had assigned it in the "Proceedings of the Linnæan Society for 1853."

In his description of Westwood's species, Schiödte says that it is dorsally carinated, but that *N. stygius* is not so. Examinations of the specimens deposited in the British Museum show this to be an erroneous impression, and Mr. Adam White, in his valuable "Manual of the British Crustacea," while accepting Schiödte's description of the species, omits to notice so striking and important a peculiarity, which he pro-

bably would not have done if the specimens had been within his reach for examination.

Under the name of *Gammarus Puteanus*, Koch has described and figured two species. With the second of these, Mr. Westwood's species agrees so nearly, that I believe it to be the same, and if, as I imagine, the species be identical, then Schiödte's specific name of Stygius will stand for all three, since undoubtedly both species of *G. Puteanus* belong to the genus of Niphargus. The specific name of Puteanus will, therefore, continue to be associated with the first described and most typical species of Koch.

M. Guerin-Meneville, of whose courtesy and kindness I cannot speak too highly, allowed me, when in Paris last autumn, to examine and take notes from his unpublished drawings and memoranda. Among these I found the figure of a Niphargus, that appears to be identical with *N. Puteanus*, that had been sent to him from the environs of St. Leger, Poictiers.

Judging from drawings and descriptions of the foreign, and examination of the only recorded British species, the specimens found in Hampshire and Wiltshire are distinct from any hitherto known. They include two new species and a new genus, of which the following are short descriptions:—

Niphargus fontanus (*n. s.*). (*Figs.* 2 & 2 *a.*)

Male.—Eye minute, yellow. Superior antennæ with the peduncle as long as the flagellum. Inferior antennæ with the last two articulations of the peduncle subequal; flagellum not so long as the last articulation of the peduncle.

First pair of gnathopoda a little smaller than the second; second pair of ditto having the propodos straight above and convex below, produced inferiorly and posteriorly, and fitting into a groove in the carpus; the palm as long as the superior margin, very oblique, waved and fringed with a series of equidistant solitary hairs, and one great moveable spine that antagonizes with the apex of the dactylos. Dactylos slightly curved, unguiculate, armed with a single tooth on the inner margin. The three anterior segments of the pleon terminating posteriorly and inferiorly in a point. Posterior pleopoda with the first articulation of the long ramus longer than the second, and the entire member nearly as long as the pleon.

Length about $\frac{1}{2}$ an inch.

Of the specimens of this species that were kindly sent to me by the Rev. Mr. Hogan, those from Corsham differ somewhat from the above in having the hands somewhat less elongate, and in the posterior pleopoda having the second articulation of the long ramus much shorter than the first. But this, as pointed out by Schiödte, is probably a sexual distinction.

Fig 1

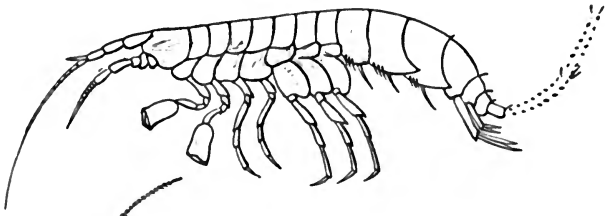


Fig 2

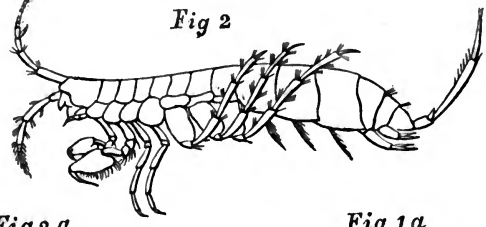


Fig 2 a

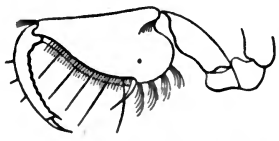


Fig 1 a

Niphargus Kochianus (*n. s.*). (*Figs.* 1 & 1 *a.*)

Eyes not visible. Superior antennæ having the flagellum longer than the peduncle. Inferior antennæ having the flagellum as long as the peduncle. First and second pairs of gnathopoda subequal, having the propodos elongate, broader at the palm than at the posterior extremity; palm slightly advanced, and produced a little beyond the dactylos, armed with a long spine a little anterior to the inferior angle of the palm.

Three posterior pairs of perciopoda having the dactylos long and slightly curved, unguiculate, and furnished with a sharp tooth upon the anterior margin.

The posterior pair of pleopoda were missing in the only specimen that has yet been found; a solitary hair surmounts the four posterior segments of the pleon. In other respects the animal appears not to differ much from the other species of the genus.

Length about $\frac{3}{10}$ths of an inch.

Its habitat is a pump in a house at Ringwood (Rev. A. R. Hogan). The species is named after Koch, who first described and figured these subterranean Amphipoda.

Crangonyx (*n. g.*).

Like Gammarus, but, not having fasciculi of spines upon the posterior segments of the pleon, and having the posterior pair of pleopoda unibranched. Telson single.

Crangonyx subterraneus (*n. s.*). (*Figs.* 3 & 4.)

Male.—Eyes not visible. Superior antennæ not longer than the inferior. First pair of gnathopoda a little stouter than the second; propodos quadriform; palm slightly convex and a little oblique; inferior margin slightly incurved. Second pair of gnathopoda a little longer than the first; slight; propodos long, ovate; palm very oblique, and continuous with the inferior margin. Three posterior pairs of pereiopoda, having the bases serrated, and fringed with short ciliæ. Posterior pleopoda scarcely longer than the two preceding, furnished with hairs stout and spinous.

Fig 3

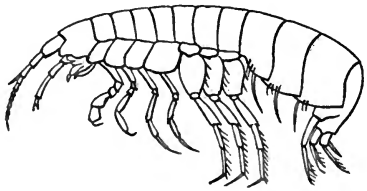
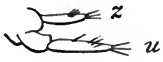


Fig 4



Length about 4-20ths of an inch.

Found associated with Niphargi in a well at Ringwood by the Rev. A. R. Hogan.

It is not improbable that this may be the *Gammarus subterraneus* of Leach; but we have no means of ascertaining.

The name of the genus is derived from κραυγον and νυξ.

The Secretary read the following paper by the Rev. A. R. Hogan, M.A., &c., Corresponding Member, Dublin University Zoological and Botanical Association:—

ON THE HABITS AND LOCALITIES OF NIPHARGUS FONTANUS (*n. s.*), N. KOCHIANUS (*n. s.*), AND CRANGONYX SUBTERRANEUS (*n. g. & s.*), SPENCE BATE.

We can no longer speak of "the well shrimp" of English naturalists. There are now four species known to inhabit the country, and it is far from improbable that we shall find many more. The total inattention of crustaceologists to this interesting group of animals is obviously the reason why the present discoveries have taken them by surprise. For five years after Mr. Westwood's capture of *Niphargus aquilex* at Maidenhead, in Berkshire, that is, from 1852 to 1857, nothing was heard about these crustaceans in Britain; but in the autumn of 1857 the publication of a figure and description of the genus and species in the "Natural History Review" again drew attention to the subject. Accordingly, within a very short time afterwards, a young friend of mine, Edwin Herbert Mullins, who had seen the figure referred to, brought me a specimen which evidently belonged to the genus Niphargus. This occurred at Corsham, in Wiltshire, where I was then residing; and its capture, together with that of several others (from a pump) at the same place, both gave me opportunities of observing the habits of these strange subterranean animals, and led to my finding a variety of the same species at Ringwood, in Hampshire, in the following year, 1858. At the same time I was fortunate enough to discover a new genus of the same family (Crangonyx), with one species (Subterraneus), a new species of Niphargus (Kochianus), and to obtain some specimens of *N. aquilex*. Scientific descriptions of the former have been already laid before the Association; but it remains to me to supply an account of the localities in which they were found, as well as to record somewhat concerning their habits, &c.

To speak of their habits first: we are met with a great difficulty at the outset; the Niphargi live only in pump water, which is generally entirely destitute of animal life, even animalculæ. On what, then, can they possibly feed? This question remains to be solved; and I am afraid I can throw no light upon it, though I strongly suspected some of the Ringwood specimens of devouring their own kind, on one occa-

sion, while in captivity; still, the evidence was not quite satisfactory, and, therefore, it cannot be asserted as a positive fact. Their movements, however, are at times very active, and they swim with rapidity up and down in the water, as if in pursuit of some, to our eyes invisible, prey.*

In this particular there was a striking difference between *N. fontanus* found at Corsham, and its variety at Ringwood; the latter, in rising to the surface of the water, generally turned the underside of the body uppermost, which the individuals observed at Corsham (which were mostly larger and stronger) did not do. Possibly this may be a habit distinctive of the sexes.

In moving along the bottom of a vessel, *N. fontanus* turns its body almost entirely on one side, and in that position, by aid of the hinder legs (using only those at one side of the body at the same time) progresses sideways in a very curious, though not crab-like manner. When resting, it curves itself into the form of the letter c, keeping two or more pairs of the posterior legs extended outwards and upwards, perhaps to balance the body against the effect of currents in the water. At the same time the three anterior pairs of pleopoda, or "swimming legs," seem never to cease moving to and fro while the animal is alive.

Sometimes *N. fontanus* may be seen to rest itself in an upright position against the side of the vessel by aid of the extended legs, but more usually I observed it to lie on the bottom, on its side. The last pair of pleopoda seemed to be occasionally used to assist the body in turning round, but not often.

These remarks have reference only to the one species, as the others were so much smaller in size, and died so much sooner in captivity, that their habits could not be well noted.

What is to be said on the localities and habitations applies to all the new species equally. The wells are all artificial, and also those in which they have been found on the Continent; in England the habitat has in each case been a pump. This is a very remarkable fact, and not

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* Since the above was written, some water, drawn from the pump at Ringwood, has been proved, by microscopical examination, to contain numerous animalcules; and this will probably turn out to be the case with all other waters in which Niphargi is found.

easy to account for: but it is certainly a great advantage to the Niphargi, in securing to them both a higher and more equable temperature than they could otherwise by any possibility enjoy. The temperature of the water in the Corsham pump (whose depth is supposed to be about thirty feet) averages 46°, while that of the well at Ringwood is as high as 50° F., even when there is ice on the water above ground. I ascertained also, by experiment, that exposure to a colder temperature had the effect of very soon numbing and deadening the vitality of Niphargi. While they lived in my possession, which was for several weeks, it was necessary to keep them in a warm room.

The depth of the Ringwood pump I could not ascertain; but it was sunk only about fourteen years since, and has, probably, some connexion underground with an old well a few feet distant, which is now covered over with earth, and cannot be examined. Upon making inquiry about other wells at Ringwood, though unable to procure additional specimens, I found out that Niphargi had been seen before, but only in the purest water, and not, it would seem, in that (as some of the water is at Ringwood) inhabited by other visible organic forms. It is likewise reported of the well at Corsham, which is about two hundred years old, that, some thirteen years ago, large numbers of Niphargi were raised by the pump, though of late the supply appears almost exhausted. Their appearance has not been confined to any particular season; they have been found at Corsham both in summer and winter, occasionally; at Ringwood, however, they have not been searched for, except in winter, as yet; and specimens could not generally be obtained from the well to which I had access, unless the water were pumped up in large quantity early in the morning, when the spring had lain undisturbed during the previous night.

The two localities differ considerably as to the nature of the ground. Corsham stands high, being on a hill, at least six hundred feet above the level of Bath; Ringwood, on the contrary, lies very low, is close to a wide-spreading river, and surrounded by a considerable extent of flat country. Corsham is on the oolite formation, Ringwood on a chalk-flint gravel. It is, therefore, natural that we should find a decided variation between the individuals of the same species (as in *N. fontanus*) found in each locality.

In concluding, I must express a hope that the facts now detailed will lead to a thorough investigation of the history and distribution of

these curious little animals. Though we have long known that there was a subterranean Fauna in Austria and in America, few have suspected that there was anything similar existing in our own islands; and albeit only a few species have been discovered, it yet remains to be seen how far we may find this hidden creation really extends.

"Well shrimps" are now known to exist in three adjoining shires,—Berks, Wilts, and Hants; it is probable that they live in many more.

They are interesting subjects of study from their high organization, their active habits, strange movements, and still more strange abodes. Created to live in the most profound darkness, and unlikely ever to fall under the eye of man by any *natural* means, we yet find them most directly connected with us, by their location in those waters from which we derive a vital portion of our sustenance; surely, then, it is right to seek, and it is reasonable to expect to find, in these animals some special evidences of the wonder-working goodness and all-careful foresight of Him whose handiwork and power are shown "in darkness and in light" both alike.

Mr. E. Burchall read the following—

LIST OF LEPIDOPTERA CAPTURED IN IRELAND DURING THE SUMMER OF 1858.

During the past summer the following species of Lepidoptera have been captured in Ireland, not previously recorded as indigenous:—

Notodonta bicolora, Killarney. July.
Leucania littoralis, Sandhills, Malahide.
Luperina cæspitis, ditto, ditto.
Noctua ditrapezium, Galway.
Agrotis corticea, ditto.
Hadena dentina, Sandford, near Dublin.
Rusina tenebrosa, Powerscourt.
Xantholeuca croceago, Sandford, near Dublin.
Botys terrealis, Howth.
Chlorochroma æstivaria, Galway.
Thera variaria, ditto.
Cabera strigillaria, Killarney.
Eupithecia subnotaria, Sandford, near Dublin.
,, *pumiliaria*, ditto.
,, *sparsaria*, ditto.

Dosithia reversaria, Howth.
Siona dealbaria, ditto.
Crambus geniculeus, Malahide.
Tortrix cratægana, Powerscourt.
,, *spectrana*, ditto.
Peronea ferrugana, ditto.
Argyrolepia cnicana, Ballytore.
Dictyopteryx forskaleana, ditto.
Sciaphila octomaculana, ditto.
Sericoris micana, Howth.
Depressaria assimiella, Waterford.

Summary.

1 Bombyx.
7 Noctuina.
1 Pyralis.
1 Crambus.
8 Geometrina.
7 Tortricina.
1 Tinea.

26

Of the conspicuous species first named *Notodonta bicolora*, only a single specimen was captured, at Killarney, on the 1st July, by Mr. Bouchard, of London. Whether this beautiful insect (which is a native of southern Europe) is really entitled to a place in our list, or has been accidentally introduced, must remain for subsequent investigation.

Noctua ditrapezium is also an interesting addition to our Lepidoptera. Of this insect, hitherto very rare in England, I captured three specimens at Sugar, near Galway, in June.

The extraordinary heat of the past summer was not without its influence upon insect life, and many species usually rare have been very abundant: among others, I may mention *Colias eduas* and *hyale*, both hitherto very rare in Ireland,—were abundant on the southern and eastern coasts.

Acherontia atropos has also been taken in considerable numbers, both in the larva and perfect insect.

Hydrelia Bankiana, of the capture of which there has been no record either in England or Ireland since 1826, except a single specimen at Roebuck, near Dublin, in 1844, by Mr. James Haughton, I met with in profusion near Killarney, on the 18th of June.

Hypena crassalis and *Melanippe hastaria*, both usually esteemed rare insects, were also observed in abundance at Killarney, in June.

Dr. E. Perceval Wright read a paper by Charles C. Babington, M. A., F. R. & L. SS., Corresponding Member, entitled—

HINTS TOWARDS A CYBELE HIBERNICA.

It is well known to the Society to which this paper is addressed that Mr. H. C. Watson, some years since, divided Great Britain into eighteen provinces and one hundred and twelve counties and vice-counties, for the purpose of elaborating the geographical distribution of our native plants. He excluded Ireland from his great work, the "Cybele Britannica," solely because he did not possess and had not the means of procuring any sufficiently complete and reliable information relative to its general, and especially its local Floras. Up to this date, I am not aware that more than one tolerably comprehensive local Flora has been published in Ireland, namely, that of the county of Cork.

The time seems now to have arrived when an attempt should be made to supply this deficiency; for it is surely the duty of an active, and especially Irish Society, to take the matter in hand, and, by making use of those advantages which its seat in the heart of the University of Dublin, the correspondence which it has established with different parts of the island, and the active researches of its members, confer upon it, to commence the work, and, it is hoped, carry it to a successful result. In order to do this, it is first necessary to divide Ireland into provinces and districts similar to those established in England and Scotland. As a contribution to the work, I venture to submit such divisions to the consideration of the Association. I should not have intruded myself into a work which seems especially Irish, had it not become necessary for me to subdivide the country for the purpose of recording the distribution of the Irish Rubi, as a part of my projected, and to a considerable extent completed, treatise upon the Rubi of the United Kingdom. The extent, position, and number of the districts has received my earnest consideration, and several plans have been formed and re-

jected. But now I have arrived at what seems to be a tolerably satisfactory map upon which to base the Cybele Hibernica. It is founded upon the same principles as those adopted by Mr. Watson, namely, an arrangement which will keep the localities occupied by the peculiar Floras distinct, and will divide the rest of the country in a tolerably natural manner. The coast, with the mountains which usually are found near to it, is separated from the interior, and, where it could be done, the counties drained by each large river are formed into a province. This was scarcely possible in the case of the Shannon, and, therefore, it has been made the boundary of three provinces. The plan adopted by Mr. Watson is also followed in another respect, by retaining the county boundaries as those of the ultimate subdivisions, except in a few cases, where a large county is divided into two vice-counties.

The following are proposed as the provinces and counties, or vice-counties of Ireland. They are numbered continuously from the list of provinces and counties used by Mr. Watson, and described in his "Cybele Britannica," vol. iii., pages 526–528. Where possible, names are taken from the rivers draining the provinces, or from the coast upon which they are placed.

Provinces.

XIX. South Atlantic.
XX. Blackwater.
XXI. Barrow.
XXII. Leinster Coast.
XXIII. Liffey and Boyne.
XXIV. Lower Shannon.
XXV. Upper Shannon.
XXVI. North Atlantic.
XXVII. North Connaught.
XXVIII. Erne.
XXIX. Donegal.
XXX. Ulster Coast.

Subdivision of the above Provinces into Counties and Vice-Counties.

XIX. South Atlantic.—113. South Kerry; 114. North Kerry; 115. South Cork.

XX. Blackwater.—116. North Cork; 117. Waterford; 118. South Tipperary.

XXI. Barrow.—119. Kilkenny; 120. Carlow; 121. Queen's Co.

XXII. Leinster Coast.—122. Wexford; 123. Wicklow.

XXIII. Liffey and Boyne.—124. Kildare; 125. Dublin; 126. Meath; 127. Louth.

XXIV. Lower Shannon.—128. Limerick; 129. Clare; 130. East Galway.

XXV. Upper Shannon.—131. North Tipperary; 132. King's Co.; 133. Westmeath; 134. Longford.

XXVI. North Atlantic.—135. West Galway; 136. West Mayo.

XXVII. North Connaught.—137. East Mayo; 138. Sligo; 139. Leitrim; 140. Roscommon.

XXVIII. Erne.—141. Fermanagh; 142. Cavan; 143. Monaghan; 144. Tyrone; 145. Armagh.

XXIX. Donegal.—146. Donegal.

XXX. Ulster Coast.—147. Down; 148. Antrim; 149. Derry.

The extent of the provinces will be seen by observing what counties are included in each of them, and, therefore, no more description is requisite. But as a few of the large counties are divided into two vice-counties, the lines used for that purpose must be described. *Kerry* is divided into *North* and *South* by a line which follows the course of the River Flesk, from its entrance into the county to its mouth in the Lower Lake of Killarney, then skirts the northern shore of that lake as far as the River Laune, which it follows to the sea. *Cork* is separated into *North* and *South* by a line descending the River Sullane from its entrance into the county, to its junction with the River Lee, and descending that river to the sea. *Tipperary* is conveniently divided into *North* and *South* by the Great Southern and Western Railway. In *Galway* the division into *East* and *West* is well defined by Lough Corrib and the river which flows from it and Lough Mask. In *Mayo*, a boundary between *East* and *West* is also tolerably well marked by Lough Mask and the course of the River Ayle, as far as a small lake above Ballyhean Church; from thence it is imaginary for a short distance, until it reaches the nearest point on the road from Tuam to Castlebar, close to a hamlet called Tully; then it follows that road as far as Castlebar, and from thence descends the course of the water through Lough Cullin, and by the River Moy to the sea at Ballina.

It will be seen that, by thus dividing the great county of Cork, we separate the mountain district, so well known as forming part of the peculiar floral region of the south-west, from the inland country, of which the plants are not known to differ in any remarkable degree from those of other parts of the centre of Ireland. The proposed division of Kerry has a similar effect, with the slight exception of detaching a small and peculiar district near Dingle from the Iveragh Mountains, with which it has a few peculiar plants in common.

The object contemplated by the division of the county of Tipperary by the line of railway is to detach that part of it which forms a portion of the valley of the Shannon and the mountain district adjoining from the rich agricultural and tolerably level country of which Cashel occupies nearly the centre. The Galtee Mountains are unavoidably included in the latter section of the county. In the counties of Mayo and Galway a similar plan has been followed. The boundary proposed will, it is believed, separate the flat parts of them from the highly interesting mountainous districts of the west, where a well-marked Flora is known to exist.

Allow me now to point out a mode by which the Association may, perhaps, proceed in preparing materials for a Cybele Hibernica. It would be well to form carefully prepared lists of all the indigenous plants found in each of the twelve provinces, recording in each case the spot where the plant grew, and the county or vice-county in which the place is situated. This will have to be done with great care, in order to avoid the errors resulting from two causes: first, the wish which many collectors have to swell their lists by including in them all the plants that they can find, without considering if the species is likely to be indigenous in the place where they have observed it; and, secondly, the mistakes often made in the nomenclature of little known, or what are called critical plants.

Unfortunately, there are other sources of error sometimes (but, happily, not often) met with—I mean intentional deceit and carelessness. In illustration of the first, I may remark that there are in my herbarium specimens of three heaths, given to me by a person who marked, with his own hand upon the tickets, the exact spots where he said he had gathered them; but which, after having myself carefully examined the places (situated in the south of Ireland), I came to the conclusion never grew there; and I am informed that, although now many years have passed since the event occurred, no one else has succeeded in discovering them in that part of the kingdom. Also, a very rare fern was stated to have been found near Belfast; nevertheless, there is no reason to believe that it really grew there; indeed, I think that it was afterwards acknowledged to be an imposition. The following is the kind of mistake likely to result from carelessness:—Sometimes collectors are not sufficiently careful to separate foreign cultivated plants from native roots derived from wild stations; and thus it has happened that they make the mis-

take of supposing that certain plants are indigenous, whilst, in reality, they are of foreign origin, or even hybrids, produced by the ingenuity of gardeners. The older collectors were especially liable to fall into this error.

It is scarcely necessary to remark that we want to obtain an account of the true native plants of Ireland for the purpose of completing the geographical distribution of the vegetation of Europe; and that the idea of there being any national credit attaching to the possession of a rich Flora is utterly devoid of foundation. Our object in such researches should be the extension of our scientific knowledge, which is quite incompatible with such ill-judged love of our local habitation.

It seems exceedingly desirable to ascertain the distance to which the plants belonging to what is sometimes called the Germanic Flora have spread towards the west of Ireland. This can only be done by the formation of lists of plants for each of the twelve provinces, and, still better, of the thirty-seven counties and vice-counties. We also want information concerning the limits of the districts inhabited by the Asturian Flora, of which traces are found in the two provinces which I have called North and South Atlantic. Are any of the plants belonging to it found in the counties of Clare or Donegal? The former county, lying between the two provinces, is an exceedingly likely locality for them; and the latter is a mountainous district, concerning the botany of which we seem to know next to nothing.

In conclusion, allow me to remark, that it is very desirable to preserve a scrap of each plant from every province, or even county, so as to afford a security against errors, which are almost sure to arise in the transcription of lists of names, and especially of numerals. Mr. Watson has largely done this for Great Britain, and the Association might do it for Ireland.

Dr. E. Perceval Wright, F. L. S., read the following—

ADDITIONS TO THE PLANTS OF IRELAND SINCE THE PUBLICATION OF "FLORA HIBERNICA." BY J. T. MACKAY, LL. D., A. L. S.

1. *Alyssum minimum* (*De C.*).—First found by Mr. F. Darley and myself on a dry, sandy ditch-bank, near the farm-house, Portmarnock, in 1817; but as it could not be found for several years before the publication of "Flora Hibernica," I did not insert it. I, however, found it again, in considerable quantity, in a sandy field, near the same place, in 1837.

2. *Hutchinsia petræa.*—Found on old walls at Bandon and on old walls near the site of the old Botanic Garden, Cork.

3. *Cochlearia Greenlandica.*—Island of Rathlin, Antrim: Mr. D. Moore.

4. *Sinapis muralis* (*Br.*), *Diplotaxis muralis* (*De C.*).—On the strand by the Glanmire Road, two miles below Cork: Mr. William Alexander. On sandy ditches at Portmarnock, 1837, by Mr. J. Johnstone.

5. *Dianthus deltoides.*—In a dry, hilly field, opposite Dunscombe's Wood, Cork, in 1837, by Mr. William Alexander, who sent me specimens.

6. *Euphorbia peplis.*—I have fine specimens, sent me by the Countess of Carrick, collected at Garry's Cove, near Tramore, county of Waterford, by Miss Trench, in 1839.

7. *Silene conica.*—Sandy field at Portmarnock, 1837: J. T. M.

8. *Silene noctiflora.*—Found in a field near Tullamore, King's County, in 1838, by Miss Green, of Dublin, who gave me specimens.

9. *Sedum album.*—Roofs of old thatched houses in the town of Antrim, and on walls near it, along with *Sedum reflexum*, in 1837: Mr. D. Moore. On a dry hill at Glanmire, in 1830, by Dr. Harvey.

10. *Acinos vulgare.*—Found near Athy by Miss Trench, in 1838; and in July, 1840, in a sandy field at Portmarnock, by several of my botanical friends and myself.

11. *Asparagus officinalis.*—Abundant on the shore near the town of Wexford: Messrs. M'Calla and Walker, who sent me plants and specimens. Tramore, Waterford, Dr. E. Perceval Wright.

12. *Myosotis repens.*—Specimens were sent me by Mr. C. Babington from the county of Mayo, since the publication of "Flora Hibernica," and I have since found it in Glancree; Mr. D. Moore also sent me specimens from Antrim in 1837.

13. *Medicago maculata.*—On the strand of the Little Island, Cork, by Mr. Denis Murray.

14. *Lathyrus palustris.*—Mr. D. Moore sent me specimens from the banks of the Lagan, near Lough Neagh, near to which place Mr. Templeton first found it. Mr. Rollins also sent me plants and specimens from ditch-banks by the sea-side, beyond Dunganstown, county of Wicklow, in 1849. I have since got fine specimens from Dr. Melville, collected by him at the same place.

15. *Polygonum viviparum.*—Mr. E. Murphy sent me plants and specimens in 1824, found by him on Benbulben; but I neglected to insert it in "Flora Hibernica."

16. *Ophrys muscifera.*—Specimens were sent me by the Rev. Mr. Despard, Curate of Castlecomer, in 1837, found by him in that neighbourhood. I have since (1845) received specimens from Miss Haughton, from the Co. Kildare.

17. *Epipactis grandiflora.*—First found by Mr. George Whitla, at Dunneen, near Antrim. I have since received specimens from the same locality.

18. *Calamagrostis lapponica.*—Banks of Lough Neagh and other places in the county of Antrim, in 1836: Mr. D. Moore.

19. *Carexa elongata.*—On the banks of Lough Neagh, near Galley's Gate, in 1837: Mr. D. Moore.

20. *Senacco squalidus.*—On the roofs of old houses in Cork and suburbs, and also on the walls of St. Finbar's Church and other places near Cork: Mr. William Alexander.

21. *Sisyrinchium anceps.*—Gathered in a coarse meadow, half a mile north of the village of Woodford, near Loughrea, in great quantity, and on the race-course near that village, and also in a coarse meadow, near the Police Barrack in Rossmore, near the Shannon, by James Lynam, Esq., who sent me specimens in September, 1847. I have also received specimens from the same place, sent me by Mrs. Mathews in August, 1855.

22. *Helianthemum Canum* (*Cistus marifolius, Eng. Bot.*).—I have fine specimens of this plant, collected in Arran by Dr. Melville in 1855. When I visited the island in 1805, principally with a view of collecting specimens of *Adiantum capillus-Veneris*, I found plants of *Helianthemum vulgare*, but not in flower. As I believe the other grows on a part of the island I did not visit, and it not being its flowering season, I did not find it.

23. *Erica ciliaris.*—Found by Mr. J. F. Bergin at Craig-a-more, between Clifden and Roundstone, on the 14th September, 1846, from whom I have received specimens.

24. *Aspidium rigidum.*—Found at Townley Hall, near Drogheda, several years ago. I have specimens, sent me by Miss Williams.

25. *Asplenium lanceolatum.*—Found by Mr. Woods, near Cork. I have specimens of a plant brought to the Botanic Garden, I believe by Dr. Kinahan, from the same place.

26. *Simethis bicolor.*—Found near Derrynane, county of Kerry, about ten years ago, by the Rev. Thaddeus O'Mahony, who gave me specimens, which I have mislaid. The plant which was brought by him may be seen

in the College Botanic Garden, with some specimens obtained by Dr. E. Perceval Wright, through the kindness of Captain O'Connell, in 1858.

27. *Saxifraga nivalis.*—Found on Benbulben, county of Sligo, by John Wynne, Esq., of Hazel Wood, ten or twelve years ago.

The ballot having closed, the following were declared duly elected:—

Ordinary Members:—Right Hon. James Whiteside, A. M., M. P.; James T. Mackay, LL. D.; Rev. W. Lee, D. D., F.T.C.D.; Robert Law, M. D.; James Glennon, Sen. Fresh. Associate Member:—John Good.

Rev. Professor Haughton moved, and Professor J. Reay Greene seconded, "That in Section IX. of the Rules of the Association the word *three* be substituted for the word *five*." This being put from the Chair, was passed.

FRIDAY EVENING, MARCH 18, 1859.

PROFESSOR W. H. HARVEY, M. D., F. R. & L. SS., PRESIDENT, in the Chair.

THE Minutes of last General Meeting having been read, were approved of, and signed by the Chairman.

The PRESIDENT read a paper—

ON A NEW GENUS AND TWO NEW SPECIES OF PLANTS FROM THE CAPE OF GOOD HOPE.

PLATE XXVI.

MACKAYA BELLA (*Harv.*), (*Acanthaceæ*). *Gen. Char.*—*Calyx* parvus, nudus, 5-partitus, equalis, laciniis, subulatis. *Corolla* e tubo cylindraceo campanulata, limbo venoso subequali erecto. *Stamina* circa apicem tubi inserta; duo fertilia antheris sagittatis bilocularibus æquilateris; duo inferiora ananthera filiformia. *Stylus* filiformis; stigma minuta, bifida. *Ovarium* loculis medio bi-ovulatis. *Capsula?*—*Frutex gracilis inermis; foliis supra minute punctatis repandis, racemis terminalibus laxe secundi-floris, bracteis bracteolisque infra medium pedicellorum minimis, floribus magnis speciosis lilacinis.*

Mackaya bella.

Hab.—Growing among stones in the river-bed of the Tongat River, 30 miles from Natal, *Mr. J. Sanderson.* (Herb. Hook., T.C.D.)

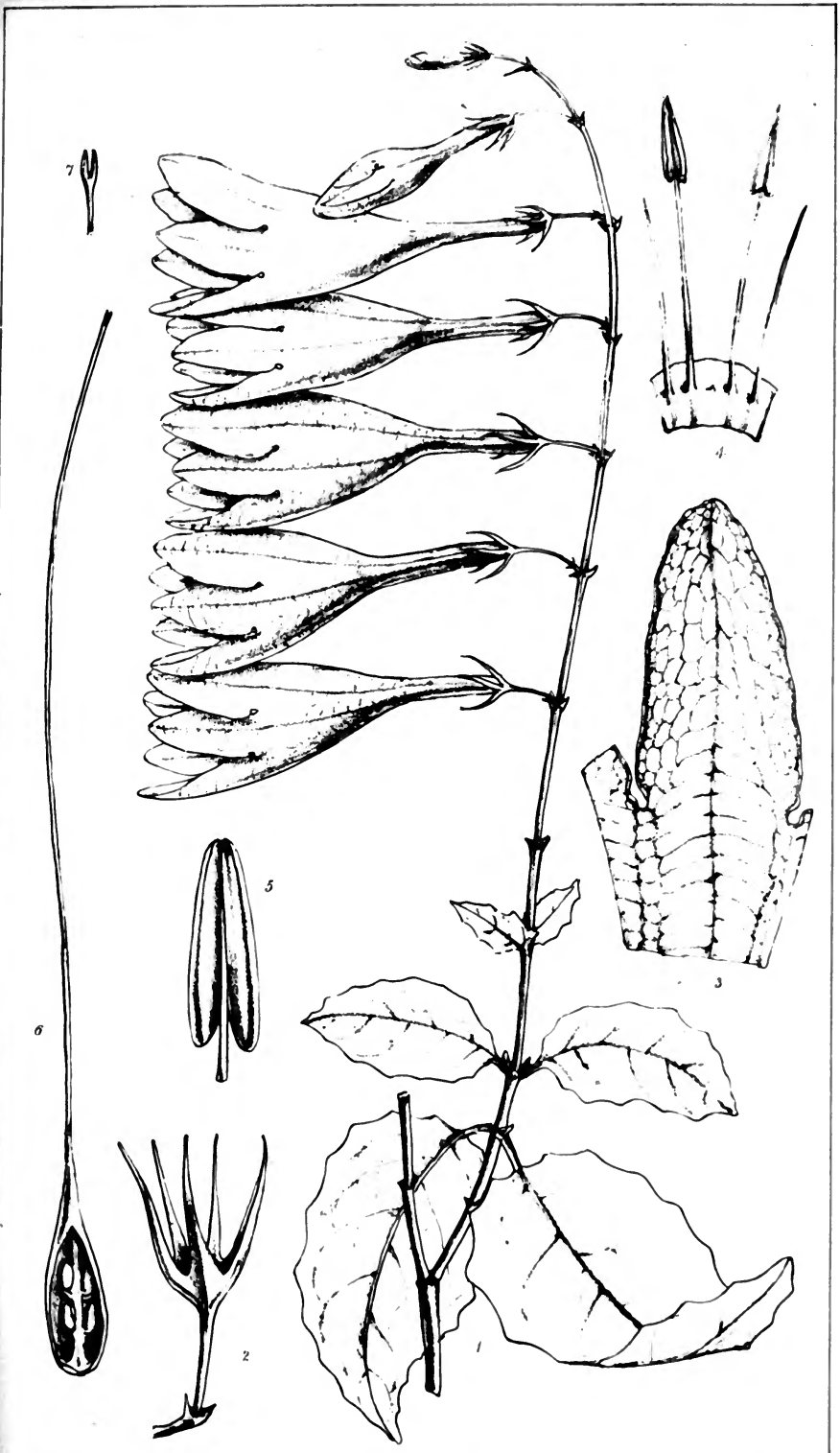
Descr.—A tall, slender, nearly glabrous shrub, with virgate branches. *Leaves* on short petioles, patent, ovate-oblong, 2–3 inches long, glabrous, but minutely granulated on the upper surface, repand, obtuse or subacuminate, veiny. *Racemes* terminal, unilateral (cymoid), many flowered; bracts opposite, minute, subulate; pedicels 2–3 lines long, cernuous, bracteolate at a line from the base. *Calyx* continuous with the pedicel, equally 5-partite, with narrow-subulate segments. *Corolla* nearly two inches long, pale lilac, of thin, membranous substance and veiny, tubular below, campanulate upwards, with a deeply 5-lobed, subequal, erect limb; the segments oblong, blunt. *Stamens* inserted at the top of the narrow part of the corolla, shorter than the limb; two perfect, with sagittate, equal-sided, 2-celled anthers; two filiform, nearly as long as the others, without anthers. *Style* filiform, with a minute, bifid stigma; ovary bilocular, with 2 ovules in each cell. *Capsule* unknown.

Described by *Mr. Sanderson*, its discoverer, as a beautiful shrub, "one mass of most delicate, pendant, pale lilac, campanulate flowers." Our figure, taken from a dried specimen, is perhaps too stiff, nor have we been able, probably, to restore the delicate corolla to its true form. I trust that this ornamental plant may before long be introduced to English gardens. The generic name is given in honour of my venerable friend, James Townsend Mackay, LL.D., author of "Flora Hibernica," and for many years the able superintendent of the Dublin University Botanic Gardens. "*Mackaya*" Arn. is the same as *Erythropalum* of Blume, as I am informed by Dr. Hooker.

Fig. 1, *Mackaya bella*, the *natural* size. Fig. 2, the calyx; 3, portion of the limb of the corolla, showing the venation; 4, the stamens; 5, an anther; 6, ovary (cut open) and style; 7, stigma. More or less *magnified.*

Plate XXVII.

Ceropegia Bowkeri (*Harv.*), (*Asclepiadaceæ*).—*C. Bowkeri:* erecta glabra; caule tenui sub-ancipiti simplici, foliis anguste linearibus utrinque acutis internodio longioribus, pedunculis axillaribus unifloris vix uncialibus, sepalis anguste linearibus, corollæ tubo tenuiter striato urceolata inferne ventricoso, limbi laciniis tubum equantibus liberis latolinearibus plumoso-ciliatis intus villosis, coronæ staminæ lobis exteri-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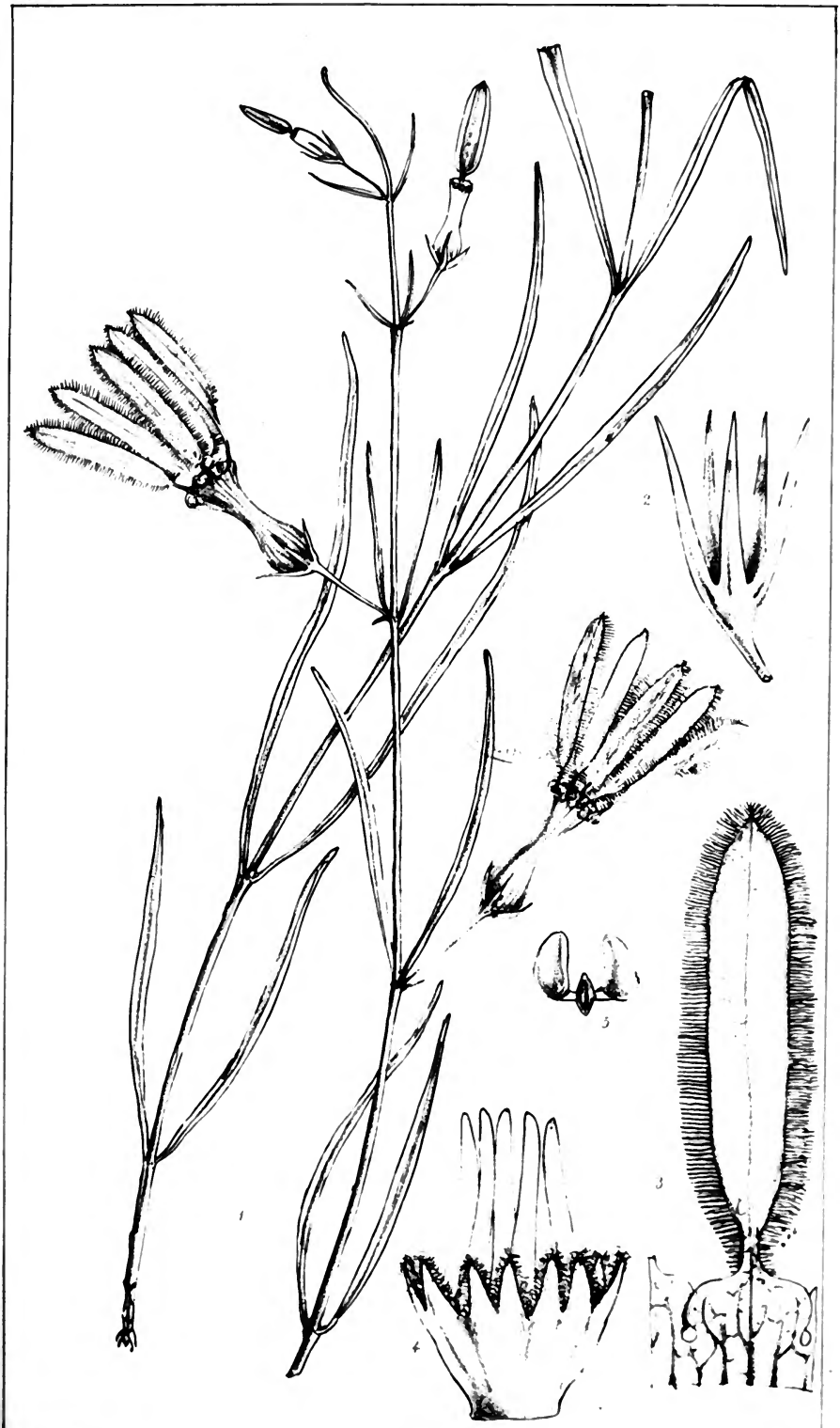

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Ceropegia Bowkeri, Harv.


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oribus anguste-triangularibus margine villosis, interioribus ligulæ formibus glabris duplo longioribus.

Hab.—In Kreili's Country, Caffraria, *Henry Bowker, Esq.* (Herb. T.C.D.)

Descr.—*Root?* *Stem* solitary, 1–2 ft. high, sub-compressed, a line broad, quite simple. *Leaves* 2–3 inches long, 2 lines broad, lanceolate-linear, acute at each end, glabrous, the margin sub-reflexed and thickened, and the rib prominent below. *Pedicels* $\frac{3}{4}$ inch long, single flowered, axillary, bracteate at base. *Calyx* lobes very slender, linear-subulate, mottled with purple. *Corolla-tube* $2\frac{1}{2}$ times longer than the calyx, marked with purple striæ, swollen at base, constricted in the middle, and again expanded at the summit, about an inch in length; *limb* as long, each lobe from a cordate, reflexed base, broadly linear, acute, $1\frac{1}{2}$ lines broad, villous within, and margined with long, golden, gland-tipped, horizontal ciliæ. *Outer corona-staminea* obconical, with ten narrow-triangular, wholly-edged lobes, approaching in pairs; *inner* twice as long, of 5 glabrous, strap-shaped leaflets. Follicles unknown.

A very beautiful and curious species, for which I am indebted to Mrs. Barber; and, in giving it her family name, I express my gratitude to the donor as well as the discoverer.

Fig. 1, *Ceropegia Bowkeri*, the *natural* size. Fig. 2, a calyx; 3, one of the segments of the corolla; 4, the corona-staminea; 5, a pair of *erect* pollen masses.

Dr. E. Perceval Wright, F. L. S., read a paper, entitled "Notes on Professor Steenstrup's Paper on Hectocotyli, with especial reference to the Collection of Irish Cephalopoda in the University Collection."

Dr. E. Perceval Wright stated that the Botanical Committee had entered warmly into the project proposed by Mr. Babington (*vide* p. 246) of forming as many local collections as possible through Ireland. They had great pleasure in reporting that the Flora of Dublin was in a very forward state, and they trusted the Association would soon be enabled to publish it; also, that very valuable collections had been made in the counties of Antrim, Londonderry, and Donegal by Mr. David Moore, A.L.S, which were still in existence in the Museum of Irish Industry. Sir R. Kane, F. R. S., had kindly allowed the Committee to examine and make a catalogue of them.

Of course it would be a labour of many years before every county in Ireland would have its own recorded Flora; but the Committee would lose no opportunity of increasing their knowledge of local plants, and they looked to each Member, more especially their Corresponding Members in Ireland, to help them in this important matter.

The ballot having been opened, the following gentlemen were declared duly elected:—

Ordinary Members:—A. Lefroy, M. A., M. P.; Rev. J. Evans, A. B.; James Wilson, A. M.; and F. W. Briscoe, Jun. Fresh.

FRIDAY EVENING, APRIL 15, 1859.

PROFESSOR W. H. HARVEY, M. D., F. R. & L. SS., PRESIDENT, in the Chair.

THE Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

DR. E. PERCEVAL WRIGHT, F. L. S., read the following paper—

ON GWYNIA, DIELASMA, AND MACANDREVIA—THREE NEW GENERA OF PALLIOBRANCHIATE MOLLUSCA, ONE OF WHICH HAS BEEN DREDGED IN BELFAST LOUGH. BY WILLIAM KING, PROFESSOR OF GEOLOGY, QUEEN'S COLLEGE, GALWAY.

THE Palliobranchs have, of late years, been much subdivided; but it is a question with many as to the value of the resulting groups—one party maintaining that a certain group is a genus; another, that it is a sub-genus. To decide this question satisfactorily it is to be feared that others even more difficult must be disposed of first; as—What is a genus? What is a sub-genus? But, as I have no intention of entering on the discussion of these questions, I may be excused passing them over, and merely stating, that I look on most of the groups alluded to as the equivalents of genera, in the ordinary sense of the term. Those who contend for their being mere sub-genera adhere to the grave error, which has often been committed, by myself amongst others, of juxtaposing and undervaluing groups which are very different in essential characters, and really typical of widely separated families. There are many cases in point: for example, the group Terebratula, as it was generally understood about fifteen years ago. At that time, he was con-

sidered a bold innovator who had the temerity to separate the infra-foraminated from the apically-foraminated species, and to rank the former as a genus, now called Rhynchonella. But in what light are they now considered? The genus is regarded not only as the type of a family, but even as the representative of an order (Helictobrachia), totally distinct from the one (Ancylobrachia) embracing the apically-foraminated species or ordinary Terebratulidæ.

Leaving the present discussion, I may now state that I purpose in this paper adhering to the view adopted in my "Monograph of the Permian Fossils of England," which regards the Palliobranchs with recurved or subgyrated labial appendages as ordinally distinct from those, in which these structures are spirally folded,* and as comprising a number of families. In the work referred to I separated the species containing a long loop from those having a short one under the name of Waldheimia; but I did not, when doing so, sufficiently estimate other differences which exist between them. For some time past, however, the conviction has gradually forced itself on me, that these differences are of sufficient importance to warrant a wider separation than a mere generic one; and, in accordance with this view, I now propose to arrange all the Ancylobrachs with a long loop, and some, which resemble them in other particulars, under a new family, which may be termed Waldheimidæ. By adopting this plan, not only do we properly estimate certain structural characters which distinguish the species of the proposed family from the short-looped Ancylobrachs or Terebratulidæ, but a practical answer is given to the first question alluded to in the beginning.

Many Palliobranchs possess, besides their brachial supports, two or more plates attached to the hinge in one or both valves. In several species the plates are separate, and stand more or less perpendicularly; but in others they are united by one of their edges, forming the various shaped processes seen in Pentamerus, Camaraphoria, Merista, Leptagonia, and other genera, as described by myself in 1846† and 1850.‡ These plates and processes I have always considered to be muscular

* Gray, the founder of this view, has designated these two orders respectively "Ancylobrachia" and "Helictobrachia."

† *Vide* "Remarks on certain Genera belonging to the class Palliobranchiata."

‡ *Vide* "Monograph of the Permian Fossils of England."

supports;* and, that their form and arrangement, in different families, constituted generic diagnoses, as is the case with the teeth in Lamellibranchs. I have therefore been led to institute two of the following genera on the peculiarities of their muscular fulcra:—

Family.—TEREBRATULIDÆ.

Diagnosis.—Small valve, generally furnished with a short, slightly recurved or anneliform loop, having its crura attached, one to each of the dental protuberances, and supporting the origin or basal portion of the labial appendages.

This family includes Terebratula, Terebratulina, and some other genera, one of which I consider is the genus next to be described. All of them appear to be entirely devoid of the muscle-bearing shelly plates common in the next family, and others (Rhynchonellidæ, &c.) belonging to the Helictobrachiate order. The want of these shelly plates constitutes a negative character of much importance in the present family.

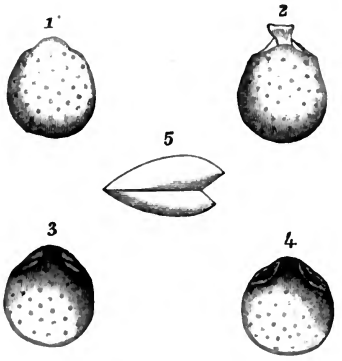
Genus.—Gwynia (*King*).

Diagnosis.—Smooth, subequivalved, sub-auriculated and longitudinally oval: valves thin, with both umbones prominent: foramen emarginated by the deltidial fissure: teeth strong, lamelliform, rather apart, and situated on the sub-auricles: cardinal muscular fulcrum excavated in the substance of the large plate: labial appendages free, except at their origin, where they are directly attached to the surface of the shell: perforations in the shell tissue rather large and wide apart.

Type species.—Terebratula capsula (*Jeffreys*).—The present genus is founded on a very minute shell, first discovered by Mr. J. Gwyn Jeffreys (to whom I have, with much pleasure, dedicated it) at Etretat, on the coast of Normandy, and since determined by him as occurring in Belfast Lough, where it has been taken by Messrs. Hyndman and Norman. Mr. Jeffreys, in his account of the species (*vide* "Annals of Natural History," January, 1859), remarks:—"This shell being equivalve, or nearly so, it may be a question whether it ought not to be

* The "pedicle muscles" generally. But the "valvular muscles" also, in Camarophoria, appear to have been supported by the spatula-shaped process of this genus; and a like office has apparently been subserved by the two long vertical plates in the small valve of Pentamerus.

placed in a new sub-genus of Terebratula." On reading this remark, I wrote to Mr. Jeffreys, who, in return, kindly forwarded to me all his specimens, so that I might be enabled to form some opinion on the question he had raised. The principal generic character of Gwynia is in the labial appendages being attached directly to the shell (first observed by Mr. Jeffreys), and not to a loop, as in other genera of the same family. The prominency of the umbone of the small or receiving valve, the form, position, and (considering the size of the species) unusual development of its teeth, also the large size of the perforations of its shell tissue, form other good distinguishing characters. In being sub-auriculated it resembles *Terebratulina*. The absence of a loop seems to oppose the genus being placed in the family Terebratulidæ; but I prefer retaining it thus, until other differences are made out: possibly when the animal is known, more satisfactory data on this point may be discovered.



Gwynia capsula.

1, outer surface of the large valve.
2, outer surface of the small valve. The projecting portion is the pedicle.
3, inside of large valve, showing teeth and deltidial fissure.
4, inside of small valve, showing dental sockets.
5, longitudinal section of both valves, in the closed state.

Family.—WALDHEIMIDÆ (*King*).

Diagnosis.—Receiving valve generally furnished with a long, deeply recurved loop, having its crura attached, one to each of the dental protuberances, and occasionally, its anterior portion united to the centre of the valve by one or two connecting processes: loop supporting the labial appendages throughout their entire extent. Pedicle muscles often

supported by plates attached to the dental protuberances, from which they pass perpendicularly or obliquely: in the latter case they become confluent, forming a sternum-like process, which is generally supported by a perpendicular plate passing considerably forward along the medio-longitudinal line of the valve.

I include in this family the genera Waldheimia (the type), Terebratella, Kingena, Ismenia, Meganteris, and some others, to which may be added the new genera next to be described. Comparing the animal of *Terebratulina caput-serpentis* with that of *Waldheimia Australis*, it is difficult to conceive that there are not differences manifested, especially in their respective labial appendages, of more than generic value: further, the presence of pedicle muscle plates in the latter, and their absence in the former, are also strongly in favour of this view. The confluent muscular fulcral plates, in the small valve of most genera, have much resemblance to a bird's sternum, viewed on its inner surface.

Genus.—Dielasma (*King*).

Diagnosis.—Smooth, longitudinally oval, inequivalve, the foraminated or condyle valve being the largest: foramen complete: umbonal cavity of the large valve furnished with muscular fulcral plates passing perpendicularly from the dental protuberances to the surface of the valve: umbonal cavity of the small valve furnished with muscular fulcral plates, oblique, confluent, and forming a sternum-like process, supported by a medio-longitudinal plate. Loop in type species short, slightly recurved, and extending to about a third of the length of the valve: perforations in the shell tissue small and approximate.

Type species.—Terebratulites elongatus (*Schlotheim*).—I have long considered that the above species, which is one of the fossils characteristic of the Permian system, ought to be separated from Terebratula, the genus in which it is usually placed. In my "Monograph" I made use of Professor Phillips's name "Epithyris" for it; but this has been objected to, with some reason, by several parties. On similar grounds, I object to the name Semiluna, which has been proposed for the group by Professor M'Coy, considering that it was originally applied to species which there is little doubt belong to the genus Rhynchonella. I was therefore induced to apply to the above species the generic name "Dielasma" in my "Historical Account of the Invertebrata belonging to the Permian Rocks of the North of England," lately published.

Notwithstanding the small size of the loop in the present genus, as compared with that characteristic of its congeners, I think the presence of highly developed muscular fulcral plates warrants its removal, not only from other short-looped groups generically, but its being considered a member of a distinct family. No known genus of Terebratulidæ, as restricted in the present paper, possesses any plates of the kind: these structures are only to be seen coexisting with the long-loop in genera belonging to the family Waldheimidæ. The short-loop in Dielasma may therefore be considered as an exceptional character; but there is no ground for considering it as exceptional in anything else but in length, inasmuch as it must be admitted that a short-loop may support labial appendages throughout their entire extent as well as a long one.

Dielasma is a protozoic form, occurring in Permian and Carboniferous rocks. It appears to have lived also at a later period, as *Terebratula ovoides* (*Sow.*) seems to be a Liassic representative of the genus. It is a remarkable fact, that we are not yet acquainted with any other Ancylobrachiate Palliobranch of the primary periods, except such as belong to Waldheimidæ, or are related to this family; for example, Meganteris and Stringocephalus.

Genus.—Macandrevia (*King*).

Diagnosis.—Smooth, longitudinally oval, inequivalve, the condyle valve being the largest: foramen emarginated by the deltidial fissure: umbonal cavity of large valve furnished with two muscular fulcral plates passing somewhat perpendicularly from the dental protuberances to the surface of the valve: umbonal cavity of opposite valve also furnished with similarly directed plates: cardinal muscular fulcrum excavated in the substance of the hinge. Loop long, strongly recurved, and extending in front of the centre of the valve. Perforations in shell tissue distinct, and separated by interspaces equal in size to themselves.

Type species.—Terebratula cranium.—Of late the shell which serves as the type of the present genus, named in compliment to Mr. M'Andrew, has been considered a Waldheimia, on account of its loop resembling the type species of the genus just named; but some other characters, apparently overlooked, necessitate, in my opinion, its removal. In none of the figures published of *Macandrevia cranium* are the muscular fulcral plates correctly represented: indeed, the fulcra of the large valve appear to have been overlooked: those in the opposite valve are

represented as confluent, and resembling the sternum-like muscular fulcrum in *Waldheimia Australis;* but the contrary prevails, as they are completely disunited. Further, there is no medio-longitudinal plate, as in the last species. The excavated cardinal muscular fulcrum also distinguishes it from the genus in which it has hitherto been placed. The muscular plates of the large valve call to mind the corresponding plates in Dielasma. In these particular structures Macandrevia differs from all known existing Ancylobrachs: they are only to be found in the living Helictobrachs—*Rhynchonella psittacea*, and *R. nigricans;* while those belonging to the small valve are altogether different from their counterparts in other Palliobranchs, except certain forms which lived during the protozoic periods.

Professor J. Reay Greene read a paper—

ON THE REMARKABLE SHELL-BED OF BEAUFORT, QUEBEC.
BY JOHN GRAINGER, A. M.

As this deposit has been minutely described by Sir Charles Lyell in his "Travels in North America," I shall confine myself to a few remarks of an expletive character on the various notices which have appeared, suggested by a small mass of the characteristic shells which I obtained when at Quebec last year. It cannot be thought that the deposit is otherwise than remarkable, when it is considered, that for twelve feet in thickness, it consists almost entirely of a species of Saxicava. Sir Charles Lyell considered it the species *rugosa*, but it appears very distinctly to possess the peculiarities of *arctica*, as distinguished in Messrs. Forbes and Hanley's Mollusca. The portion of the deposit which I possess happens to have been broken out in the shape of a rough three-sided prism, about six inches in length, and two inches and a half in breadth, and is composed almost entirely of the agglutinated Saxicava, with a hard mixture of siliceous grains and pebbles. In the sides of this figure there can be distinguished about one hundred valves lying in all directions, "end uppermost" included; they are bleached and brittle, but appear to possess a portion of their animal gluten. Very few of them have both valves united. Sir Charles Lyell must have met with them in a different condition, when he observes that their valves were mostly united. They generally exceed an inch in length, which is rarely the case in British examples. One of them is bored to the width of one-eighth of an inch.

As a confirmation of this view, I would refer to the "Philosophical Transactions" for 1835, in which are figured various examples of the Saxicava, which Sir C. Lyell found at Uddevalla, in Sweden, and between which and those of the Quebec deposit, as well as between most of the other shells of both deposits, he discovered an identity, which beautifully established the oneness of geological age of two drift formations of so widely separate localities as Canada and Scandinavia. I think I shall be agreed with, after a comparison of these plates with those of Forbes and Hanley, and with their description, in referring the shells to the species *arctica*. In passing, it may be observed, that these authors, in stating that they had seen inland Canadian Saxicava from Sir Charles, do not say of what species. One of them presents a boring rather less than that of the Saxicava already noticed, and betrays the presence, perhaps, of a different species of Purpura, to which these borings, I believe, are generally referred. The boring into the Saxicava is wider on the outside coat of the shell than even the one-eighth of an inch which I have mentioned as the diameter, while that on the Tellina is a clean boring of the same diameter outside as within the shell. As Messrs. Forbes and Hanley state that the *Tellina proxima* is found in the pleistocene deposits of Canada, it may be well to mention, that this must be an inadvertence for post-pleistocene formations, as there are no true tertiary organic remains in Canada. See, on this subject, the first Number of the "Canadian Geologist."

The mass contains also a fragment of *Mytilus edulis*, retaining its bright blue colour, and another fragment, which is evidently a portion of a Balanus, but it is so small a portion that it does not distinguish itself as to species, unless that its not appearing longitudinally striated except on the inside of the base would refer it to Uddevallensis, of which Sir Charles Lyell found many fragments.

I have also a valve of *Mya uddevallensis* from the same locality which presents the extreme shortness of the posterior end which distinguishes this variety of the well-known *M. truncata*.

I found three valves of *Tellina proxima*, which is a characteristic shell of these deposits; their size is much beyond that of the dead British specimens which have been dredged, being fully an inch and a half in length and above an inch in breadth. They are of the variety Calcarea, noticed in the Appendix to Forbes and Hanley, and correspond exactly to the specimen figured in the last plate of vol. iv.

I have still to mention that a specimen of *Buccinum undatum*, from the same locality, appears to be of the variety 1 of Alder and Hancock, and Pelagicum of King, which speaks of deep water inhabitation, as this variety is from a hundred fathoms' dredging in the present day.

Dr. E. Perceval Wright, F. L. S., read the following paper—

ON THE OCCURRENCE IN GALWAY OF THE LESSER HORSE-SHOE BAT (RHINOLOPHUS HIPPOSIDEROS). BY PROFESSOR WILLIAM KING, QUEEN'S COLLEGE, GALWAY.

When present at the Anniversary Meeting of the Dublin University Zoological and Botanical Association in October last, I mentioned to the President, Dr. Harvey, and to Dr. Kinahan, that I had captured one of the Horse-shoe Bats in the neighbourhood of Galway; and that it was my intention to draw up a short notice on the subject for publication. Both these gentlemen expressed themselves highly delighted at the information, and urged me to lose no time in preparing my paper. The present communication is the fulfilment of a promise I made on that occasion.

The bat in question is a male specimen of *Rhinolophus hipposideros;* but it must be confessed that I felt at first some hesitation in positively pronouncing it to be this species.

It was while sitting in the dining-room, on a fine evening in the middle of last June, that one of my family called out that a bat was flying about the room. No sooner was "Flitty" announced, than the usual preparations were made for its capture, every one present furnishing himself or herself with either a cap, hat, or handkerchief for the purpose. After eluding our efforts for some time, it was at last secured, and forthwith put under a glass for exhibition: it was rather vicious, attempting to bite when handled. I was at once struck with the remarkable appendages surrounding its nose, and saw that it was not one of the usual bats which had been captured in the house on previous occasions. This led me to consult some works I had by me at the time, when I made out that "Flitty" was of the Horse-shoe genus; but I could find no record of any specimens of the kind having occurred to any one else in this country.

Having to leave home next morning, on a geological excursion in the south of Ireland, I desired one of my sons to endeavour to keep the

bat alive; and, in the event of its dying, to preserve it in spirits. On my return, a week after, I was informed that "Flitty" could not be prevailed on to take any food, and, as a consequence, had died; it had, however, been carefully deposited in a small bottle of spirits, as directed.

It has been stated that I felt some hesitation at first in positively pronouncing my specimen to be the Lesser Horse-shoe Bat. There were some features in its nasal appendages apparently different from the characters which Jenyns and Bell have assigned to these structures; but I now feel that the observed differences result from the mode of preservation of the specimens examined by these naturalists; and I am afraid, as the nasal appendages of my specimen have become contracted, that the following description of them, as well as the drawing herewith sent, will also be faulty. However, I hope to be able to add something to the present knowledge of this species.

My specimen measures, from the upper margin of the ears to the point of the tail, a little above two inches and a quarter. Its body is clothed with a long, soft, silky fur, of a light ashy-brown colour on the belly, and a dusky gray on the back. The fur is thick on the forehead, and on the cheeks especially, where it forms a pair of well-furnished whiskers: a narrow fringe of bristly hairs, forming a moustache, occupies the marginal portion of the upper lip. The flying membranes are darker than the body, and impressed with oblique bands crossed with very fine linear puckerings, particularly on the interfemoral portion, where the puckerings become more strongly marked, and not so regularly linear: there are about twenty puckered bands on the interfemoral membrane. The tail is not so long as it is represented in Bell's figure of the species: it appears to extend no further than the wrist of the hind hands. "The prehensile character of the extremity of the tail," observed by Professor Bell in the pipistrelle, seems also to be a feature of the present species, inasmuch as this part is furnished with a blunt terminal claw: there are five joints in the tail. The eyes, which are with difficulty seen amongst the thick and long fur surrounding them, are small, and situated near the inferior angle of the opening of the ears.

The ears consist of an anterior and a posterior lobe; the latter is half an inch long, having its upper margin rounded, and tapering to a point turned outwards: the outer margin is uni-sinuated, and marked with a few slight or obsolete sulci, which run transversely to nearly the

centre of the ear. The anterior lobe is a forward inflected curve of the outer margin of the posterior one, and nearly half its height: the upper margin is gradually rounded into the inner one, which descends suddenly to the base of the corresponding margin of the posterior lobe, leaving a slit-like space between them: at the junction of the two lobes there is a well-marked sinus.

The nasal appendages are usually considered as two or three in number; but it appears to me to be more correct to regard them as four; though there is no very decided line of separation between them: they may be named as follows:—

1st. Labial leaf,
2nd. Nasal disc.
3rd. Median crest,
4th. Frontal leaf.

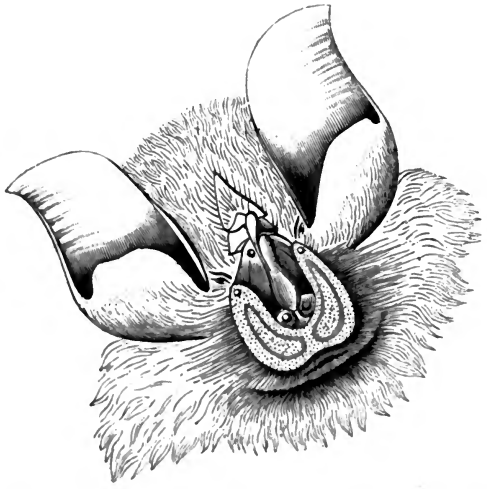
The *Labial leaf*, or horse-shoe appendage, as it is usually called, is a belt-like membranous expansion, covering the upper lip (except the narrow marginal space furnished with the moustache), and curving up on each side of the nostrils to nearly the inner angle of the eyes. The outer margin is sharp, and may be raised from the lip: it is slightly emarginate in the centre. The inner margin is a thickened or raised fold, obviously so on each side of the nostrils: a broadish, shallow groove runs up the middle of the ascending or lateral portions, to nearly their termination: on each of the last parts there is a slightly raised gland-like wart. The surface of the labial leaf is very minutely pimpled, and naked, with the exception of a few very minute straggling hairs.

2nd. *Nasal Disc.*—This is situated between the ascending or lateral portions of the labial leaf, and is continued behind them and above the eyes, terminating in a somewhat obtuse point. On its anterior portion are seated the nostrils, rather apart from each other, and bounded posteriorly by a slightly curved transverse ridge. Near the apex or terminal point, there are two gland-like warts, similar to those occurring on the last-described appendage, and separated from each other by the median crest. The surface of the nasal disc is naked, somewhat flat, and depressed below the labial leaf.

3rd. *Median Crest.*—The present structure originates between the nostrils, and is prolonged backward, or upward, along the central line (to which it is attached) of the nasal disc, passing beyond its apex, and becoming more and more elevated in its course: the anterior half is

rather wide, slightly excavated at top, and somewhat spoon-shaped: the posterior half decreases rapidly in width, is more elevated at its free termination, and has a deep notch on it, which causes the divided portion to appear like a pyramidal projection.

4th. *Frontal Leaf.*—This is a somewhat flattened membranous expansion, slightly ridged along the medio-longitudinal line, and having a marginal outline resembling a scalene triangle, the base being situated near the posterior termination of the nasal disc, and the apex reaching to nearly half the length of the ears: it is separated by a deep constriction from the nasal disc, and attached to the forehead by its inferior half: on the latter part there are two transverse, rather prominent leaflets, the anterior one rising from the basal or anterior margin. The posterior half is considerably elevated, and has the apex or termination curving slightly forward. The whole of this structure is thinly beset with long bristly hairs.



As regards the habitat of the specimen which has been described, I have not been able to obtain any knowledge; but I suspect that its station was within a radius of a few miles beyond where it was captured. I reside about two miles from Galway on the Dublin Road; and not far from my residence there are two or three places, an old castle in Merlin Park, and a subterranean passage in a so-called Danish fort: possibly one of these may have served as its habitation.

P. S.—It is somewhat remarkable, that, five months after I had announced the occurrence of this bat in Galway to Drs. Harvey and Kinahan, the latter gentleman should have had the opportunity of recording its occurrence at Ennis, where it appears to be rather common, Mr. F. J. Foot, of the Geological Survey, having captured some specimens for him in March of the present year.—*Vide* "Proceedings of the Natural History Society of Dublin," "Natural History Review," vol. vi., p. 381.

FRIDAY EVENING, MAY 20, 1859.

PROFESSOR W. H. HARVEY, M. D., F. R. & L. SS., PRESIDENT, in the Chair.

THE Minutes of last General Meeting having been read, were approved of, and signed by the Chairman.

Letters acknowledging their election as Corresponding Members, and thanking the Association for the honour conferred upon them, were read from Professor Huxley, F. R. S., P. Lutley Sclater, F. L. S., Dr. Asa Gray, and Dr. Leidy.

DR. E. PERCEVAL WRIGHT, F. L. S., read the following—

CONTRIBUTIONS TO IRISH LICHENOLOGY: PART I. BY ISAAC CARROLL, CORK. WITH PLATES XXIX., XXX., XXXI.

IN this and the following papers each genus will be animadverted on without respect to its place in a natural system of arrangement. In consequence of the important changes in the nomenclature of even the commoner species of Lichens, since these plants have been examined by the aid of powerful microscopes, I have thought it better to include *all* those species which have come under my own observation. The synonyms quoted from examination of authentic specimens are distinguished by a note of admiration. I have to thank Mr. Moore and Rear-Admiral Jones for the kindness with which they have allowed me to inspect their collections.

Genus.—LECIDEA (*Ach.*).

1. *Lecidea exanthematica* (*Sm.*). *Thelotrema clausum* (Schœr. Lich. Helv. Exs. 122!). Sheep-walk, Armagh, on limestone; Admiral Jones.

2. *L. cupularis* (*Ach.*). *Gyalecta cupularis* (Schœr., L. H. Exs. 135!). On siliceous stone, over which water, impregnated with carbonate of

lime, flowed; Dunkerron Mountain. Dr. Taylor in Herb. Moore. This species is also present in a small collection sent to Dr. Hincks by Miss Hutchins, and now in the Royal Cork Institution.

3. *L. lutea* (*Schær.*). *Lichen luteus* (*Dicks.*). On trees, Dunkerron; Dr. Taylor in Herb. Moore. Glenarm, Co. Antrim, Moore. Near Cork and Killarney.

4. *L. pineti* (*Ach.*). (Nyl. L. P. Exs. 56!). *Lecidea pineti. β. minor* (Schœr., L. H. Exs. 218!). *Gyalecta? pineti.* (Leight., L. B. Exs. 89!).

On *Pinus sylvestris* (*L.*) near Larne; D. Moore. In Lord Aldborough's demesne at Baltinglass, Co. Wicklow, and near Cork, where I have also observed it on an apple-tree.

5. *L. lurida* (*Ach.*), (Schœr. L. H. Exs. 157! Nyl. L. P. Exs. 131!). On limestone near Galway; D. Moore. *Vide* Plate XXIX., Figs. 1, 2, *a*, *b*, *c*.

6. *L. sublurida* (Nyl. MSS.). On sandstone and slate rocks. Specimen marked *Lecidea lurida* in Herb. Cork Inst., collected by Miss Hutchins. Rocks near Belfast and on Island Magee, Co. Antrim; D. Moore (*vide* Plate XXX., Fig. 1, *a*, *b*, *c*). Brandon Mountain, Kerry; D. Moore. Crevices of rocks by the sea at Ballycotton, Co. Cork. Plate XXXI., Fig. 2, *a*, *b*, *c*, *d*. This fine species, the distinctive characters of which I was the first to point out, may be recognised from *L. lurida* (*Ach.*), when growing, by its larger size and paler colour, but more certainly by the appearances presented on dissection. It is allied, Nylander says, to *L. rufonigra* (*Tuck*) of N. America.

7. *L. glaucolepidea* (Nyl. MSS.). "Thallo glauco, squamulosa; found on the top of a mountain, Ireland, 1812. Miss Hutchins, in Herb. Hooker" (Nyl. *in litt.*). About the roots of heath, on a moor, four miles from Ballintoy, Co. Antrim; D. Moore. Plate XXXI., Figs. 2, 3, *a*, *b*, *c*. This cannot be confounded with any other British species.

8. *L. mutabilis* (*Fée, fide* Nyl.). Thallus whitish or glaucous; apothecia reddish-brown; spores simple ovate, rather large. On the bark of young trees in a very few localities in Co. Cork, as at Castlebernard Park, Bandon, where Admiral Jones has also found it. On holly, Blackwater Bridge, Kerry. This species, according to Nylander, is new to Europe, having hitherto been found in North America only. *Vide* Plate XXIX., Figs. 2, 3, *a*, *b*, *c*.

9. *L. Lightfootii* (*Ach.*), *var. minor* (Nyl. *in litt.*). *L. commutata* (*Ach. fide* W. Mudd, who thinks it a distinct species). On young trees at Cahirlogue, near Glanmire, Cork.

10. *L. lucida* (*Ach.*). The barren thallus of this lichen is not rare on shaded slaty rocks, but I have not yet found the apothecia.

11. *L. vernalis* (*Ach., Nyl.*). *Var.* (1). *Muscorum* (*Schœr.*). *Biatora muscorum* (Leight., L. B. Exs. 91!). *Lecidea sphœroides, v. dolosa* (Schœr. L. H. Exs. 474!). *L. milliaria, v. saxicola* (Leight., L. B. Exs. 210!), *L. sphœroides, v. muscorum* (Schœr. L. H. Exs. 209!), and *L. Templetoni* (*Tayl.?*), from Co. Antrim, in Herb. Moore, seem also to belong to this form, which is not rare on the ground, sometimes occurring on trunks of trees.

Var. (2) *Milliaria* (*Fr.*) *Lecidea milliaria, v. terrestris* (Leight., L. B. Exs. 238!). *L. geomœa* (*Tayl.*) in Herb. Borr.! On the ground, not rare. In Herb., Cork Institution. Miss Hutchins. Several localities in Co. Antrim; D. Moore, who sends it as *L. geomœa* (*Tayl.*).

Var. (3). *Montana* (*Nyl.*). On wet earth, Co. Wicklow; D. Moore.

12. *L. cyrtella* (*Ach.*). *L. vernalis* (*Ach.*), *var. anomala* (*Nyl.*) On trees, and occasionally on rocks, frequent. Nylander thinks this plant a form of the preceding; but I do not feel satisfied that such is the case.

12*. *L. sphœroides* (*Dicks.*). On trees, Florence Court, Admiral Jones. This, as well as the preceding species, are considered by Nylander forms of *L. vernalis* (*Ach.*); but I am not satisfied that such is the case.

13. *L. gelatinosa* (*Flk.*). *L. viridescens* (*Ach.*), *v. gelatinosa* (*Flk., Nyl.*), *L. gelatinosa* (Schœr. L. H. Exs. 205!). Specimens in Herb., Cork Inst., collected by Miss Hutchins, certainly belong to this species, which has been also found "on turf, Slemish Mountain," and "on the ground, Kelly's Glen," by Mr. D. Moore. I have not had an opportunity of examining *good* examples of *L. viridescens* (*Ach.*), to which the present species has been referred as a *var.* by Nylander.

14. *L. decolorans* (*Flk.*). *L. quadricolor* (*Borr.*). *L. granulosa* (B.) (Schœr., L. H. Exs. 214!). In Herb., Cork Institution; Miss Hutchins. Boggy ground, Co. Wicklow; D. Moore. On the mountains near Doneraile, Co. Cork.

15. *L. uliginosa* (*Ach.*). *Biatora uliginosa* (Leight., L. B. Exs. 120!). *Lecidea microphylla, δ. uliginosa* (Schœr., L. H. Exs. 162! 163!). In Herb., Cork Institution; Miss Hutchins. On turf, Co. Derry, and on decayed grass, Ballymoney, Co. Antrim; D. Moore. Near Cork and Doneraile.

16. *L. quernea* (*Ach.*), (Schœr., L. H. Exs. 582!). *Biatora quernea* (Leight., L. B. Exs. 61!). On trees, especially aged oaks and beech common. Apothecia on oak at Castlebernard Park, near Bandon.

17. *L. coarctata* (*Ach.*), (Nyl., L. P. Exs. 54!). *Lecanora coarctata* (*Ach.*). On old red sandstone at Kilcully; also on limestone near Blackrock Castle, Cork. Blackwater Bridge, Kerry.

18. *L. luteola* (*Ach.*). *Var. rubella. L. rubella* (Schœr., L. H. Exs. 210!). *L. vernalis* (Leight., L. B. Exs. 92!). On an old ash (or elm) tree, Castlemartyr Demesne. The typical form (*L. luteola*, Nyl., L. P. Exs. 55), which differs from *Var. rubella* merely, as it seems to me, in the colour of the *apothecia*, I have not yet found. Imperfect states of *L. luteola* (*Ach.*) are of frequent occurrence.

19. *L. endoleuca* (*Nyl.*), *olim L. luteola* (*Ach.*), *v. endoleuca* (Nyl., Prod.), *Biatoria premne* (Leight., L. B. Exs. 90!). Common, especially on young ash trees. North of Ireland; Mr. Moore; Admiral Jones.

20. *L. holomelæna* (*Flk.*). *Scoliciosporum holomelænum* (*Kœrb.*). *Lecidea vermifera* (Nyl., L. P. Exs. 136! Leight., L. B. Exs. 158!). Frequent on rocks. North of Ireland; Admiral Jones.

21. *L. pachycarpa* (*Duf.*). *L. incana* (*Turn. et Borr.*). On trees, Castlebernard Park, Bandon; barren thallus only; Admiral Jones. Killarney, with *apothecia*, very fine, 1859; D. Moore!

22. *L. canescens* (*Ach.*), (Schær., L. H. Exs. 576; Nyl., L. P. Exs. 137). Common on trees and rocks, in a barren state; with apothecia on trunks of trees, Co. Wicklow; D. Moore; and in several localities near Cork.

23. *L. vesicularis* (*Ach.*), (Schær., L. H. Exs. 168!); (sub. nom. *Lecidea cæruleo nigricans*). Several stations in the north of Ireland; D. Moore; on walls near Cork and Midleton. Our Irish plant closely resembles *L. candida* (Ach.), (Schær., L. H. 167!) in external appearance, but the internal structure is quite different, and is identical with *L. vesicularis*.

24. *L. aromatica* (*Ach.*), (Leight., L. B. Exs. 154!). Deer Park wall, Belfast; D. Moore. North of Ireland; Admiral Jones, who remarks that his specimens are invariably found creeping over the surface of *Pannaria triptophyllia* (*v. nigra, Nyl.*), (*Collema nigrum*, D. C.). Near Cork this species is common on the mortar of walls.

In one instance I detected the apothecia of *L. aromatica* located on thallus of *Endocarpon Hedwigii*.

25. *L. parasema* (*Ach.*). On trees and rocks, very common. The following forms occur:—

(1) *Coniops. Lecidea sabuletorum, v. coniops* (Schœr., L. H. Exs. 193! Leight., L. B. Exs. 331!). *L. scabra* (*Tayl.* in Herb. *Borr.!*). Common on rocks by the coast.

(2) *Crustulata* (*Flk.*). On rocks near Cork.

(3) *Enteroleuca. L. enteroleuca* (Schœr., L. H. Exs. 530!). On trees, frequent; specimens collected on rocks near Larne, by D. Moore, appear to be the same thing.

(4). *Elæochroma. L. elæochroma* (Leight., L. B. Exs. 126!). On trees, very common.

26. *L. atro-alba* (*Flot.*). Brandon Mountain, Kerry; D. Moore. Probably frequent.

27. *L. badio-atra* (*Flk.*). On rocks by the coast, frequent.

28. *L. stellulata* (Tayl., Leight., L. B. Exs. 276!). Common on rocks.

29. *L. petræa* (*Flot.*). Very common on rocks.

Var. concentrica (*Dav.*). *L. petræa* (Schœr., L. H. Exs. 183!) *L. atro-alba, v. concentrica* (Leight., L. B. Exs. 17!) On stones of walls, &c., abundant.

Var. Æderi. Frequent on high mountains, as in the north of Ireland (D. Moore), and on Mangerton. This form, *Lecidea œderi* of authors, appears to be only *petræa*, having the thallus tinged of a rusty hue with oxide of iron. *L. atro-alba, v. atro-albella* (Leight., L. B. Exs. 184!) (in my copy) is also *petræa*.

30. *L. contigua* (Fr., Schœr., L. H. Exs. 446! Leight., L. B. Exs. 155! 156! 337!). On rocks, common.

Var. confluens (Schœr., L. H. Exs. 187! 188!).

Var. platycarpa (Nyl., L. P. 141!). *L. platycarpa* (Schœr., L. H Exs. 228!) These *vars.* also occur, and a third form, resembling *L. calcivora* (*Ehrh.*), occurs on limestone rocks near Glenarm, where it was collected by D. Moore.

31. *L. lapicida* (*Fr.*). North of Ireland; D. Moore, *var. silacea, L. silacea* (*Arch.*), frequent on rocks. This lichen is probably common, but is difficult to distinguish from the preceding.

31*. *L. albo-cœrulescens* (*Fr.*), *var. alpina* (*Schœr.*). Killiney Hill; Admiral Jones.

32. *L. atro-sanguina* (*Hoffm.*). *L. immersa, δ. atro-sanguinea* (Schœr., L. H. Exs. 628!). Armagh; Admiral Jones. Frequent near Cork, especially on limestone.

33. *L. calcivora* (*Ehrh.*), (Nyl., L. P. Exs. 138!). *L. immersa, a. calcivora* (Schœr., L. H. Exs. 201!). On limestone near Blackrock Castle, Cork.

34. *L. fusco-atra* (*Ach.*), (Leight., L. B. Exs.215 ! 239 !). *L. fumosa* (Schœr., L. H. Exs. 470). In Herb. Cork Institution ; Miss Hutchins. Specimens, apparently belonging to the species, were collected by Mr. Moore in the north of Ireland, but I was unable to make out their spores.

35. *L. rivulosa* (*Ach.*). Very common on rocks in exposed or elevated localities.

36. *L. lenticularis* (*Ach.*). *L. chalybeia* (*Borr.*). Common on rocks, whether sandstone or limestone. North of Ireland, in various localities; Mr. Moore and Admiral Jones. Rare on trees, as on alder at Rostellan, near Cork.

37. *L. premnea* (*Ach.*), (Nyl., L. P. Exs. 67 !). *L. abietina* (Leight., L. B. Exs. 124 !). On an aged oak, Castlebernard Park, Bandon.

38. *L. abietina* (*Ach.*). *L. leucocephala, vars. lecidina et denudata,* (Schœr., L. H. Exs. 534 ! 535!). Kerry ; Dr. Taylor in Herb. Moore.

39. *L. albo-atra* (Schœr., L. H. Exs. 445 ! Nyl., L. P. Exs. 63 ! Leight., L. B. Exs. 64 !). On trees, frequent.

Var. epipolia (Nyl., L. P. Exs. 64 ! Leight., L. B. Exs. 241 !). On rocks, especially near the sea.

40. *L. disciformis* (*Fr.*). (Nyl., L. P. Exs. 60 ! Leight., L. B. Exs. 180 !). *L. punctata, a. macrocarpa* (Schœr., L. H. 197 ! *γ. saprophila,* 198 ! et *δ. microcarpa,* 199 !). Frequent on trees and rocks.

41. *L. myriocarpa,* D. C. *L. pinicola* (*Borr.*). Leight., L. B. Exs. 631 *L. punctata. ε. punctiformis* (Schœr., L. H. Exs. 200 !) *L. myriocarpa* (Nyl., L. P. Exs. 61 ! Leight., L. B. Exs. 181 !), (*Saxicola*). On trunks of aged Coniferæ ; frequent near Cork.

42. *L. grossa* (Pers. Nyl., L. P. Exs. 66 !). *L. leucoplaca* (Leight., L. B. Exs. 125 !). On trees near Blarney, Cork ; and at Muckross, Killarney; several localities in the north of Ireland; Moore.

43. *L. geographica* (*Schær.*). Abundant on rocks in exposed or elevated situations.

44. *L. rupestris* (*Ach.*). Common on rocks and walls.

Var. calva. L. rupestris, β. calva (Schœr., L. H. Exs. 221 !). Common on limestone. Nylander makes *L. rupestris* a *var.* of *Lecanora cerina* (*Ach.*), but I am by no means convinced that he is right.

45. *L. Mooreana* (*n. sp.*). Thallus indeterminately spreading, composed of greenish-yellow or brown tumid granulations. *Apothecia* large, tawny-black, with a narrow elevated border. *Hypothecium*, a narrow black

line. *Spores*, 8, in rather long and narrow *thecæ*, ovate. *Hymeneal gelatine* turning *yellow-brown* with tinct. iodine. *Paraphyses*, extremely narrow-filiform. On the surface of decaying trap-rocks, Crow Glen, near Belfast, April, 1838; D. Moore. Plate XXXI., Fig. 1, *a*, *b*, *c*.

This fine lichen, the *apothecia* of which are as large as, and similar in appearance to those of *L. contigua* (*Fr.*), whilst the thallus, as Mr. Moore justly remarks, reminds one of *Lecanora vitellina* (*Ach.*), Nylander has pronounced, from a scrap I sent him, "*forte nova*," and not being able to find any description to accord, I have named it after its discoverer. I am not aware of any British species with which it is likely to be confounded.

46. *L. parasitica* (*Flk.*). *L. inspersa* (*Tul.*) (Leight., L. B. Exs. 183.) On crust of *Pertusaria communis;* on fir at Blarney, Cork; one specimen only found.

47. *L. sanguinaria* (*Ach.*). Dublin Mountains; Admiral Jones.

Dr. Harvey exhibited to the meeting specimens of an Alga from Western Australia, regarded by him as the type of a new genus, to be named Cliftonia, a genus which would also comprehend the little known and very rare *Amansia semipennata* of Lamouroux, a figure of which was shown to the Members present. Dr. Harvey proposed to place the new genus in the proximity of Amansia and of Claudea; to the former of which it was allied by the nature of its cellular structure, and to the latter by the peculiar evolution of the frond. Claudea was described as consisting of several successive series of very narrow linear, mid-ribbed, secured leaflets, whose apices anastomosed with the midribs of the leaflets placed next above them. In Cliftonia the frond is likewise composed of secured leaves and leaflets, but they do not anastomose into a network, and the opposite sides of each leaflet are differently evoluted. If we take the *costa* or rib of the leaflet as an axis, then we observe that, at one side of the costa the leaflet has an undivided, semi-lanceolate, perfectly entire-edged lamina, composed of oblong, hexagonal cells; at the opposite side it has no expanded lamina, but a *double* row of subhorizontal, slender, filiform, articulated, and four-tubed ramuli, resembling in structure the ramuli of a Polysophonia. The general habit of the frond, omitting the anastomosis of the leaflets, is strikingly similar to that of Claudea, so that Cliftonia may almost be regarded as a free-branched (not networked) Claudea; and would, therefore, stand related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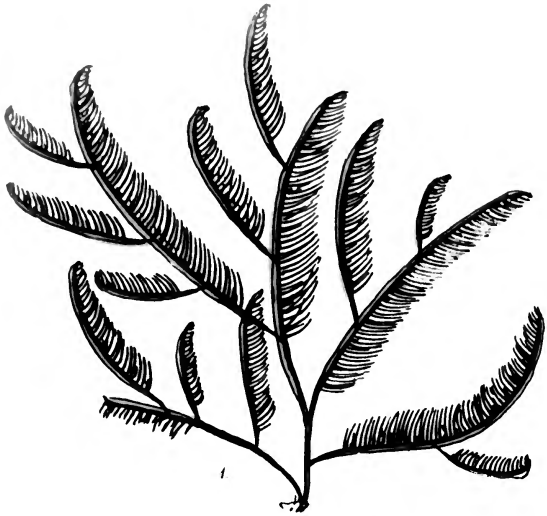

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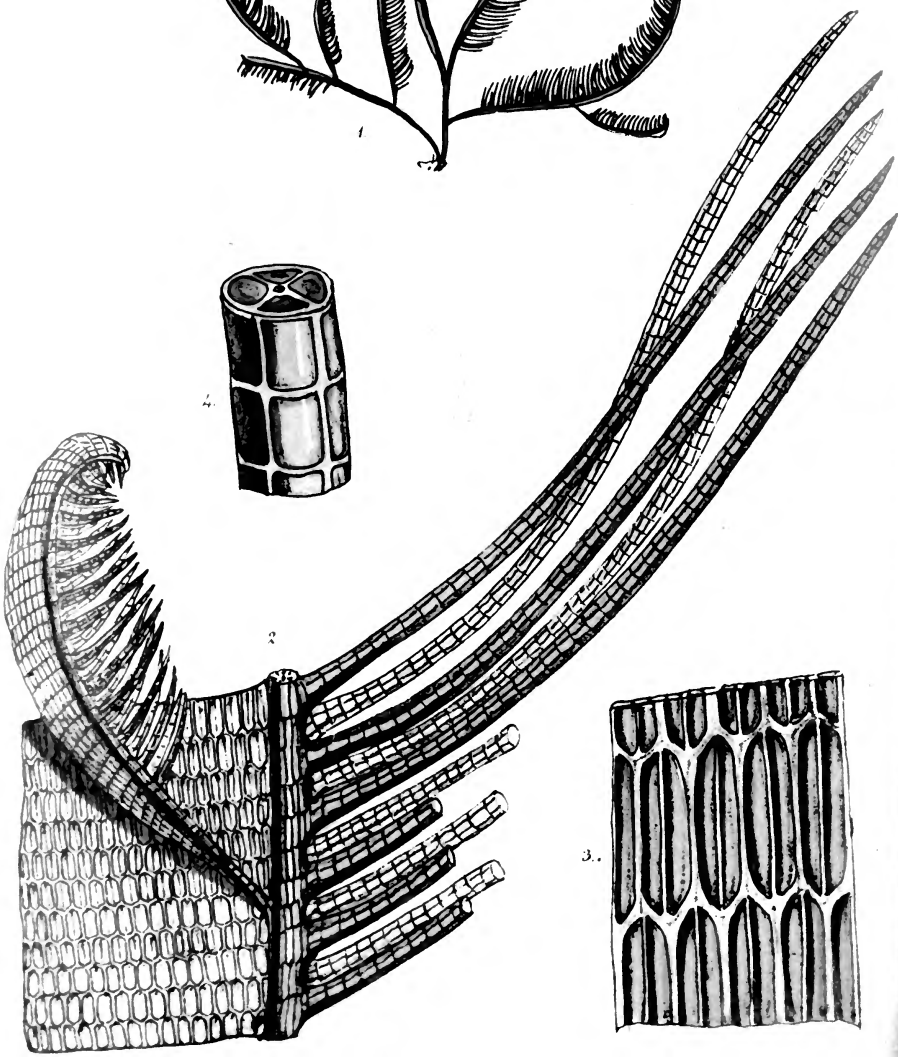

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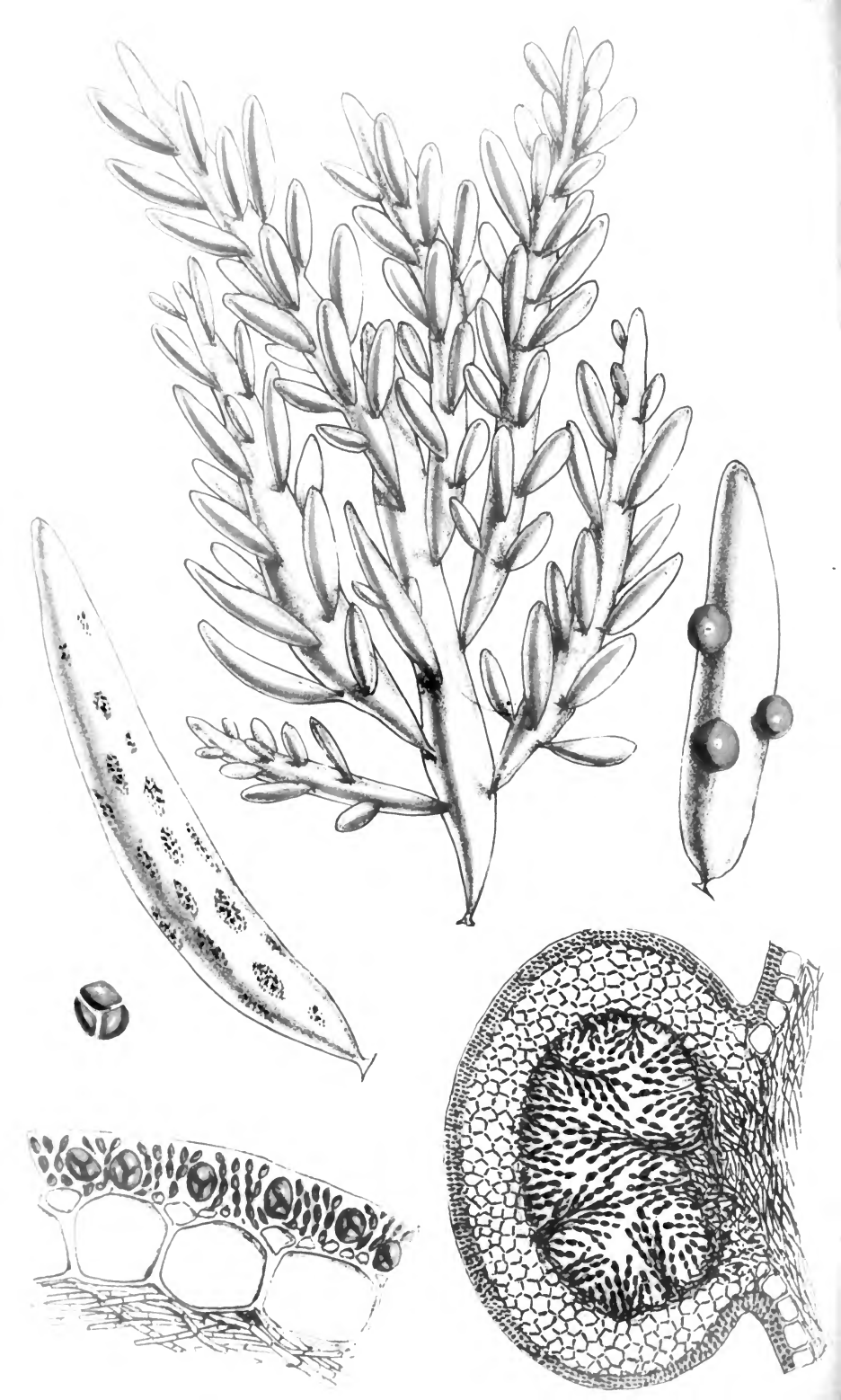

to Claudea, exactly as Dasya stands to Thuretia and Dictyurus. Cliftonia, named in honour of the discoverer of the new species now exhibited, will shortly be figured in the "Phycologia Australica;" meanwhile, to insure priority, the following generic character is given :—

CLIFTONIA (*Harv.*, non *Banks*).* Tab. XXII.

Frons stipitata ex phyllodis secundé proliferis hemiphyllis hinc pectinatis evoluta. Phyllodia costata lateribus diversis; uno latere plano areolata membranaceo integerrimo, altero pectinato-partito laciniis articulatis pleiosiphoniis. Fructus ignotus.—Alga coccinea *Australiæ Occidentalis* ex tribu *Rhodomelaceanæ*.

Species, Pectinata.

DR. HARVEY also exhibited specimens of *Bindera splachnoides* (Tab. XXVIII.), and gave the following generic character :—

BINDERA (*Harv.*), *n. g.*

Frons saccata, prolifera, succo hyalino repleta, membranacea, stratis fere tribus contexta; strato medullari filis articulatis intertextis longitudinalibus, intermedio cellulis magnis sub-quadrilateris uniseriatis, corticali cellulis minimis coloratis pauci seriatis constante. *Fruct:* 1, conceptacula (*desmiocarpia*) in frondem sessilia, globosa, fasciculos parietales plures filorum sporiferorum foventia; 2, *tetrasporæ* triangule divisæ, in soros definitos superficiales collectæ.

This very remarkable Alga was discovered at Garden Island, near Fremantle, West Australia, by George Clifton, Esq., and by him communicated to the University Herbarium. Dr. Harvey mentioned that the genus was dedicated to Dr. Binder, burgomaster of Hamburgh, an enthusiastic admirer of Algæ, and the owner of a very fine collection of marine plants, to whom the University Herbarium is indebted for many rare specimens.

MR. J. BAIN, Curator of the University Botanic Gardens, exhibited a remarkable variety of *Athyrum filix fœmina*.

The Hon. Secretaries announced that the first Excursion for the Session had been fixed for the 9th of June.

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* Cliftonia of Banks is synonymous with the older Mylocaryum (*Willd.*).

FRIDAY EVENING, JUNE 17, 1859.

PROFESSOR W. H. HARVEY, M. D., F. R. & L. SS., President, in the Chair.

THE Minutes of last General Meeting having been read, were approved of, and signed by the Chairman.

Dr. E. Perceval Wright, F. L. S., read a paper entitled "Notes of a Zoological Tour in the South-west of Ireland."

C. C. Babington, A. M., F. R. & L. SS., sent for exhibition native specimens of *Cerastium pumilum* (*Curtis*), and expressed himself as strongly in favour of the positive distinctness of this species. The specimens were placed in the British Herbarium in the Library of the Association, and thanks voted to Mr. Babington.

PROFESSOR J. REAY GREENE read the following paper :—

CONTRIBUTIONS TO IRISH LICHENOLOGY : PART II. BY ISAAC CARROLL, CORK.

GRAPHIS (*Ach.*).

1. *G. anguina* (*Nyl.*). *G. scripta* (Leight., Mon. Br. Graphideæ). *G. pulverulenta* (Leight., *ibid.*). Common on trees, especially young oak. *G. pulverulenta* (Leight.) scarcely differs from the ordinary form save in its more or less powdery thallus. *Opegrapha anomala* (*Leight.*) found "at Glengariff, on holly, by Mr. H. Piggott," appears, from the figure in the "Annals of Natural History" to be also a form of *G. anguina* (Nyl.), in which the *excipulum* is entire, "surrounding the sides and base" of the lirella, as in the genus Opegrapha (*Ach.*). The spores, ovate or oblong, "*murali-divisæ*," are alike in all.

2. *G. scripta* (*Ach.*). *G. serpentina* (Leight., Mon. Br. Graph.). On trees, very common; varying much in form, but readily distinguished from every state of the preceding by the different spores. Perhaps the most remarkable *vars.* are the δ. *flexuosa* of Leight., Mon. Br. Graph., found at Castlebernard Park (Prof. Hincks), and elsewhere, in which the *lirella* are very long, simple, flexuose, and a form found at Rostellan, on alder, having the *lirella* slender and branched as in *G. dendritica* (*Ach.*).

3. *G. elegans* (*Ach.*). *Aulacographa elegans* (Leight., Mon. Br. Graph.). *Opegrapha sulcata* (Pers. Tayl. in Fl. Hib.). On young trees, especially oak; common in the south of Ireland.

4. *G. inusta* (*Ach., Nyl.*). *G. Smithii* (Leight., Mon. Br. Graph.). Very common (especially *var. divaricata* of *Leight.*) on young oak, &c.

Var. ε. macularis (*Leight.*) occurs at Castlebernard.

5. *G. dendritica* (*Ach.*). *Hymenodecton dendriticum* (Leight., Mon. Br. Graph.). On trees, frequent; especially fine at Castlebernard Park,, where the *var. obtusum* (Leight.) also abounds.

6. *G. Lyellii* (*Ach.*). *Chiographa Lyelli* (Leight., Br. Graph.). On young oaks; Cahirlogue, and in a wood opposite Coolmore, Cork; abundant in Castlebernard Park, where the following forms also occur:—

(1) *Radiata* (*Carr*). On oak.

(2) *Macularis* (*Carr*). On aged beech: and—

(3) *Fastigiata* (*Carr*). A beautiful form, resembling some states of *Graphis dendritica*. On young trees; also found by Admiral Jones.

Opegrapha (*Ach.*).

1. *O. varia* (*Pers.*), (Leight., Mon. Br. Graph.). "Spores 5-septate." On trees in various places, as at Ardrum, near Cork, Muckross woods, Killarney, &c., but not nearly so common as the following species.

2. *O. rimalis* (*Ach.*). *O. Turneri* (Leight., Mon. Br. Graph.). "Spores 3-septate." Very common on trees, and varying extremely in form. I do not believe this plant to be more than a state of the preceding.

3. *O. saxatilis* (*D. C.*), (Leight., Mon. Br. Graph.). On a hill near Fermoy; T. Chandlee, whose specimens have the spores 7-septate, as in Leighton's figure; other specimens, collected by myself, on limestone, near Cork, have been referred hither by Mr. W. Mudd, but they do not exactly correspond in this respect.

4. *O. Chevallieri* (Leight., Mon. Br. Graph.). On various rocks; common. Nylander refers this to *O. atra* (*Pers.*), but the spores are different.

5. *O. saxigena* (*Tayl.*), ("Flora Hibernica," Part ii., p. 259). Kerry, D. Moore; Derrynane, T. Wright; rocks at the Old Head of Kinsale.

6. *O. atra* (*Pers.*). On trees everywhere; very common. A form with very short, almost dot-like, lirellæ occurs on ash at Carrigaloe, near Cork, and is probably *var. hapalea* of Nyl.

7. *O. vulgata* (*Ach.*). On trees, very common, several forms occur.

8. *O. herpetica* (*Ach.*). *O. herpetica, a. vera* (Leight., Mon. Br. Graph.) Armagh, on ash and birch! Admiral Jones. Rare.

STIGMATIDIUM (*Mey.*).

1. *S. crassum* (*Dub.*). *Sagedia aggregata* (Fr. Leight. Br. Aug. Lich.) On the rugged bark of trees; common.

2. *S. Hutchinsiæ* (*Leight.*). *Platygramma Hutchinsiæ* (Leight., Mon. Br. Graph.). On shaded rocks, Dunscombe Wood, near Cork. This plant was, as the name indicates, originally discovered by Miss Hutchins.

ARTHONIA (*Ach.*).

1. *A. cinnabarina* (*Wallr.*) *Coniocarpon cinnabarium* (*D. C.*), (Leight., Br. Graph.). *Spiloma gregarium* (*T. et B.*). Very common on trees. Various forms occur in which the apothecium ranges from nearly white, through rose-colour and brick-red, to almost black. On holly, at O'Sullivan's Cascade, Killarney, a *var.* (*astroideum*), is found with apothecia, apparently lirella form, radiated. In all the states of this plant which I have seen, the spores are precisely identical.

2. *A. lurida* (*Ach.*). On young oak and Spanish chestnut, Castlebernard Park, Bandon. On *Salix cinerea*, by the lake at Luggelaw, Co. Wicklow.

3. *A. astroidea* (*Ach.*). (Leight. Br. Graph.). *A vulgaris*, δ. *astroidea* (Schœr. Lich. Heb. Exs. 161 517!). Common, especially on young oak.

Var. Swartziana. A. Swartziana (*Ach.*), (Leight., Mon. Br. Graph. *Opegrapha atra*, λ. *Swartziana* (Schœr., Lich. Helv. Exs. 462!). Abundant on young ash and other trees.

Var. epipasta. Arthonia epipasta (Leight.) Mon. Br. Graph., (according to Nylander). On smooth bark of young trees, Great Island, and Rostellan, Cork.

In all our Irish forms the spores were exactly identical. Specimens which I have seen of English growth (*var. astroidea*) had the spores more regular in their outline, as represented in Leighton's figure; but this seems to depend on the age of the plant.

4. *A. ilicina* (*Tayl.*), (Leight., Mon. Br. Graph.). On holly at Killarney and Glengariff; plentiful. A fine and distinct species.

5. *A. glaucomaria* (Leight., Lich. Br. Exs. 247!). Parasitic on the disk of the apothecia of *Urceolaria scruposa ?* At Barclay's Rock, Co. Down; Admiral Jones.

6. *A. punctella* (*Nyl.*) (*n. sp.*) Parasitic on thallus of *Lecidea alboatra* (*Saxicola*) and *Lecanora erysibe.* On rocks exposed to the tide, below

Cusquinny, Cork Harbour. A most minute species, with 1-septate spores.

7. *A. dispersa* (*Duf.*). Specimen on the bark of holly collected by Miss Hutchins, and preserved in the Herbarium Royal Cork Institution, under the name of *Opegrapha epipasta!*

This remarkable species resembles *A. astroidea, var. epipasta*, very closely, but may be at once distinguished from that and all other British species by the large, broadly ovate, muriform spores.

CHIODECTON (*Fée*).

1. *C. albidum* (*Tayl.*). *Syncesia albida* (*Tayl.*) in Fl. Hib. Kerry! Dr. Taylor in Herb. Moore. Co. Antrim! D. Moore.

A paper was read from ROBERT PATTERSON, F. R. S., Corresponding Member, Belfast—

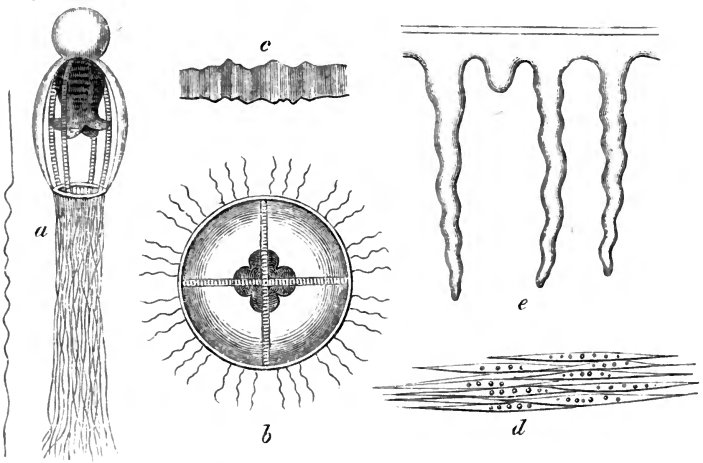
ON A NEW NAKED-EYED MEDUSA.

THE size of the first specimen that came under my notice on the 14th June, 1859, was about one inch; at first it was rather more, for the upper portion, which, when the animal was in full vigour, presented a mitred appearance, became much collapsed. The genus Turris, distinguished from Oceania by the possession of muscular bands, was evidently that to which it belonged. Its size, independent of other characteristics, distinguished it at once from *Turris neglecta*, while its four bands of yellowish muscular fibre marked it as distinct from *T. digitalis*, which rejoices in double that number. The bands were very conspicuous, and, looked at through a lens, were not plain along their margins, but furbelowed, reminding one of the Laminaria. Where the band joined the margin of the disk there were, at either side, three tentacula; three more occupied the space between, so that each compartment had nine tentacula, being 36 in all ($3 \times 3 \times 4$). They seemed equally distant from each other, if looked at horizontally; but, viewed from above, and when the animal was at rest, they arranged themselves gracefully in groups of three. They were highly contractile, extending at times to between two and three inches. The colour at the base was yellow; not the bright yellow of gamboge, but a more sober tint, inclining a little to brown. The extended filaments were perfectly colourless. Between some of the tentacula, minute tubercles were no-

ticed. These were, probably, tentacles in a rudimentary condition. No ocelli or marginal vesicles could be detected.

A membranous veil seemed to separate the interior portion, where the peduncle was placed, from the exterior. This was transparent, and seemingly elastic, and at times was drawn up towards the sides, and the peduncle protruded. The creature sometimes stood on its head, if the apex may be so termed, and then, contracting its length, and pushing out the peduncle, seemed as though it were about to perform the singular gymnastic feat of turning itself inside out.

The large size of the central peduncle, with its convoluted ovaries, and its rich crimson tint, rendered it the most conspicuous part. Its form was ever varying as it moved rapidly through the water. When looked at from above, there were times when, in its contracted state, it presented the appearance of a splendid Maltese cross.



a, *Turris constricta*, seen in profile; *b*, the same, viewed from above; *c*, part of a muscular band; *d*, portion of the lining of swimming bell; *e*, portion of the marginal canal, showing three tentacles, between two of which a rudimentary tubercle (tentacle?) may be seen.

The movements when swimming were vigorous and graceful. With each contraction of the motor tissue a portion of the transparent outer margin was protruded, and by its appearance and disappearance added another peculiarity.

After admiring this nameless beauty in many aspects, I retired with it to a dark room, and tried by various devices to induce a brilliant display of irritation; but my efforts were vain. It had been taken in Strangford Lough, county of Down, and forwarded to me by Mrs. Ward, of Tubber-na-Carrig. On being informed that it was rare and highly acceptable, that lady, with the most considerate attention, forwarded to me, on the ensuing day, two additional specimens, which, being sent by a special messenger, reached me in about three hours after leaving Strangford, and exhibited in full perfection the outline of the animal, with the chamber surrounding the peduncle. The name of *Turris constricta* seems applicable to this Medusa. Its specific application has reference to the form of the swimming bell, which, among the several specimens examined, varied exceedingly. The species was not observed in Strangford Lough, except once, though carefully looked for.

The Rev. Professor Haughton, F. R. S., read a paper—

ON SOME FOSSIL PYRAMIDELLIDÆ FROM THE CARBONIFEROUS LIMESTONE OF CORK AND CLONMEL.

The following fossils were placed at my disposal by Mr. Joseph Wright, of Cork; and as some of them are new forms, and others excellent specimens of rare fossils, they appeared worthy of being exhibited before this Society.

The genus Loxonema was formed by Professor Phillips as a provisional genus for the reception of many of the Palæozoic shells, previously named Melania, Turritella, &c.; and the genus Macrocheilus was suggested by the same geologist as a convenient substitute for the Buccinum of the older writers. Both these genera are properly placed by Woodward among the Pyramidellidæ. There is considerable difficulty in ascertaining the precise conchological affinities of the fossil shells of the older rocks, owing to the circumstance that the mouths of the shells are generally broken off or concealed by stone. It is, therefore, in many cases impossible to pronounce absolutely on the identity of a fossil with a recent genus; and the most that can be done under these circumstances is to give it the name of the genus to which it appears most closely allied, attaching at the same time a specific name, suggestive either of the locality in which it was found, or of some other genus to which it is also allied.

"*Loxonema* (Phillips, Pal. Foss., Cornwall, p. 98).—Spiral, turriculated, whorls convex, their upper edges addressed against the next above, without spiral band, mouth oblong, attenuated above, effused below, with a sigmoidal edge to the right lip; no umbilicus, surface covered by longitudinal threads or ridges, generally arched."

This genus now includes many Palæozoic shells, formerly called Melania, Turritella, Scalaria, Rissoa, and Terebra.

I. "*Loxonema sulculosa* (*Melania sulculosa*), (Phil., Geol. Yorksh., Pl. xvi., Fig. 1, a)."

Some fine specimens of this species were found by Mr. Wright at the Windmill Quarry, near Cork. (Pl. xxi., Figs. 1 and 1.)

II. "*Loxonema rugifera* (*Melania rugifera*, Phillips, Geol. Yorksh., Pl. xvi., Fig. 26)."

This beautiful species was found, for the first time in Ireland, by Mr. Wright, at the Windmill Quarry, near Cork. (Pl. xxi., Figs. 2 and 2.)

III. "*Loxonema constricta* (*L. pulcherrima*, M'Coy, Carb. Foss., Pl. vii., Fig. 7). *Loxonema sinuosa* (Phil., Pal. Foss., Cornwall, Pl. xxxviii., Fig. 182)."

From the neighbourhood of Clonmel. It is not an unfrequent fossil in the Carboniferous Limestone of Ireland.

IV. "*Machrocheilus acutus* (Sow.).—Windmill Quarry, near Cork. (Pl. xxi., Figs. 3 and 3)."

These specimens would be referred by some to *M. curvilineus*, but the truth is, that the species of this genus are very arbitrary; and it appears better for the present to consider them to belong to the well-known form *M. acutus*, to which they are evidently closely allied.

V. "*Cerithioides telescopium* (new).—Generic characters: same as those of Cerithium, with the exception of the mouth, which is unknown. Sp. character: Elongated, conical, whorls numerous (12), slightly convex, smooth, with a faint subcentral band; base of shell provided with five or six well-marked longitudinal concentric grooves, extending from the columella nearly to the outer border."

From the Windmill Quarry, near Cork. (Pl. xx., Figs. 2, 3, 4.)

VI. "*Cerithiodes* (*n. sp.*). Carrigtuohill, near Cork. This is a species distinct from the former, but not sufficiently well marked in the specimens I have seen to admit of description. It has a narrow band on the bottom of each whorl. It differs little from some specimens of *Tur-*

ritella suturalis; and I am of opinion that the few carboniferous species of Turritella which are still left in that genus should be removed into another, as they are wanting in some of the characteristics of the true Turritellidæ."

The provisional genus Cerithioides might be made to receive them, as they are certainly not either Loxonema or Macrocheilus. The quadrangular shape of their mouth is a character of no value in a Palæozoic fossil, liable to the distortion produced by pressure. I have seen the undoubted *Turritella suturalis* of the Carboniferous Limestone of Cork, with the Melania-shaped mouth of Loxonema, produced by pressure, which had at the same time, squeezed the cross-section of the shell into an ellipse.

DESCRIPTION OF THE PLATES.

Plate XX.

Fig. 1. *Cerithium telescopium* (recent), for comparison with the fossil shells.

Figs. 2, 3, 4 (new) *Cerithioides telescopium* (*Haughton*). Figs. 2 and 3 show the faint subcentral band; and Fig. 4 shows the concentric basal grooves.

Plate XXI.

Figs. 1 and 1. *Loxonema sulculosa* (*Phillips*).

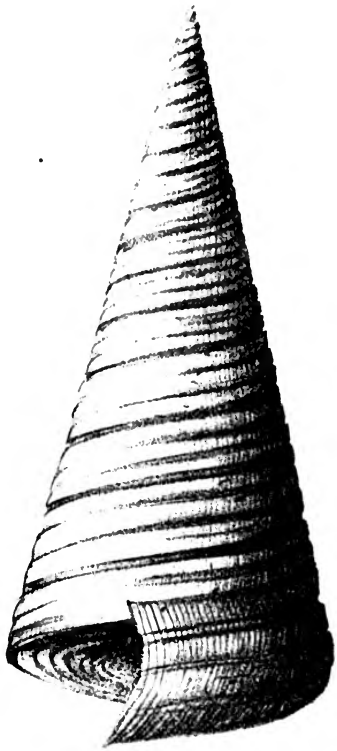
Figs. 2 and 2. *Loxonema rugifera* (*Phillips*). (New to Ireland.)

Figs. 3 and 3. *Macrocheilus acutus* (var.) (*Phillips*).

Fig. 4. A new patelliform fossil, allied to *Acmæa*, found in the Windmill Quarry, near Cork.

The Hon. Secretaries announced that the second and last Excursion for this Session had been fixed for the 16th of July.

The ballot having been opened, Henry Joy, LL.D., Q.C., was declared elected as Ordinary Member.



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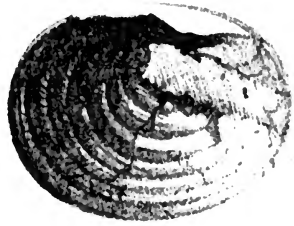

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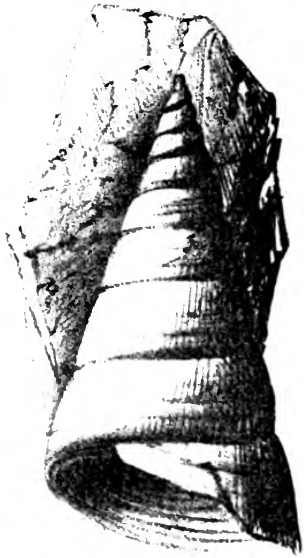

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BRITISH
NATURAL HISTORY

Plate I., Figs. 1 and 2, Euomphalus cristatus.

Plate II. Fig. 1, Euomph. acutus; Fig. 2, E. reginæ, *n. s.*; Figs. 3 and 4, E. pugilis. *Vide* p. 60.

Plates III. and IV., illustrations of the Fossil Flora of the Lower Carboniferous beds of Germany and Ireland. *Vide* p. 134.

Plates V., VI., VII., VIII., and IX., illustrative of new genera and species of Polyzoa, *vide* p. 93 for details of species. *Vide* p. 77.

Plate X., illustrative of Fossil Flora of the Lower Carboniferous beds of Germany and Ireland. *Vide* p. 134.

Plate XI., new genera and species of Desmidiaceæ, *vide* p. 129 for details of species. *Vide* p. 94.

Plate XII., Hypocalymna Philipsii, a new Myrtle; Figs. 1 and 2, a branch, natural size; Fig. 3, calyx and ovary; Fig. 4, transverse section of ovary; Fig. 5, insertion of anther lobes; Fig. 6, insertion of stamens. *Vide* p. 131.

Plate XIII., Greyia Sutherlandi.

Plate XIV., ditto. For details *vide* p. 139.

Plate XV., Steraclia Alexandri. *Vide* p. 140.

Plate XVI., Anagallis Huttoni. *Vide* pp. 141, 135.

Plate XVII., illustrative of the encysted state of Diatoma vulgare. *Vide* p. 164.

Plate XVIII., Corynactis Allmani. *Vide* p. 185.

Plate XIX., on new Isopods. For details of species *vide* pp. 201. *Vide* p. 188.

Plates XX. and XXI., illustrative of new Irish Carboniferous Fossils. For details *vide* p. 283. *Vide* 281.

Plate XXII., Cliftonia pectinata. *Vide* p. 275.

Plates XXIII. and XXIV.—Plate XXIII., Figs. 1 to 4, Ornithorhynchus; 5 to 8, Echidna. Plate XXIV., Figs. 1 to 4, Hypsiprimnus; 5 to 7, Phalangista (Petaurus, *F. Cuvier*); 8 to 9, Mole. —1, first pair of nerves; 2, second ditto; 3, third ditto, &c.; *s*, corpus striatum; *t*, thalamus; *q*, corpora quadrigemina; *l*, lobule of the cerebellum; *f*, fornix; *h*, hippocampus; *p*, pituitary body; *p'*, pineal ditto; *c*, commissure; *c'*, corpus callosum; *b*, basilar artery; *e*, internal ear; *m*, malleus; *i*, incus; *s*, stapes. *Vide* p. 223.

Plate XXV., Sphenotrochus Wrightii. *Vide* p. 234.

Plate XXVI., Mackaya bella. *Vide* p. 253.

Plate XXVII., Ceropœgia Bowkeri. *Vide* p. 254.

Plate XXVIII., Bindera splachnoides. *Vide* p. 275.

Plate XXIX., Lecidea mutabilis: *a a a*, vertical sections of *thallus* with *apothecia*, magn. 55 diam. lin.; *b*, *thecæ*, with spores magn. 430 diam. lin.; *c*, spores, magn. 720 diam. lin.

L. lurida; *a a*, vertical section of *apothecia*; *b*, *thallus*. Both magn. 55 diam. lin.; *c*, thecæ, with spores, magn. 430 diam. lin.; *d*, spores, magn. 720 diam. lin.

Plate XXX., Fig. 1, L. sublurida, from Co. Antrim: *a*, vertical section of the apothecium; *b*, *thallus;* both magn. 55 diam. lin.; *c*, spores, magn. 720 diam. lin. Fig. 2, from Co. Cork; *a*, vertical section of *apothecia*; *a b–b*, *shallus*, magn. 55 diam. lin.; *c*, *thecæ*, magn. 430 diam. lin.; *d*, spores, magn. 720 diam. lin.

Plate XXXI., Fig. 1, L. Mooreana: *a*, vertical section of *apothecium*, magn. 55 diam. lin.; *b*, *thecæ*, with spores, magn. 430 diam. lin.; *c*, spores, magn. 720 diam. lin. Fig. 2, L. glaucolepidea: *a*, vertical section of the *apothecia*, magn. 55 diam. lin.; *b*, *thecæ*, with spores, magn. 430 diam. lin.; *c*, spores, magn. 720 diam. lin. *Vide* p. 268.

WOODCUTS.

1. Hippolyte Gordoniana, p. 49.
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3. Bryum sanguineum, p. 71.
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5. Ditto, ditto, details of structure, p. 152.
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11. Rhinolphus hipposideros, p. 267.
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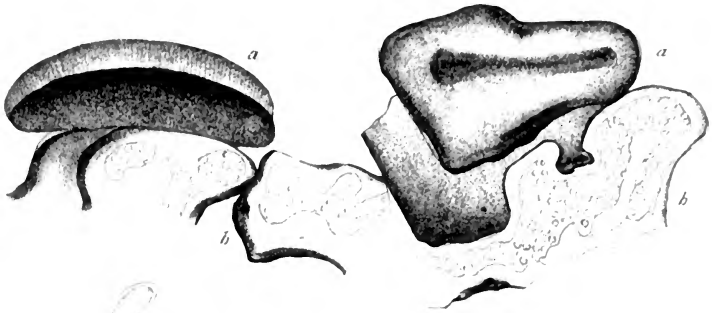
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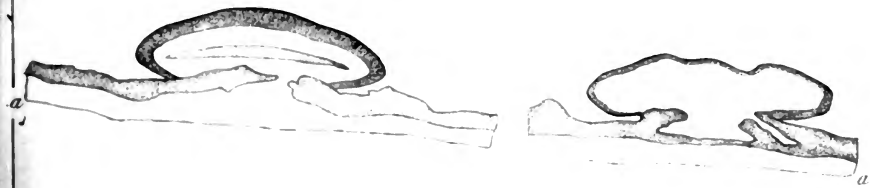
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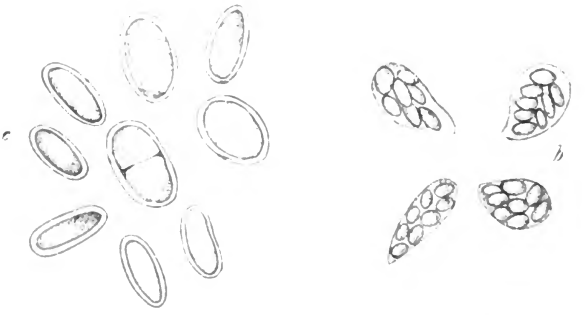
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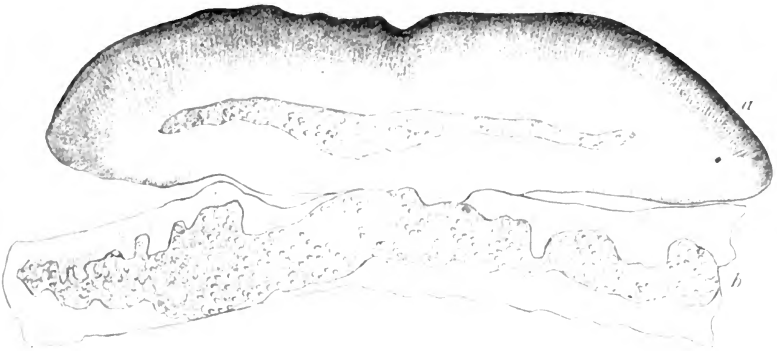
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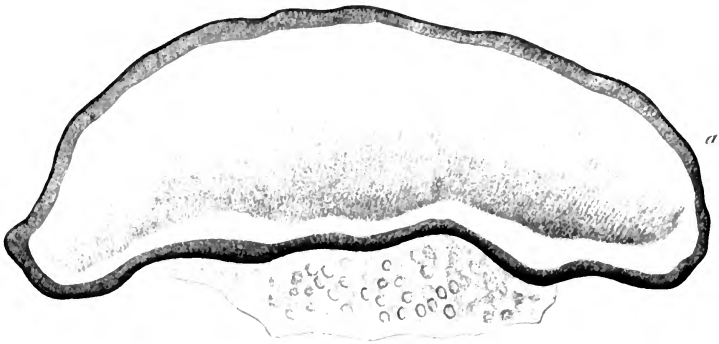
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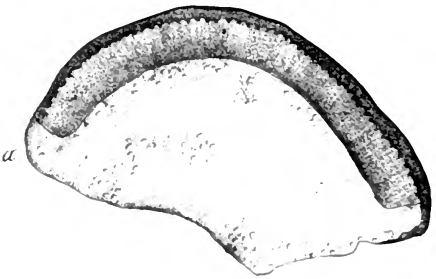
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BRITISH MUSEUM
NATURAL HISTORY.

The Council have decided, for the present, to publish only one Part of the Proceedings each year. The Papers, or abstracts thereof, will be published as usual, each quarter, in the pages of the "Natural History Review and Quarterly Journal of Science."

Part I., Vol. I., containing 130 pages and 9 Plates, July, 1858, price 5*s.*, can be obtained by Members from the Honorary Secretaries, 5, Trinity College, Dublin.

Part II., Vol. I., containing 107 pages and 10 Plates, price 5*s.*

Part III., Vol. I., containing 64 pages and 11 Plates, price 4*s.*

And by others, at Messrs. Williams & Norgate's, London.

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E. PERCEVAL WRIGHT, M.B., F.L.S.,
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J. REAY GREENE, A.B., M.R.I.A.,
Professor of Natural History, Queen's College, Cork
} *Honorary Secretaries.*

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PROCEEDINGS

OF THE

DUBLIN UNIVERSITY

Zoological & Botanical Association.

VOLUME II.—PART I.

NOVEMBER, 1860.

With Three Plates.

DUBLIN:

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LONDON:] [WILLIAMS & NORGATE.

PROCEEDINGS

OF THE

DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

FRIDAY, OCTOBER 21, 1859.

Professor W. H. Harvey, M. D., F. R. & L. SS., President, in the Chair.

Dr. E. Percival Wright, F. L. S., read the following—

REPORT OF COUNCIL.

Your Council have to congratulate the Association on the success which attended the meetings for the last session. The papers read during the session were twenty-nine in number, of which nineteen were on zoological, and ten on botanical subjects; besides containing many important facts in anatomy, physiology, and development, with valuable contributions to the study of geographical distribution, they recorded the existence of no less than thirty new species, all of which have been illustrated in Part 2 of the "Proceedings," or are in process of illustration in Part 3. At the close of the last session, Part 2 of the "Proceedings," dated July, 1859, was published, and duly forwarded to the Members. It contained 110 pages, ten lithographic plates, and four woodcuts; also appendices, with list of members, catalogue of foreign periodicals in our library, &c. Part 3, concluding Vol. I., and containing the "Proceedings" to the June meeting in 1859, will, it is hoped, be laid on the table before the next December meeting, and will contain twelve plates, of which two will be coloured. It has been decided that, for the present, but one Part of the "Proceedings" will be published each year, so that after the publication of Part 3, the date of Volume II., Part 1, will be November, 1860.

During the past session your Association has lost by death two Mem-

bers—one, R. M'Dermott, A.M., M.B., an ordinary member, of high collegiate distinction—one whose literary attainments and scientific research bade fair to place him high in that profession which he both loved and honoured, and one whose sudden death has afflicted so many friends; the second, William Bean, of Scarborough, a corresponding member, well known as an ardent collector of British marine zoology.

The loss by resignation this session amounted to five, all being ordinary members. Of this number, four have resigned, either owing to their leaving the country on military service, or for the purpose of devoting themselves more closely to their collegiate studies. The total loss to the Association from all causes has been 7, while the gain has been—of ordinary members, 21; associate members, 7; corresponding, 6; total gain, 34; deducting loss, leaves a clear gain of 27 members during the session. Of the ordinary members lost by resignation, 3 were under A.M. standing, and 2 above it; of those gained, 18 were above A.M. standing, and 3 below it, leaving an addition to the income of the Association of £16 per annum. Your Council trust that an equal increase will be made in the course of the present session, and that the Members generally will exert themselves to augment their ranks.

Your Council wish to mention that the Botanical Committee reported to them that very good progress had been made in the compilation of a "Flora of Dublin." This most desirable object your Council would be most anxious to see accomplished, and trust that a large addition of new Members may enable the incoming Council to authorize the Botanical Committee, at the close of another year, to commence the printing in our "Proceedings" of the long-wished-for "Flora Dublinensis." Through the kindness of Sir Robert Kane, F.R.S., the Botanical Committee have also had access to the botanical collections made under the superintendence of the Ordnance Survey in the counties of Antrim, Down, and Londonderry. These they propose to examine and collate during the present session, and it is hoped will be thus enabled to draw up a MS. catalogue of the plants of these counties, which, at some future time, can be published by the Association. Before leaving this subject, your Council have pleasure in stating that they trust their successors will be able (without incurring any serious expense) to present to the Members, in the course of the session, a new edition of the "Flora of Cork;" and hope that they will prove by these publications that, while promoting to the best of their power the progress of foreign

Zoology and Botany, they still can find both time and means to elucidate the Fauna and Flora of their own island.

Your Council formed two excursions of the Members during the past summer—the first, to Lough Bray and the Powerscourt Demesne. Kind permission to thoroughly explore the botanical treasures of this latter place was courteously granted by the Right Hon. Viscount Powerscourt, through his agents, Messrs. Stewart and Kincaid. This excursion was accompanied by twenty-one Members and their friends. The second was by rail to Malahide, and then by special steamer to Lambay Island. This excursion was attended by twenty-four Members and visitors; and your Council venture to congratulate the Association on the success of these pleasant *reunions*, for, although, owing to the lateness of the season, many of the Members were out of town, the loss which fell on the general funds of the Association was only 10*s*.

One of the last acts of your Council has been to inaugurate a movement for presenting an address, accompanied by a testimonial, to our distinguished fellow-member, Captain M'Clintock, R.N. This will be matter for the incoming Council to refer to; but your Council would briefly mention that, up to the present, the project has advanced most cheeringly, and they feel confident it will be fully worthy of the Members.

Your Council had also the satisfaction to forward to her Majesty's Government, in the course of last spring, and in conjunction with the Royal and Linnean Societies in London, a very strong recommendation that her Majesty's Government would see fit to grant a pension from the Literary Fund to assist a most distinguished English corresponding member, whose fortune had been unexpectedly lost in the failure of one of the English Banks.

Your Council have to report the resignation of the treasurership by the Rev. Thaddeus O'Mahony, A.M, who has held this honorary post since the formation of the Association in 1852, important professional engagements taking up so much of his time as to hinder him paying attention to the rather onerous duties of the place. They recommend the Rev. Eugene O'Meara, A. M., to the vacant post.

Your Council regret that, from the heavy expense incurred in illustrating Parts 2 and 3 of the "Journal," they have been obliged to spend the whole of the reserve fund which had accumulated from the payment of life compositions. Until they are enabled to repay this sum, the

Council feel that they will have to use great discretion in the future illustration of the "Journal." In conclusion, your Council would congratulate the Association on the prospect of many valuable papers for the present session; and, confidently trusting that the Members will exert themselves to render their Association worthy of their University, they resign their office into the Members' hands.

J. Beete Jukes, A.M., F.R.S., moved, and Dr. R. M'Donnell seconded, the adoption of the Report.

The Treasurer's and Librarian's Reports being read, the Members proceeded to ballot, when the following were declared duly elected for the Session 1859-60:—

President.—Professor W. H. Harvey, M.D., F.R.S., F.L.S., &c.

Vice-Presidents.—Rev. Professor S. Haughton, M. A., F. R. S.; Alexander Carte, M.A., M.B., F.L.S.

Honorary Treasurer.—Rev. Eugene O'Meara, M.A.

Honorary Librarian.—W. B. Brownrigg, A.B., Science Sch. T. C. D.

Honorary Secretaries.—Joseph Reay Greene, A.B.; E. Perceval Wright, M.B., F.L.S.

Council.—In addition to the Honorary Officers—Professor R. W. Smith, M.D.; Professor W. Stokes, M.D.; Professor M'Dowel, M. D.

Botanical Committee.—William Archer; John Bain; Robert Callwell; Rev. T. O'Mahony, M.A.; David Moore, A.L.S.

Zoological Committee.—W. H. Baily; John Barker, M.B.; Alexander Carte, M.B.; Robert M'Donnell, M.D.; Rev. Professor S. Haughton, M.A.

The President then delivered his Address, after which the Members adjourned to the third Friday in November.

GENERAL MEETING, FRIDAY EVENING, NOVEMBER 18, 1859.

Professor W. H. Harvey, M.D., M.R.I.A., F.L.S., F.R.S., President, in the Chair.

The Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

The PRESIDENT read the following notes—

ON BOWKERIA TRIPHYLLA, A NEW GENUS AND SPECIES OF PLANT FROM SOUTH AFRICA.

GEN. CHAR.—*Calyx* 5-partitus, sepalis inæqualibus postremo latiori æstivatione imbricatis. *Corolla* ovoideo-ventricosa, bilabiata, labio superiore galeata erecto bidentato, inferiore inflato-cymbiformi apice trilobo. *Stamina* 4, corollæ basi inserta, didynama, inclusa; antheræ didymæ, biloculares, loculis æqualibus parallelis muticis. *Ovarium* 2–3-loculare; ovulis plurimis. *Stylus* filiformis; stigma simplex. *Capsula* trivalvis, trilocularis, septicide dehiscens, valvulis bifidis.—*Frutex glaberrimus, foliis sæpius ternis ovato-lanceolatis denticulatis venulosis, cymis terminalibus trifloris, pedicellis bracteatis, floribus viscosis.*

B. TRIPHYLLA: *Harv. in Herb. T.C.D. Harv. Thes. Cap. t.* 37 *Trichocladus? verticillatus, E. & Z.!* 2271.

HAB.—Winterberg, *Ecklon & Zeyher!* On the Eastern Frontier, *Mrs. W. F. Barber*. (Herb. T.C.D.)

DESCR.—A shrub. Branches virgate, glabrous or scaberulous, pale, reddish-buff. *Leaves* in threes, or opposite, nearly sessile, oblongo-lanceolate, rounded at base, subacute, penninerved, slightly corrugated above, nerved and veined, and resinous-dotted underneath, denticulate, nearly glabrous, 3–3½ inches long, 1–1½ inch broad, pale green. *Cymes* subterminal, pedunculate, 3-flowered, bracteate; bracts ovate, acute, scarious, deciduous. *Calyx* 5-parted, sepals acute, strongly imbricate, exuding viscid resin. *Corolla* more than twice as long as the calyx, egg-shaped, bilabiate; the upper lip vaulted, with a flattish, narrow limb, bifid at the summit; lower pouch-like, with a deeply 3-lobed limb. *Genitalia* included. *Stamens* 4, didynamous, attached at the base of the corolla; anthers 2-celled, perfect. *Ovary* generally 3-celled; style simple. *Capsule* 3-valved, 3-celled, septicidally dehiscent; valves bifid.

A very remarkable new genus, allied in several respects to *Halleria*, but with a dry fruit, a corolla more like that of *Scrophularia*, and a pouched lower lip, reminding of *Calceolaria*. The generic name is designed to commemorate the services rendered to South African Botany by Henry Bowker, Esq., and his sister, Mrs. F. W. Barber (formerly Miss Bowker); who have both contributed largely to our knowledge of the plants of the Eastern frontier, and to whom the University Herbarium is indebted for many interesting specimens. *Ecklon & Zeyher* distributed specimens in fruit under the above-quoted synonym.

Robert M'Donnell, M.D., M.R.I.A., Lecturer on Physiology in the Carmichael School of Medicine, Dublin, read—

NOTES OF SOME EXPERIMENTS REGARDING THE INFLUENCE OF PHYSICAL AGENTS ON THE DEVELOPMENT OF THE TADPOLE OF THE COMMON FROG.

For several successive years I have studied experimentally the influence of physical agents upon the development of the tadpole of the common frog. During the spring and summer of 1858 the experiments were performed, of which an account is given in the following pages.

At that time, and indeed until very lately, I was unacquainted with the observations of John Higginbottom, F.R.C.S.,* on this subject, which both he and I seem to have been led to investigate; in order to test the truth of an opinion very generally held by physiologists, that the tadpole of the frog, when deprived of *the influence of light*, cannot arrive at its full development and become a perfect frog. This opinion was due, I conceive, to the assertions made by W. F. Edwards in his well-known work, "De l'Influence des Agents Physiques sur la vie;" assertions, the truth of which, I regret to say, I have found great reason to doubt.

April 19th, 1858.—First Experiment.—Two glass jars, cylindrical in form, each 1 foot high, 5 inches wide, and capable of containing more than half a gallon of water, were filled with fresh water; 100 tadpoles, many, but not all of which, had just lost the external branchiæ, were placed in each jar, and a diaphragm of net so placed across each, that the tadpoles cannot ascend higher than within two inches of the surface of the water. One of these jars (A) was placed in the window, the other (A′), in the inside of a large chest, which, when closed, was perfectly dark; no food was put in either.

21st. Fifty-three of the tadpoles in A are dead; none dead in A′. The dead ones having been taken away, and fresh water given to those that remained, the diaphragm was replaced as before, and (A) again placed in the window. A′ was not interfered with.

22nd (morning). All save four were found dead in A′; these continually swim up to the diaphragm, and are small, having but just lost the external branchiæ.

Those replaced with fresh water in A yesterday seem lively.

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* Philosophical Transactions, 1850, page 431.

22nd (evening). All are dead, without exception, in both jars.

Second Experiment.—A glass jar, one foot high, and filled with fresh water, had a diaphragm of net extended across the middle of it, and was so arranged that twenty tadpoles were confined in a compartment below the diaphragm, and were consequently unable to reach the surface, while twenty more, placed above it, had free access to the air. After the lapse of twenty-four hours, all those below the diaphragm were dead; none of those above it; these latter lived for many weeks, but none of them developed into frogs. This jar stood in the window; these tadpoles were not specially fed.

Third Experiment.—Six tadpoles, very young, and all having the external branchiæ still in existence, were placed under a small bell-glass completely filled with water, and standing in a saucer, so that not a single bubble of air was within the bell of the glass; all were dead in twenty-four hours.

Fourth Experiment.—One dozen of well-grown healthy tadpoles were put into an earthen vessel (*a marmalade pot*) 4 inches deep, and 4 inches wide at the mouth. Over the mouth of the vessel was tied a piece of net to prevent the tadpoles from getting out, and by the aid of a string it was let down to the bottom of a large crock containing six gallons of fresh water. Every day the water in the large crock was stirred violently, so as, in some degree, to aërate the water, and the tadpoles were examined daily.

On the ninth day from the commencement mortality began; on the fifteenth day every one of the dozen were dead.

18th.—Fifth Experiment.—Five dozen and four tadpoles, most of which had just lost the external branchiæ, were put into a tin canister, the mouth of which was tied over with a net to prevent their escape; the canister was let down five to six feet into a river, in which there was not a very rapid stream. Ten dozen similarly circumstanced were lowered into a large tank of stagnant water,—this experiment being set on foot in the country, some distance from Dublin, I was not able to watch the progress of it daily. I can, therefore, only state that—

25th. The tadpoles which were this day week put into the river and tank at *Kilsharvan* were taken up, found lively, tied up again, and returned.

May 23rd. Four weeks later all were dead in both river and tank.

These experiments show that an abundant supply of oxygen is one

of the very first conditions necessary for the development,—for the life of the tadpole. Even when respiration is performed by the external gills and cutaneous surface, life is very short, if the creatures have not access either to the surface, or at least a very highly aërated water; and in all cases life is of limited duration when the animals are prevented from coming to the surface of the water in which they live. Higginbottom's observations agree on this subject; he says: "I found that the tadpole of the frog soon dies in either aërated or boiled water, if excluded from atmospheric air; those in aërated water live longest, some of them I found at the top of the water, and on examination the lungs were observed to be inflated, whilst those tadpoles in the boiled water sank to the bottom of the vessel. Tadpoles put into boiled water, exposed to the atmospheric air, live as in aërated water.

W. F. Edwards seems to have been in some degree blinded by his apparent anxiety to prove that light was an important agent in bringing about the transformation of the tadpole. Neither Higginbottom's results nor mine accord with his, when he says that he "put some tadpoles of the frog into two large vases containing ten litres of water, both capable of admitting light, the one of glass, but with a diaphragm on the surface of the water to prevent aërial respiration; the other open so as to leave to the animals the liberty of rising to the surface and breathing atmospheric air. Both sets enjoyed the light; there was no difference seen in the want of pulmonary respiration. Those that were deprived of it (indeed, more slowly) became transformed, but this delay was so short that the influence of the cause, which I wished to appreciate, appeared very feeble.*

Sixth Experiment.—Two glass jars, of the same dimensions and form as in the first experiment, were filled with fresh water, and 100 healthy tadpoles were put in each. One (B) of these was placed in the window; the other (B′) was put into a chest in darkness, but in the same apartment, and consequently nearly the same temperature. Neither set were supplied with any food, but it must be remembered that they ate voraciously their dead companions, and that the vegetable growth which rapidly appears in water standing exposed to light gives abundant nutriment to those submitted to light. This experiment was com-

* W. F. Edwards, "De l'Influence des Agens Physiques sur la vie," page 398–9.

menced upon April 19th. On May 10th much green confervoid vegetable matter having grown in B, I changed the water in both vessels (although that in B′ was quite clear and pure) and took the opportunity of reckoning the tadpoles. I found still living, in B, 58; in B′, 100; no appearance of limbs on any of them; many have little silvery marks on each side of the middle line of the back, which on examination I find to be little bubbles marking the first appearance of the lung.

May 25th. I again, on account of a renewed growth of vegetable matter in B, changed the water in both, and reckoned the number: in B, five alive, large, healthy and active; B′, but one alive, not very large; no sign of limbs appearing on any of these.

June 21st. In B, five still alive, healthy and active; in B′, one still alive, and healthy; no sign of limbs.

August 1st. In B two continue to live, as large, healthy tadpoles, showing no signs of further development. Both died undeveloped in the course of the month of August.

The one in B′ died in the end of June.

Seventh Experiment.—Two glass jars of the same form and capacity as those used in the first experiment, were filled with fresh water and 100 tadpoles put into each; one (C) was placed in the window; the other (C′) in darkness in the inside of a large chest; in both, the tadpoles were fed with portions of the flesh of frogs, which they ate voraciously; besides, in that which was submitted to the light the confervoid vegetable matter afforded abundant food. This experiment was commenced April 19th.

May 10th. The confervoid vegetable matter has grown so abundantly in the vessel (C) in the window, that the water in it, as well as in C′, was changed, and the tadpoles reckoned: in C, 60 alive; in C′, 100. No sign of commencing transformation in any.

25th. The water was again changed on account of the growth of vegetable matter. In C, 29 alive and healthy; in C′, 36 alive, of various sizes, but even the smallest healthy and active. No sign of commencing transformation.

June 21st. Water again changed: in C, 4 alive; in C′, 7 alive: one of those in C has the posterior links just beginning to appear.

August 1st. Of the four tadpoles in C, at last report, one died undeveloped; one of large size was this day taken to be preserved; 2 underwent complete development into frogs, and lived for some time as frogs,

having the opercula of the gills still open, and fit for aquatic respiration. In C′ one continued alive, but eventually died undeveloped.

The following Table shows the rates of mortality in Experiments, 1, 6, and 7, in which vessels of the same form and capacity were used, and the same number of tadpoles put in each :—

	1st Experiment, with Diaphragm preventing access to surface.		6th Experiment, tadpoles, not specially supplied with food.		7th Experiment, specially supplied with frogs' flesh for food.	
	A in the light.	A′ in darkness.	B in the light.	B′ in darkness.	C in the light.	C′ in darkness.
April 19, . . .	100 alive,	100 alive,	100 alive,	100 alive,	100 alive,	100 alive,
April 21, . . .	47 ,,	100 ,,	100 ,,	100 ,,	100 ,,	100 ,,
Evening of April 22, . .	All dead,	All dead,	100 ,,	100 ,,	100 ,,	100 ,,
May 10, . . .	. . . .	. . . .	58 ,,	100 ,,	60 ,,	100 ,,
May 25, . . .	. . . .	. . . .	5 ,,	1 ,,	29 ,,	36 ,,
June 21, . . .	. . . .	. . . .	5 ,,	1 ,,	4 ,,	7 ,,
August 1, . .	. . . .	. . . .	2 ,,	0 ,,	3 (2 frogs)	1 ,,

It will be observed that in all these experiments the mortality was at first much greater in those exposed to the light than among those in darkness. The reason of this is sufficiently obvious in the first experiment, where the animals are prevented by a diaphragm from coming to the surface, for those in the light, being much more active, lively, and vigorous in their movements than those in the dark, became sooner exhausted from want of abundance of oxygen. In the other experiments this phenomenon is not as easily explained.

In the seventh experiment only did any become developed into frogs, and this was not only where they were exposed to light, but where from the beginning they were specially fed. Before attempting to give what appears to me to be the explanation why, in the experiments before us, so small a number as two only became frogs, let me say what is in this country the usual condition in the natural state of the tadpole, which I have often carefully observed. The instinct of

the parent urges it to seek for shallow or stagnant water, wherein at the proper season to deposit the spawn; rarely in running water is the spawn found, and never in deep places, for, if placed in water even few feet deep, it sinks to the bottom and rots away undeveloped; shaded places are generally selected, such as pools and ditches, into which the sunlight does not shine, for, if subject to a strong sunlight and heat, there is danger that all the water in the pool would be too quickly evaporated, and the brood destroyed before being fitted to pass from an aquatic to a terrestrial existence. At the very commencement of life the tadpole in the natural state is supplied with nourishment in the jelly-like material of the spawn, a substance which, according to Brande,* is intermediate between albumen and gelatine, and which Higginbottom shows to be of great consequence in the early growth of the creature. Somewhat later they feed upon both vegetable and animal matter. In the month of May those taken from their native pools have already the lungs beginning to appear, and at this period, if watched in the natural state, it will be seen that they swim to the margin of the shallow water in which they live, and there lie. In June the limbs begin generally to appear, and as soon as the anterior pair have become free, the little animals make use of them to mount upon the duckweed, so constantly growing where they exist, or clambering up the shelving margins of their pools, and, for a time practising aërial respiration, they descend again into the water; at this period the branchiæ still exist, and the opercular coverings are not yet closed. In August and September, the development being completed, they, as perfect frogs, leave the waters. Indeed, it is rare in September, except in the cases I have seen in deep quarry-holes, in pools in rocks, to find any tadpoles remaining, and, so far as I am aware, they never in this country remain, as Edwards says they do in France, the whole winter in the tadpole state, becoming frogs the following spring.

How different are the circumstances in which the tadpoles are placed in Experiments 6 and 7; independently of the variety as to light and food, all were in water very deep as compared with their native pools. The vertical side of a glass vessel differs altogether from the gently sloping bank, and offers no facility for the tadpole to rest near the surface when the aërial respiration is about to commence, and when proxi-

* Philosophical Transactions, 1810.

mity with the atmosphere seems a necessity; neither is there duckweed or vegetable matter to mount upon, when, at a later period, the lungs actually exist. In glass vessels a foot deep, I have often watched a tadpole resting for a time at the bottom, slowly and with the least movement on its own part, it begins to ascend, gradually reach the surface, there expel a minute bubble of gas, and its specific gravity being altered by the expulsion, it as gently sinks to the bottom again. After a time another bubble is secreted within; it again ascends like a little balloon, and so on. It is probable that the first development of the lung commences by a secretion of gas, and, as the homology of the organs would lead us to suppose, it is at first a bilobed swim bladder, and afterwards a lung.

Many die in the artificial form, from a disease accompanied with unequal development and over-distention of those little air-sacs; they are buoyed up so as to be with difficulty able to swim down, and are turned on one side, or even belly upwards.

With reference to the influence of light on the development of the tadpole, Higginbottom speaks with authority. "I am enabled," he says, "from the most minute observation to state that their development advances equally well in the dark and in the light, and that absence of light has no influence in retarding their development." Of this I am also convinced: increase of temperature unquestionably accelerates, within certain limits, their development; if light has any effect, it is only when the creature, being unfed, the light, by producing vegetable growth, produces food for them. In fact, as is natural to suppose, in creatures the most remarkable part of whose metamorphosis is the change which the respiratory system undergoes, any influence which interferes with the natural performance of the respiratory function interferes with the progress of development more readily than any other. Hence, no doubt, the explanation of why so few in the foregoing experiments passed into the state of frogs, where no facilities were afforded by floating vegetable matter, of coming in contact with the air, and where the depth of the water and the vertical sides of the vessels offered absolute obstacles to the same. The same, I fancy, is the cause of the mortality being at first, in the three experiments of the table, greater in the light than in darkness. In the first, a complete exclusion from the air was offered by the diaphragm; in the others (sixth and seventh experiments) the form of the vessel offers an obstacle to reaching the

air freely; this want is first felt by those whose motions are the most vigorous and active. Those in the light are always observed to be more lively than those in darkness; hence *they* the sooner fail from the cause in question. Next to the influence of atmospheric air, that of food is the most powerful in the development, not only of tadpoles, but probably of almost all animals. In the absence of food they remain small, and do not become frogs, rarely living beyond eight weeks. It has been already said that light tends to feed them by producing a growth of vegetable matters, and that in the very early state the jelly of the spawn affords them nutriment, but they thrive on animal as well as vegetable diet.

With reference to the influence of temperature, I have made no particular experiment, but the observations of Higginbottom leave no doubt, that not only the hatching of the ovum (as *is* the case *in* the ova of higher animals), but the subsequent development of the tadpole is considerably accelerated by a heightened temperature.

The influence of various coloured lights upon animal life remains as an interesting subject for further research. The experiments which I have undertaken upon this subject are incomplete as yet. I shall hope at a future time to make known the results.

Note.—Since the foregoing pages were written, the very interesting paper of Horace Dobell, M. D., "On the Influence of White Light, of the different coloured Rays, and of Darkness, on the Development, Growth, and Nutrition of Animals," has come under my notice. His researches, an abstract of which is published in the Proceedings of the Royal Society, vol. ix., p. 644, were conducted during the years 1855–56–57–58, and the subjects selected were the ova and larvæ of the silkworm, and of the frog.

His general conclusions are, that, all other conditions being the same—1st. The ova of insects are not directly influenced in the development by white light, by the different coloured rays, or by darkness.

2nd. The larvæ of insects are not *directly* influenced in their development, growth, nutriment, or metamorphosis by white light, by the different coloured rays, or by darkness.

3rd. The larvæ of Batrachian reptiles are not directly influenced in their development, growth, nutrition, or metamorphosis, by white light, by the different coloured rays, or by darkness.

4th. The materials necessary to the colour of insects and reptiles are prepared equally under the influence of white light, of the different coloured rays, and of darkness.

Dr. Gladstone's experiments on plants are mentioned by Dr. Dobell, as showing that the development of the colouring matter in the petals of flowers is independent of the influence of light; that flowers raised under the different coloured rays, and in darkness, have the same colour in their petals as when raised in ordinary light. Thus, even in vegetables, *etiolation* is confined to those parts of the plant which depend for their colour upon the condition of the chlorophyle, to the green appearance of which some portion of the solar beam is evidently essential.

I am well pleased to find that on those points which touch upon each other, my observations receive support from those of Mr. Higginbottom and Dr. Dobell, while all coincide in showing the error of Edwards' very generally received views—error which, I am very sorry to say, seems not to be accounted for by mere inaccuracy.

The Meeting then adjourned to December 20.

FRIDAY EVENING, DECEMBER 20, 1859.

Dr. Carte, M. R. I. A., F. L. S., Vice-President, in the Chair.

The Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

Mr. David Moore, A. L. S., M. R. I. A., read:—

OBSERVATIONS ON THE PREVAILING AND RARE PLANTS OF ERRIS, AND OF SOME OTHER PORTIONS OF THE COUNTY OF MAYO.

For the purpose of obtaining living plants for the Royal Dublin Society's Botanic Garden, and procuring specimens of some scarce kinds, to dry for correspondents, I made a journey to the most westerly parts of the county of Mayo in last July. This enabled me to add considerably to my previous knowledge on two subjects I have paid a good deal of attention to namely, the geographical distribution of plants in Ireland, and the formation of peat bogs. On the former of these topics I have long entertained a theory, the correctness of which can only be proved by extensive

observations in the field. The published results of previous inquiries will show that I believe a given area of surface on the west coast of Ireland does not contain so many species of plants as an equal area on the east coast, although both be as nearly as possible under the same physical conditions. The prevalence of plants diminishes as we proceed westward; and although individuals of the kinds may occasionally be found in suitable localities, they do not grow in equal quantities, as they are to be seen on the eastern, northern, and southern sides of the island; besides, some species disappear altogether, and are replaced by others fewer in number than those that are lost. Without entering more minutely into this theory, which I do not assert has been proved, I may give the genera of Rosa and Rubus as familiar instances, on a large scale, of their abundance on one side of the island, and paucity on the other. I believe I could collect more of those in one parish in either of the counties of Down, Antrim, or Wicklow, than I could in the whole of the county of Mayo.

Without entertaining you with observations made from the top of a stage-coach, I shall commence mine after having reached Ballina, whence I proceeded, partly on foot and partly by car, to Bangore, in Erris, where I established my head-quarters, having been at Belmullet on a previous occasion, and from this locality I made excursions in every direction. To those who are only acquainted with the eastern and midland counties, it would be nearly impossible to realize an adequate idea of the wild, bleak, treeless, barren aspect of the extensive barony of Erris. As a proof of this, I may state that from Crossmolina to Belmullet—a distance of thirty miles—there is scarcely a tree or hedge to be seen the whole of the way, the country being nearly one continuous, primitive, heath-clad bog, broken by a few dry stone walls, and interspersed with small lakes. That this is a good field for observation, where the hand of man has yet done little to alter the surface from its original natural state, will be readily admitted. On arriving at Bangore, I first visited the highest mountain of the Nephin Beg range, which is called Curslieve, and rises 2367 feet, almost immediately from the sea level. Before reaching the base of the mountain, I had to pass over some miles of spongy, wet bogs, which produced only a few of the very common plants, such as generally grow on the surface of these. The only rare plant I observed was *Carex limosa*, which is rather remarkable from its being typical of the Flora of the extreme north of Ireland. I never before saw it growing in any

other part, save the counties of Antrim and Down, where it is rare, nor am I aware of its being noticed elsewhere by others. I also observed what I took to be a variety of *Orchis latifolia*, with narrow leaves and white flowers, growing in the wettest parts of the bogs. Of this I picked seven plants, all of which had white flowers, but could not find one having the usual pink colour. The sides of the mountain were covered with soft, spongy herbage, composed of Sphagni, a few of the coarsest Cyperaceæ, and grasses. On reaching the narrow ridge which rises gradually to the summit, the surface became hard and stony, with very little rank vegetation. This being the kind of ground favourable for the growth of many of the rarer mountain plants, I fully expected something good would turn up, but was disappointed. In Scotland and Wales a similar surface at such an elevation would produce a large portion of the rare Alpine plants, though such was not the case here, *Salix herbacea* being the only Alpine type I met with. In place of those, large quantities of *Saxifraga umbrosa*, with *Armeria vulgaris*, and some few plants of *Arbutus uva-ursi*, were the principal kinds. The ridge I mention divides the south and western sides of the mountain, which face the sea, from the north and eastern sides. The sea-facing sides, which must be exposed occasionally to terrific gales of wind, blowing directly on them from the Atlantic, produced few plants of importance; but the more sheltered side was covered with large masses of *Saxifraga umbrosa*, *Vaccinium vitis-idæa*, *Hymenophyllum unilaterale*, *Jungemannia juniperina*, and *Jungemannia Taylori*. On pulling a handful of the last, it contained two plants of the pretty little Orchid, *Listera cordata*, more of which I observed as I descended the mountain. Other of the higher peaks of this range were visited with similar results; and having on a previous excursion ascended Nephin Mountain, which is the highest in the district, and may be considered a continuation of this range, I am now pretty well aware of the kinds of plants which are produced in this extreme north-west portion of Ireland. I fully expected to have found some rare mosses and lichens, which was not the case; *Gyrophora erosa* is the scarcest species of the latter I observed.

One of my principal objects being to obtain plants of the dwarf-growing, deep pink-coloured heath, which is so intermediate with the two kinds generally considered specifically distinct, namely, *Erica carnea* (Linnæus), and *E. Mediterranea* (Willdenow), I went to Gresallagh, in Blacksod Bay, where I collected it some years ago, and where I found

the first white variety of it which had ever been discovered. As this is the plant which gives so marked a feature to the Flora of the north-west of Ireland, I felt desirous to inform myself on the peculiarities of its habitats, and of the extent of its distribution. Respecting the latter, I traced it, during my last visit, from the top of Carrowmore Lake to Achill Sound; and I have been told by others that it occurs occasionally, in more or less quantities, along the shores of Clew Bay, by Westport, on to Roundstone, in the county of Galway, where it was first found, and where it disappears. It skirts along the sea-shore all the way, never, so far as I could observe, growing at a greater distance than three miles inland from the sea, and in greatest abundance close to it. The wettest parts of the bogs appear to be its favourite spots. When it grows on the sides of low hills, it is nearly or altogether confined to the margins of rills of water which descend from the high grounds, and along the shores of Carrowmore Lake it only grows where it is partially covered with water during the winter.

On passing over the bogs, I observed large quantities of *Penguicula lusitanica*, *Centunculus minimus*, *Anagallis tenella*, and, in some places, *Hypericum elodes*. The pools were blue with the beautiful flowers of *Myosotis cæspitosa*, and the margins of their banks black with *Schœnus nigricans*. Ferns were scarce, and only few species, *Osmunda regalis* being the prevalent kind. On the wet banks of the Owenmore River *Aspidium oreopteris* occurred in several places, along with *Habenaria chlorantha*. The small lakes were also unproductive of rare plants. *Eriocaulon septangulare* having been one of those I wanted specimens and plants of, I could not find a trace of it in Erris, though I visited many of the lakes there; but as soon as I approached the verge of the county of Galway, I got it. My investigations do not lead me to believe this curious plant grows farther north than Castlebar, if it reaches even so far. Connemara is its chief locality, where it grows in nearly every lake and pool.

After hastily examining the west and south parts of the county, I proceeded to Killala, on the north side, where a large portion of the land is arable, and the species of indigenous plants increase considerably; but nothing either very rare or new to the Flora of this country was observed by me among the phænogamic plants during this hasty visit. From Killala I went along the coast by Lackan to Dunfeeny, where I

picked up a few rare mosses. On the sand-hills near Lackan I found *Distichium inclinatum* in fruit—a species which, so far as I am aware, is confined to the west and north-west of the island. *Hypnum abietinum* grew along with it, which is also a rare species in Ireland. I also observed *Blysmus rufus*, *Carex distans*, and *Carex extensa* growing together in a salt marsh near Killala, and *Arabis hirsuta* on dry places, showing that those species reach the extreme west of the country.

Having thus given a brief sketch of the prevailing and rarer plants of this remote portion of Ireland, with the exception of Achill Island, which I never was in, I will now make a few observations on the formation of the extensive bogs there.

In no other part of Ireland are better opportunities afforded for seeing the gradual increase of red bog going on than in the barony of Erris. The small lakes are numerous, and are being gradually filled with the plants growing around and in them; besides, the more solid portions are likewise in their primitive state of formation. I examined many spots, from which the turf was cut, and also the sides of deep gulleys, but saw nothing to alter the views I expressed in the communication I made here at the Meeting of the British Association on that subject in 1858.

From the bottom of the deepest cuttings to the present surface, the debris of the same kinds of plants constitute the mass which are now growing on it. But what appears to me worthy of recording in this instance is, the circumstance of large quantities of roots and trunks of trees, consisting of Scotch firs, birch, and alders, lying buried in the bogs of this extensive and now treeless county. I noticed them in many places, but especially on the shores of Carrowmore lake, and on the flat bogs between Bangore and Tullachan Bay. To a utilitarian mind, this suggests the basis of improvements in Erris. The kinds of trees which grew there at no very remote period would, unquestionably, grow again if planted, and proper care taken of them at first, though the country people say they will not, in consequence of being exposed to the great storms of wind which so frequently occur on that bleak coast. Notwithstanding this statement on their part, if my advice were asked on the subject, I certainly would give it unreservedly to the proprietors of the country to persevere in planting, were it only to afford shelter to cattle, and improve the herbage they feed on.

At present, the latter is chiefly made up of a few of the coarsest

kinds of Gramineæ and Cyperaceæ, which indicate a soil surcharged with moisture, and in great need of drainage. Shelter and drainage, in my opinion, constitute the basis of all permanent improvement which can be effected on the lands of Erris.

In summing up the foregoing remarks, I may state, first, that the prevalence of *Erica carnea* and *Saxifraga umbrosa* distinguish the Flora of Erris from that of the east coasts of Ireland, as well as from any other part of the British Islands; which, taken in connexion with the prevalence of *Pinguicula lusitanica, Hypericum elodes*, and *Anagallis tenella*, affords further proof of its tendency to the Floras of western Spain and France. 2nd. Respecting the theory I have noticed at the commencement of this communication, the results of my late journey to the west are such as to confirm it. Localities in England and Scotland, with mountains of similar altitude and extent—having intervening glens, lakes, and bogs, and particularly so large a sea-board—would certainly produce a far more extensive and varied Flora than is to be found in Erris, as would also be the case on the east coast of Ireland.

Mr. William H. Baily, F. G. S., read a paper—

ON A NEW SPECIES OF PENTACRINITE FROM THE OXFORD CLAY, WEYMOUTH, DORSETSHIRE.

This beautiful fossil crinoid was discovered by the Rev. Osmund Fisher in the Oxford clay, Green Hill, Weymouth, Dorsetshire, and presented by him to the Dorchester County Museum. The late Professor Edward Forbes since named it, in MS., after his friend the discoverer, and as it had never been published, it has been intrusted to me for that purpose.

The following, therefore, is the description of the species:—

Class.—ECHINODERMATA.

Order.—Crinoidea. Genus, Pentacrinus (*Müller*).

Pentacrinus Fisheri (*Forbes*). (Plate I., Fig. 1).

Sp. Char.—P. calyce parvo lævi; articulis basalibus clypeiformibus, quinque; articulis radialibus amplis quinque; articulis brachialibus amplis, triangularibus, quinque; brachiis decem bifurcatis, articulis cuneiformibus alternis; pinnulis articulis octo; columna pentagonale; ramulis articulis contiguis.

Diagnosis.—Calyx small, composed of five shield-like thick plates, having a double excavation at their lower extremity, where they articulate with the pentagonal stem: radial plates five in number, about twice as broad as long: brachial plates also five in number, broad and triangular, supporting the rays, which are ten in number, and very long, composed of cuneiform, alternating articulations, and bifurcating four or perhaps more times, every alternate joint of these rays being furnished with a long, slender, eight-jointed pinnule. The stem consists of a number of pentagonal joints of equal length, each united by a crenulated margin, and for the greater portion of its length comparatively smooth, but towards the calyx becoming strongly ridged, and beaded across the exterior surface of each angle; at about every eighth joint on each of its angles were articulated five closely-jointed ramules.

DIMENSIONS OF SMALL SPECIMEN.

Length of calyx, $\frac{1}{10}$; diameter, $\frac{2}{10}$ of an inch.
Diameter of stem rather less than $\frac{1}{10}$ of an inch.
Length of rays, about two inches,
Do. of stem, nearly five inches, } probably much longer when perfect.

DIMENSIONS OF LARGER SPECIMEN.

Length of calyx, $\frac{3}{20}$; diameter, $\frac{5}{20}$ of an inch.
Diameter of largest fragments of stems, $\frac{2}{10}$ of an inch.
Other fragments vary in diameter, from rather less than $\frac{1}{10}$ to $\frac{2}{10}$ of an inch.

This fossil sea lily is remarkable for its elegant and graceful form and the great length of its arms; the calyx or cup, like that of the typical and recent example of this genus *Pentacrinus caput Medusæ*, is small, and composed of but few plates, the basal series or pelvis consisting of five very convex and solid elements, the lower portion of each being excavated, forms an articulating surface which rests securely on the pentagonal stem; the five radial plates are closely fitted to these; upon them rest the five brachial plates, triangular in form, the sides of which support the long rays or arms, which bifurcate or subdivide several times; these are ten in number; commencing from the brachial plate, they continue for about $\frac{3}{10}$ths of an inch to the first subdivision, consisting of from eight to ten irregularly-shaped joints, closely fitting to each other, and bearing a second triangular plate; like the first brachial plate, the sides of this support the second division, one branch of which, consisting

of fifteen joints, again bearing the third triangular plate, from which springs a fourth subdivision; to one of the branches of this division sixteen more joints can be counted without any further branching, the termination of this, the best preserved of the arms, being still wanting. The plates composing these rays become more closely set and flatter towards their upper part, their surfaces being marked by a continuous double line or angular ridge. The rays, in consequence of the numerous subdivisions, may in the perfect specimen have been fifty or more in number. The delicate pinnules or tentaculæ with which they are furnished are not closely arranged, but attached to every alternate joint; they are about $\frac{4}{20}$ of an inch in length, flattened and angular, curved, and composed of about eight elongated joints. The stem or column is composed of pentagonal plates, of nearly equal thickness, each having a star-like, crenated, articulating surface, the external surface of each angle being ornamented with a faint band of bead-like markings, which become strong ridges, accompanied by a central depression or pit towards the upper portion of the stem. At variable intervals, generally about the eighth joint, sprung the ramules or auxiliary side arms, five in number, developed from an articulating surface in the centre of each of the angles of a joint; in the specimen under consideration they are mostly broken off short; the portions which remain show that they were round and closely jointed; an articulating surface of one of these ramules is very well shown in the enlarged figure of a portion of the stem (Fig. 1, *e*).

The plan of the arrangement of Plates, comprising the calyx (Fig. 1, *c*) is taken from a well-preserved and larger example, in which, however, the upper portion of the rays are absent. This specimen is quite relieved from the matrix, and exhibits most perfectly the whole of the plates of the head, with the lower subdivision of the arms (Fig. 1, *b*).

Affinities and Differences.—This species somewhat resembles *Pentacrinus Milleri* (*Austin*), but differs in several particulars. It is of more delicate proportions: the branching of the rays takes place at longer intervals: the tentacles are not so closely set: the stem, or column, has sharper angles and square sides; whilst in *P. Milleri* the angles of the pentagonal joints are much rounded, and very prominent; and again, the ramules, or auxiliary side-arms, in our species are situated at greater distances. *Pentacrinus scalaris* of Goldfuss—said to be a synonym of *P. Milleri*—is a species found upon portions of the stem only,

which certainly bear a resemblance in some of its varieties to this species; but, as it is considered by good authorities to be identical with *P. Milleri*, ours is sufficiently distinct from that species not to be confounded with it. The establishing a species from the column alone is very objectionable, unless under peculiar circumstances, such as its being found in a particular formation which has yielded no other species; each formation having, doubtless, its characteristic crinoids, as it had its other peculiar organic remains.

Locality, and Stratigraphical Range.—Several specimens of this elegant little Pentacrinite were collected by the Rev. Osmund Fisher from the Oxford Clay, Green Hill, Weymouth, to whom it was dedicated by the late Professor Edward Forbes.

The following is a stratigraphical list of the fossil species belonging to this genus:

Pentacrinus		priscus (*Goldfuss*).	Devonian.
	,,	rotundus (*Austin*).	Carboniferous Limestone.
	,,	subcrenatus (*Münster*).	St. Cassian Beds.
	,,	propinquus ,,	,, ?
	,,	Brauni ,,	,,
	,,	lævigatus ,,	,,
	,, ?	venustus (*Klien*).	,,
Extracrinus (	,,	) Briareus (*Miller*).	Lias.
	,,	crassus (*Deshayes*).	,,
	,,	moniliferus (*Münster*).	,,
Extracrinus (	,,	) subangularis (*Miller*).	,,
	,,	scriptus (*Roemer*).	,,
	,,	tuberculatus (*Miller*).	,,
	,,	Goldfussi (*Wright*).	,,
	,,	gracilis (*Charlesworth*).	Lias and Inf. Oolite.
	,,	Milleri (*Austin*).	Jurassic. ,,
	,,	basaltiformis (*Miller*).	,,
	,,	Nicoleti (*Deshayes*).	,,
	,,	cingulatus (*Münster*).	,,
	,,	pentagonalis (*Goldfuss*).	,,
	,,	paradoxus ,,	,,
	,,	tuberculatus (*Mer. Des.*).	,,
	,,	subsulcatus (*Goldfuss*).	Inf. Oolite and Bradford Clay.

Extracrinus (	,,	) Goldfussi (*Roemer*).	Inf. Oolite.
	,,	subtere (*Goldfuss*).	,,
	,,	cylindricus (*Deshayes*).	,,
	,,	alternans (*Roemer*).	,,
	,,	Fisheri (*Forbes*).	Oxford clay.
	,,	Fittoni (*Austin*).	Neocomian, Gault, and Lr. Greensand.
Pentacrinus		annulatus (*Roemer*).	Necomian.
	,,	Neocomiensis (*Deshayes*).	,,
	,,	cretaceous (*Leymerie*).	Upper Greensand Chalk.
	,,	Bronni (*Hagenow*).	Upper Greensand & Chalk.
	,,	Agassizi. ,,	,,
	,,	Kloedeni ,,	,,
	,,	bicoronatus ,,	,,
	,,	stelliferus ,,	,,
	,, ?	nodulosus (*Roemer*)	,,
	,,	subbasaltiformis (*Miller*).	Lower Eocene.
	,,	Sowerbyi (*Wetherell*).	,,
	,,	Oakeshottianus (*Forbes*).	,,
	,,	Prattii (*Austin*).	Tertiary.

The Members then proceeded to ballot, the Rev. E. O'Meara having been appointed Scrutineer; and the following were declared duly elected:—

Ordinary Members:—Thomas W. Grimshaw, Sen. Soph., 13, Molesworth-street; James M. Sinclair, Sen. Fresh., 2, Trinity College.

Associate Member:—A. A. Dunlop, 95, Baggot-street.

The Meeting then adjourned to January 20, 1860.

FRIDAY EVENING, JANUARY 20, 1860.

Dr. Carte, M. R. I. A., F. L. S., Vice-President, in the Chair.

The Minutes of last Meeting having been read, were approved of, and signed by the Chairman.

Dr. John Barker, M. R. I. A., read a paper "On the Temperature of Plants." *Vide* end of March meeting.

Drs. Carte and M'Donnell exhibited to the Association their dissections of a recently dead, and carefully injected, specimen of *Lepidosiren annectens* of the Gambia, a full account of the anatomical details of which

has appeared elsewhere. The attention of the Association was especially directed to the structure of the air-sacs, the pancreas, and its ducts, which open by a common orifice below the pyloric valve, the two-auricled heart, and, finally, the attachment of the anterior limb as an appendage to the scapular arch, formed by the articulation of the scapula with the occiput above, and completed below by the coracoid bones meeting in front of the heart. Dr. M'Donnell also informed the meeting that he had lately learned that the Lepidosiren exists in the rivers of Natal, as well as in the marshes of Quillimane, as shown by Peters.

The Meeting then adjourned to February 17, 1860.

FRIDAY EVENING, FEBRUARY 17, 1860.

PROFESSOR W. H. HARVEY, M. D., M. R. I. A., F. L. S., F. R. S., President, in the Chair.

THE Minutes of last Meeting having been read, were approved of, and signed by the President.

The President read a paper, entitled, "A Guess as to the probable origin of the Human Animal, considered by the light of Mr. Darwin's Theory of Natural Selection, and in opposition to Lamarck's notion of a Monkey Parentage."

The following paper, by CHARLES FARRAN, M. D., was read:—

ON ADAMSIA MACULATA.

Adamsia maculata, from its inhabiting deep water, is not at all so often seen as the more littoral species of the various genera of Zoantharia; and, so far as I am aware, it has been but once recorded as Irish,—namely, in the fourth volume of Thompson's "Natural History of Ireland," where the following notice occurs:*—"This extremely beautiful species was taken by dredging in Strangford Lough, in January, 1835, by Mr. Hyndman and myself, and has subsequently occurred commonly to us there and in Belfast Bay: to *Bulla* (*scaphander*) *lignaria*, as well as to the

* Dr. E. Perceval Wright records its occurrence on the west coast, *vide* "Proceedings," vol. i., p. 183. In the list there given, the Waterford locality was, by a strange oversight, omitted.

larger Trochii, it is occasionally found attached; every shell that I have seen *A. maculata* invest was tenanted by the *Pagurus Prideauxi* (Leach), a species which, extensively as the native Paguri have been collected by me, never occurred under other circumstances. On the Waterford coast, investing dead shells (inhabited by *P. Bernhardus*) of *Buccinum undatum* (Dr. Farran)."

Waterford coast being a truly vague locality, I shall endeavour here to indicate the exact spot where I found this anemone. Ere proceeding, I should mention, that on my discovering this species, I wrote to the late William Thompson on the subject, unconscious that he had previously met with it. The great size of my specimen, its having invested a much larger shell than he had seen it on, and that shell being inhabited by another member of Pagurus, seemed to excite his surprise; and a somewhat lengthened correspondence ensued, which terminated by my suggesting the probability of its being a southern form; that it might be approaching its northern limit when found in Belfast Bay, and, consequently, diminished in size; and if research was prosecuted more to the southward, it might be found of increased size. I cannot say whether he assented to those views; but I conceive there is a near approach to truth in them.

I now proceed with my narrative.

Anxious to have a view from the sea of the Bonmahon cliffs, pierced in all directions by the labours of miners from time immemorial, I went in a row-boat, to the distance of half a mile from the land, and, "lying-to" directly opposite to the portion of the cliff called the Silver Mines, I had a full view of what I had so much desired. As is my usual habit, I inquired from the boatmen the depth of the water, and the nature of the ground under the boat; and found that there were from 12 to 15 fathoms water, and the ground was a bank of old shells—a spot likely to produce many desiderata. When thus occupied, one of the boatmen had thrown overboard a hook, baited with a limpet, which had been left from the previous night's fishing. It had not been down five minutes when it was laid hold on, and, on being drawn up, I found attached to it an old shell of *Buccinum undatum*, inhabited by *Pargurus Bernhardus*, of large size, which had seized on the bait. On examining our "haul," I found that the Buccinum (which was about four inches in length) was invested, for about three-fourths of its surface, with *Adamsia maculata;* it was a quarter of an inch in thickness, equally spread over the shell from the

apex, and terminating in festoons on the first or inflated whorl. It is impossible to describe the beauty of its colouring, which was of a rich cream colour, profusely dotted with dark-purple spots, well defined. There was no appearance of a disc or tentacula fringing its circumference. Placed in a saucer, which casually was on board, I perceived a slight elevation gradually to arise in what I would say was the centre of the animal. This increased to the height of a quarter of an inch. On the top a slit appeared, through which the œsophagus was slowly everted; and, with a sudden spasm, a small shell was thrown into the saucer. The œsophagus was then gradually drawn in, and the animal restored to its first appearance. Presently the same process was renewed; again another shell was thrown out; and this was repeated four times. Here a sad accident occurred,—a squall of wind imparted a sudden shock to the boat, which upset the saucer; and the boatman, endeavouring to save himself, stood on it, and crushed both the specimen and my hopes, at least for that time. Fortunately I had removed the ejected shells, and found them to consist of *Trochus tumidus*, *Trochus Montagui*, *Nassa incrassata*, and *Mangelia linearis*. *The animals had been removed from the shells.* I had been in hopes of bringing the captives home, and placing them in the aquarium, and there studying their habits; but was thus frustrated. Had I had my dredge with me, I should soon have made good my loss.

The excursion took place on the 16th of March, 1846.

The Meeting then adjourned.

SPECIAL MEETING, FRIDAY, MARCH 16, 1860.

This Meeting was held, by the special leave of the Provost, in the Examination Hall of Trinity College. The semicircular rows of seats at the upper end were reserved for ladies,—each subscriber to the Testimonial Fund receiving three ladies' tickets; a long table reached half-way down the centre of the Hall, at the upper portion of which were seated the Honorary Officers of the Association, the President having on his right the Right Hon. the Lord Justice of Appeal, Vice-Chancellor of the University, and on his left the Rev. the Provost and the Right Hon. the Lord High Chancellor of Ireland. The Members of Council and the Press occupied the lower portion of the table. The dais on each side was filled with the various invited guests, the remainder of the large Hall being densely crowded with the Members and their friends: the majority of the former wore their academic gowns and hoods.

The Chair was taken at 2 o'clock by Professor W. H. Harvey, M. D., F. R. & L. SS., the President of the Association.

Captain Sir F. Leopold M'Clintock, R. N., wearing the pink hood of LL. D., was introduced by the Vice-Presidents of the Association, the Rev. S. Haughton, A. M., F. R. S., and Dr. Carte, A. M., F. L. S.

Dr. John Barker, Honorary Secretary, then read the minutes of the previous meeting, which, being approved of by the Members, were signed by the Chairman.

The Rev. Dr. Todd, S. F. T. C. D., President of the Royal Irish Academy, then rose and said:—

Sir,—I beg to propose that an address from this Association be presented to Captain Sir Leopold M'Clintock. It is unnecessary for me, in making this motion, to say anything of the public services of our distinguished countryman. Those services have been acknowledged by the British public, by the Parliament of the United Kingdom, and recently by the honour so worthily bestowed by the hands of her most gracious Majesty. But, perhaps, I ought to say a word of apology, in defence of this Association, for the apparent presumption of endeavouring by our humble voice to swell the cheer of national applause with which Sir Leopold M'Clintock has been received. Let me remind you, then, that Sir Leopold M'Clintock was an old member of this Association; he always took a lively interest in its welfare; he has always endeavoured by every means in his power to promote the objects it has in view—that of cultivating among the students of the University a scientific taste, and particularly a taste for those sciences from which the Association derives its name. I believe I am correct in saying that one of the first, if not the very first, scientific communications which he addressed home from the dreary land in which he has won his good fame, was sent to this Association, and read at one of its meetings. No man can, therefore, justly accuse us of presumption, if we feel deeply interested in his success, and manifest that interest by this attempt to greet his safe return to us. We are well aware that, in condescending to accept from us an address, and the trifling present which accompanies it, he is doing more honour to us than we can do to him; but we hail him as a friend, as a member of this Association, and now also as a member of this University. I was going to say that we should likewise hail him as an Irish-

man; but I doubt if we have any right now thus to appropriate him to ourselves. He has become public property—he is the property of the empire, and the fame which he has attained is now an integral portion of the glory which surrounds the imperial crown of Great Britain. I wish, indeed, the time were come when the distinction between English and Irish could be forgotten, and when every subject of her Majesty might be regarded, without reference to the place of his birth, as entitled to such promotion as his merit may deserve; but that time, unfortunately, has not come. The icy barrier of prejudice that once separated us even more than it does now has indeed given symptoms of breaking up, and the deeds of such men as M'Clintock are doing more, perhaps, to undermine it than any abstract consideration of justice or injustice. The competitive examination system also has shown the world what Irish lads can do when they get fair play. That icy barrier in former days rendered it very difficult for an Irishman, however deserving, to get promotion even in his own country, and impossible in England; but now that that barrier is giving way, it is generally acknowledged that there ought to be reciprocity, although in many departments, both of Church and State, the reciprocity is still, unfortunately, all on one side. I do not say this in any bigoted spirit of nationality; but I confess to this weakness, that I cannot help indulging some feeling of pride when I hear the sound of that Celtic patronymic, which adorns the names of more than one of our successful Arctic navigators. It seems an evidence that the spirit of enterprise which was so remarkable a characteristic of our remote ancestors, still forms an ingredient in our modern Celtic blood. The spirit of enterprise and adventure led the ancient Irish ecclesiastics to carry the sound of the Gospel into the most distant regions—to penetrate the dark forests of Caledonia, and compel the barbarous and savage Picts to do homage to Christ. That love of adventure, sanctified by a nobler motive, led them also to the land of the then no less barbarous Saxons, in order to win them from the blood-stained rites of Thor and Woden, to the worship of the one true God. That spirit of adventure led them also to many parts of Europe—to the forests of Germany, to Gaul and Switzerland, to the recesses of the Alps—where they founded seminaries of learning, and monasteries of religion, many of which still exist, and still bear testimony to their Irish origin; and in the libraries of many of them manuscripts with Irish glosses are still to be found, which long lay dormant like seed in the

earth, but which are now bringing forth a goodly crop of Irish scholars whose zeal and attainments put to the blush the apathy and neglect of our native students of the Celtic languages. But the spirit of enterprise of which I speak was not altogether in ancient times confined to missionary labour. We have traces of what may be very well called scientific researches, for they were so in that age as much as its light admitted. I will just refer to one or two cases, only: the first is that of an individual named Dicuil, who was the author of a remarkable treatise entitled "De Mensura Orbis Terræ." In that treatise we find all we know of its author. It tells us expressly that he was an Irishman, and that he undertook his travels for the purpose of geographical research. The book itself is a curious specimen of an ancient scientific treatise; its genuineness is undoubted, and it is written in very Hibernian Latin; but the glory of its publication, Ireland, as usual, *incuriosa suorum*, has suffered to be appropriated by German and Italian scholars. The other instance to which I refer is that of the great Saint Brendan: whose celebrated voyage, although the accounts we have of it are overlaid with fable, and discredited by ridiculous legends, may nevertheless rest upon a substratum of true tradition. And, if so, it seems possible that he may have been the earliest discoverer of America. The story, divested of the fabulous, is, that he set sail (if, indeed, he had a sail), from the mountain of Kerry which still bears his name; that he steered due west, and arrived at length at a land which he assumed to be an island; the narrative goes on to say that he and his companions were fifteen days engaged in exploring the coast, and failed to establish its insular character. The admission of this failure looks like a fragment of truth, especially as the hypothesis that the unknown land was an island is not abandoned; but the only conclusion drawn from his failure is, that it was a very large island. He celebrated during his absence seven Easters, and on his return was driven to some northern islands, probably the Shetlands or Orkneys; but he returned home in safety, and became the founder of many churches, as well as the author of a monastic rule, which in that ascetic age had numerous followers in Ireland. To estimate the real amount of adventure in this voyage we must bear in mind what was probably the state of naval architecture in the west of Ireland at that remote period of time. I know my friend here thinks nothing of an iceberg, or of an avalanche; he makes himself comfortable at eighty degrees below freezing point, and laughs at the pelting sleet of an Arctic winter; but how would he like a trip to America in a Con-

nemara currach, perhaps without a sail, and certainly without a magnet, guided solely by the stars of heaven? Yet it is difficult to believe that St. Brendan had it in his power to man a better sort of craft than the skin-covered boat still used by the adventurous fishermen on the west coast of Ireland. It may, perhaps, be matter of doubt whether a voyage to America was possible in such a vessel, although the canoes of the Pacific have often been driven before a gale to incredible distances, without swamping; but this at least is quite certain, that, whatever boat St. Brendan had, it was immeasurably inferior to the good ship Fox, in which my friend made his successful voyage to the Arctic regions. The discovery of St. Brendan, if indeed he did discover the great continent of America, was allowed to fall into oblivion; and a thousand years passed away before anybody attempted to follow his footsteps. He himself knew not the value of his discovery, nor did any of his contemporaries. But the discoveries of our M'Clures and M'Clintocks are not likely to meet with such an end. They are hailed with applause, and have been received with all the intelligent sympathies of a scientific age, well able to appreciate and to make use of them; and I trust before long we shall be called upon to appreciate new and further discoveries in the same fertile field of investigation, for I am not one of those who think that the success which has attended the intrepid voyages of our modern Arctic navigators is an argument against a continuation of the search. It may be that a north-west passage, which cannot be passed except by such daring and undaunted spirits as our Franklins, and M'Clures, and M'Clintocks, is not worth much to the interests of commerce; but is it nothing to have the knowledge of the geography of those mysterious regions which their perils have won for us? Is it nothing to have careful observations of the astronomical and meteorological phenomena of such high latitudes? Is it nothing to learn something of the Flora and Fauna of the Polar regions, and the conditions on which animal and vegetable life may be sustained under the disadvantage of a temperature 100° below zero? Is it nothing to learn the variations of the needle, and the laws of terrestrial magnetism, at a degree or two from the Poles? It is impossible to say what benefits to science and to mankind may be the result of such knowledge; and I would therefore hope that the success which has attended these investigations, perilous as they doubtless are, will not be converted into an argument against continuing them. I do hope and trust that many well-appointed ships will yet go forth, manned by our British hearts of oak, and commanded by

M'Clintocks yet unborn, not only to the Arctic, but to the still less known Antarctic regions; and that they will go forth in the true spirit of scientific research—*pro dignitate et augmentis scientiarum*, bearing on their flags that ancient Hebrew prophecy, which Laplace mistook for an aphorism of our immortal Bacon—MULTI PERTRANSIBUNT ET AUGEBITUR SCIENTIA!

The Rev. PROFESSOR HAUGHTON, A. M., F. R. S., V. P., in seconding the resolution, said:—

SIR,—On rising to second the adoption of the Address which has been so learnedly spoken to by Dr. Todd, who proposed it, I would wish to say a few words to this meeting,—which contains a number of visitors to our Zoological and Botanical Association, as well as, I am happy to say, many of its members,—a few words of a prefatory character as to the origin of this Association, as to the nature of its proceedings, and as to the manner in which we became connected with the distinguished member of our Association whom we are assembled here to honour to-day, and, in doing so, to confer an equal honour upon ourselves. The Zoological Association of this University is the creation of the young men of the University themselves. It is no foreign growth which has taken root within our walls; it sprung up amongst us from a feeling and a want that was experienced by the students in this University of some society or association in which young men might meet together, as young men, to discuss questions connected with natural history—questions connected with nature, a tendency to investigate which is, I believe, inherent in every human breast. This Association expresses the want that was felt in our educational system. The time had come when we could be no longer satisfied with the literature of Greece and Rome, or the study of abstract mathematics merely. The study of mankind, as such, in their religious, moral, and social nature, has been, and always will be, the highest object for human learning. But the study of nature, since the commencement of this century, has increased with rapid strides. It was begun in a world outside the universities, and is now within their walls, and has found an echo in the hearts of the young men of this Society, and societies such as this. The authorities of the University met this want as far as in them lay, by introducing these subjects into the curriculum of our University education; but the authorities of the University could not do all that required to be done for the furtherance of natural science within these

walls. It remained, therefore, for the young men of the University themselves to do something, and that something they have well commenced in the institution of this Society. Nor is the value of this Society, and of such societies as this, confined to its value as a mere part of our educational machine. I believe it has a higher and more important value, as forming a link between the students who are studying within these walls and their predecessors who have gone forth into the world; and when the gates of your Alma Mater close behind you—when many of those whom I address shall have gone forth to carry the Gospel of peace to the hamlets and villages of our land—when many shall have gone to the mountains and plains of India, and to the Colonies—when others of you, as medical men, shall have assigned to you the scarcely less solemn duty of carrying the aids of science to solace the pain and aid the necessities of the sick and suffering poor—when you have left these walls, and entered upon your appointed path of life, you will feel a want of some tie or link to connect you with this place, in which you will have spent the happiest hours of your lives. To others, I am happy to say, another and very bright career has, within the last few years, been opened, by the opening of the higher branches of the public service to your honourable competition. The highest offices in the India Service, in the Army, and in the Royal Navy are thrown open to your competition, and the best man must win. Every other office in the public service which is worth competing for, in time, I have no doubt, will be thrown open to your competition, and many of you will be scattered over the globe, and you will then feel the want of some link and bond to connect you with those from whom you received your education. I speak from experience—not alone from my own experience, but from the experience of others as well—that when once you have left these walls, you may form many acquaintances, but you will add few to the number of your friends. The friendship which one forms in youth will last till the grave closes upon him. There is no such thing as cordial friendship except that formed in youth. You may become acquainted with men for the purpose of business, in pursuit of pleasure or instruction; but the warm friendships that are to last through life must be formed with those of an equal age, in such institutions as that in which we are now assembled. It is, then, no light or mean privilege to have learned here to converse with nature, and love the works of God. It will preserve you from temptation in the hour of solitude; it will give you moments of employment;

and if your lot is cast in a distant land, you may add greatly and largely to the borders of science. Such has been the fortunate lot of the distinguished member whom we are assembled to-day to address with our congratulations—Captain M'Clintock. I prefer, gentlemen, to call him Captain M'Clintock. He has not yet worn his spurs long enough to make the handle to his name familiar to my tongue. He is a Doctor of this University, and a citizen of London; he has been knighted by the Queen; he has received from every class of his countrymen, both here and in England, congratulations and addresses on his return; but I believe I may say, in your name, that we will not yield to any body, to any corporation, or to any class of men who have addressed him and presented him with rewards, in a sincere and heartfelt admiration of his achievements. Where are we to seek for a cordial admiration of brave deeds if not in the hearts of the young? The old will ask, what were his motives, what was his object, what will he gain? But the young will impede us with no such questions, but will spontaneously accept the brave deeds of a brave and honest heart and hand.

Before I sit down, I would say a few words as to the additions which Captain M'Clintock has made to our science. I believe they are known to many here, and a minute examination of them would be tedious; but a few words respecting the circumstances under which they were made, I believe, will not be uninteresting—"Donum non est æstimandum magnitudine doni, sed mente datoris." Whether we estimate the additions made to the sciences of zoology and geology by our distinguished member, by the value of the presents he has made to the Royal Dublin Society,—or whether we consider the important inferences that may be drawn from them,—it is impossible to value too highly the gift that that Society has received. It is right that I should here mention that when Captain M'Clintock first presented his fossil collection to the Royal Dublin Society, he kindly placed at my disposal, for the Museum of this University, his very valuable collection of minerals. I thought it right not to let the interests of science suffer from any petty feeling of jealousy, and therefore I had great pleasure in handing over to the Royal Dublin Society that very valuable mineralogical collection, and they are now in the Museum of that Society; and, together with the Greenland collection of Sir Charles Giesecke, form a collection which, I am proud to say, this city need not be ashamed of, inasmuch as it is far superior to any other collection

from those Arctic regions to be found in Europe or in America. But the circumstances under which this collection was obtained enhances their value. He observed at once, although he had no special knowledge of the subject, that he had discovered fossils totally different from any he had seen elsewhere. When, in his third sledging expedition, it was impossible for him to carry much weight (some of his men were sick), they were forced to leave their cart behind them; but in the last march towards his ship, at the close of 105 consecutive days, rather than burden his men with any weight, he carried these valuable fossils, now in the Dublin Society's Museum, in his own pockets; and if it were not for the bringing home of these, one of the great problems of the northern hemisphere must have remained in doubt, for the evidence brought home by Sir Edward Belcher and others was not enough to establish the point. To the honour of Captain M'Clintock be it recorded, that when the Resolute and Intrepid were abandoned, and a small weight allowed to each officer, he abandoned part of his own personal outfit to find room for the skin of a polar bear. I feel certain, Sir, that no length of speech on my part would add anything to the feelings which my young friends entertain towards this distinguished man; but, in the name of the Zoological and Botanical Association of this University, in the name of the visitors whom I see around me, in the name of the undergraduates of this College, I request that you will desire the Address to be read which we have proposed as our humble tribute of respect for, and admiration of, our gallant and distinguished member.

The PRESIDENT then directed Dr. E. PERCEVAL WRIGHT, A.M., F.L.S., Honorary Secretary, to read the Address, which was handsomely engrossed on vellum, with illuminated title, and was as follows:—

To CAPTAIN SIR F. LEOPOLD M'CLINTOCK, R. N., LL. D. T. C. D., *Member of the Dublin University Zoological and Botanical Association.*

SIR LEOPOLD,—We, the President and Members of the Dublin University Zoological and Botanical Association, heartily congratulate you on your safe return to your native land, and on the full success which, after so many disappointments, has crowned your Arctic labours.

IT does not become us to speak largely of the great public services you have rendered: you have already received from almost every quarter

from which praise can worthily come the highest encomiums that can be given to courage and worth. The proudest tribute to your qualities as a Seaman and a Commander has been paid to you in the unanimous Address from the officers and men under your command,—the sharers of your toil,—who saw you in your hour of anxiety and danger, and gathered courage and confidence from your countenance; who saw you also in your hour of success, and loved you for the generosity that made you share with another the prime glory of the Expedition, whilst taking on yourself a far more laborious and less exciting field of search. Praise from men who knew you so intimately, and wrought with you so long, must be to you an incense as sweet as has ever been offered to man.

Your native town was the next to address you, and well may she be proud of the imperishable fame of her son.

Then followed this University, within whose walls our Association is fostered, conferring on you, in full Comitia, the highest honorary distinction in her power to bestow,—whether for courage, for conduct, or for science; and in your case, Sir Leopold, the honorary LL. D. was equally earned by, and was equally given to, distinguished courage, distinguished conduct, and distinguished scientific research.

And now, our gracious Queen, in dubbing you Knight,—we trust in earnest of more substantial favours,—has gracefully acknowledged that never were spurs better earned by chivalrous devotion to a noble cause.

The world will echo the words of the Sovereign, and, so long as generosity and noble deeds are admired among men, the man who volunteered life and fortune, in the cause of a helpless woman and a true wife, will live in the hearts of his countrymen.

After encomiums such as you have received, any praise from us, your fellow-members of a Scientific Society, seems out of place,—unless we limit it strictly to an expression of gratitude for the aid which, under circumstances of great difficulty and anxiety, you found time, and thought, and opportunity to render to the Sciences which we more especially cultivate. *We* heartily *sympathize* with you in the applause your more public service has won; but we *gratefully thank* you for what you have done for Arctic Zoology and Botany.

The details of your discoveries in Arctic Paleontology are either already before the public, or are preparing for publication, and it would be out of place to enumerate them now. But we cannot forget how, in one case, with ship abandoned and an icy desert of unknown extent to

be traversed, you contrived to bring home, when each small weight was a serious burden, some fossil shells,—precious in our eyes, as affording the key to the solution of a previously unsettled problem in Arctic Geology.

We, in conclusion, request your acceptance of the accompanying Testimonial [a copy of the Encyclopædia Britannica], as a mark of our entire sympathy with your labours, and a record of our appreciation of the brilliant discoveries that will ever be associated with your name.

The President then rose, and said :—

Captain Sir Leopold M'Clintock,—It is now my grateful duty, as President of this Association, to present you with the Address unanimously agreed to by the Council, in the name of the members. It expresses briefly, and in somewhat blunt language, the genuine feelings of our hearts, and as such we hope you will receive it.

We do, indeed, rejoice to see you once more amongst us, returned in safety and in honour, from what appeared to many of us, when you started, as a forlorn hope, and we do most warmly sympathize with all the praise and all the honour you have received. We do not think you have been too highly praised, or too liberally laden with honours. What you have received, you have thoroughly earned. I am not now, however, going to trouble you with further compliments. I know that it must be painful to a modest man to have to stand up in public and listen to his own praises. But if any place could divest praise of the shadowy nature of compliment, and invest it with the substance of truth, surely this old hall is that place. The honours here usually conferred are not mere passing compliments; they are laurels, sharply contested for, fairly won, and equitably awarded by competent authority. One such honour was awarded to you when last within these walls. We do not seek by our present address to add any distinction to your name, but as our little offering springs from a root of love and of respect, we hope that it carries with it also "a seed of immortality !"

We have had some difficulty in selecting a memorial which might be worthy of your acceptance, and within the scope of our ability. Many propositions have been made to us. We debated them several times, and at last concluded that a set of books of reference, such as would be useful to you at all times, and that you could carry to sea on future voyages, would be the most suitable gift for us to make to you. We hope you will accept them in the spirit in which they are offered.

I now have the pleasure to present you both with the Address and Testimonial.

Sir Leopold M'Clintock, on proceeding to acknowledge the compliment, was warmly applauded. He said :—

Mr. President and Fellow-Members of the Zoological and Botanical Association, before commencing to read my reply, allow me to say, that since I have been entitled to appear amongst you in academic costume, I derive increased satisfaction from my connexion with your Association, forming, as it does, an additional tie to our venerated University of Dublin. I trust the honour you have conferred upon me may not be altogether void of utility, since it will show my brother collectors that no region is too barren but that it may reward them, and no amount of scientific knowledge so small that it may not be turned to some practical advantage. I hope and believe, that there are many of our members now present who will bear in mind the proceedings of this day. If on this subject any doubts exist, they will be dispelled, and if there is any stimulant wanting, it is amply supplied by your acts of this day, which plainly show that you are ever ready and ever anxious to confer both honour and reward.

He then read the following formal reply :—

Mr. President, and Fellow-Members of the Zoological and Botanical Association,—The very complimentary address which you have presented to me is, indeed, peculiarly gratifying, inasmuch as it expresses the kindly feelings and the favourable judgment of a scientific body intimately connected with the most ancient and revered institution in this country, the University of Dublin. You have briefly but forcibly alluded to some of the honours which have been paid to me since my return from the Arctic regions—the first, and perhaps the most touching, being a testimonial from the companions of my voyage in the Fox—and you have traced the progress of similar demonstrations even to the Throne. I may now add, with pardonable pride, that the same generous sentiment has found a response in America. Yet I am not the less truly and deeply grateful to you for the honour you have bestowed upon me, for the hearty congratulations upon my safe and successful return, which you have so warmly expressed, and the interest and value you attach to my scientific researches. As your associate, it was clearly my duty to avail myself of every opportunity for the advancement of the kindred

sciences of zoology and botany. The very valuable and appropriate testimonial which you have been pleased to present to me, I accept, I need scarcely assure you, with feelings of the liveliest pleasure; it will henceforth be the companion of my voyages, and it will ever bring to mind the agreeable recollection of my fellow-associates within the walls of "Old Trinity," of their cordial sympathy with me, in the applause which my Arctic services have elicited, and of their ardent appreciation of my labours in the triple cause of humanity, discovery, and science.

Dr. Stokes, Regius Professor of Physic, said he had now the honour of moving the thanks of the members of the Association to the Right Hon. the Lord High Chancellor of Ireland, to the Vice-Chancellor of the University, to their worthy Provost, to the members of the Board, and to all the other distinguished visitors who had honoured them with their presence on that occasion. He would content himself by simply moving the resolution, and observing that it was the general opinion, not alone of the members of that Association, but, he might say, of the educated portion of British society, that the University of Dublin had taken a distinguished place in the encouragement not only of natural history, but of the other liberal arts also. He believed, if they compared the old Universities of Oxford and Cambridge with that of Dublin, it would be found that the latter had outstripped the others in the practical application of the means for the advancement of those ennobling pursuits.

The Right Hon. Joseph Napier, LL.D., in seconding the resolution, said they were all deeply indebted, indeed, to the distinguished visitors who had upon that occasion enabled them to mingle together the sympathies of the young with the sanction of those of maturer years. He took for granted, however, that the resolution included the ladies amongst the distinguished visitors, although they had been portioned off to a separate department; but there they had been enabled to add sunshine to daylight upon that most interesting occasion. The original of the portrait which hung above them (Bishop Berkeley) once observed, that the highest praise that could be conferred on woman was, that her name should never be mentioned; but he was bound to say that in those days they had not yet exorcised the spirit of celibacy out of the University. They now lived in happier times, when the name of a lady might be honourably mentioned, and he rejoiced that so many of their fairer countrymen—well, that was only a *lapsus linguæ*, and it reminded

him of the man who said, "My father was an Irishman, and my mother was an Irishman too." He, however, thought that the presence of the ladies was the more particularly appropriate, because they could not forget that in connexion with Sir Leopold M'Clintock was associated the honoured name of Lady Franklin, and he was sure that every honour conferred upon Captain M'Clintock was received by her with the highest gratification. He remembered when Lady Franklin did him the honour, when he represented the University, to ask him to bring her case before the House of Commons; on that occasion he first heard of Captain M'Clintock, who was particularly noticed by Dr. Rae. "If," said he, "you get Captain M'Clintock to superintend this special service, you need not fear but that it will be brought to a successful termination." Well, since that time, and since the service had been accomplished, he had seen the gallant officer in that University receive distinguished honour at the hands of the Vice-Chancellor. His Excellency the Lord Lieutenant yesterday presided at the Royal Dublin Society, whose honours were also bestowed upon him. But, standing in that hall, the scene of his own early struggles, and of his happiest triumphs, he would tell Sir Leopold this, that no honour could be conferred on a public man superior to the free, generous, and disinterested approval of minds and hearts, candid and cultivated as were those of the Irish youth in the University of Dublin.

The PRESIDENT then put the resolution, which was passed by general acclamation.

The Right Hon. the VICE-CHANCELLOR returned thanks on behalf of the visitors. He said that, in the absence of the Lord Chancellor, who had left the Hall, it became his duty to return the thanks of the visitors for the resolution that had just been passed; but, in truth, they required no thanks, for the gratification afforded them in being present upon so deeply interesting an occasion amply repaid them for any sacrifice of theirs, if any sacrifice there had been.

The Testimonial consisted of a copy of the "Encyclopædia Britannica," published by Messrs. A. and C. Black, Edinburgh, in twenty-one 4to volumes, bound in red morocco, full-gilt backs and edges, by Messrs. Cavanagh, of Dublin. Each volume of the work had the College arms impressed, and the first volume had the following inscription:—

"Presented, with an Address, by the President and Members of the Dublin University Zoological and Botanical Association, to Captain Sir F. Leopold M'Clintock, R. N., LL. D., Dub., Friday, 16th March, 1860."

The whole will be enclosed in a handsome ship's bookcase, made of oak, varnished.

The names of Subscribers (many in autograph, the others neatly engrossed in fac-simile) were affixed to the sheet of vellum which contained the Address.

The President then declared the meeting to be adjourned.

FRIDAY EVENING, MARCH 16, 1860.

Professor W. H. Harvey, M. D., M. R. I. A., F. L. S., F. R. S., President, in the Chair.

The Minutes of last Meeting were approved of, and signed by the President.

W. H. Baily, F. G. S., read the following paper:—

ON FOSSIL CHITONIDÆ, AND THEIR DISTRIBUTION IN GEOLOGICAL TIME.

Amongst all the shell-bearing families of the class Mollusca, which includes so many varieties of form, that of the Chitonidæ presents the most anomalous characters; its shell being composed of eight distinct plates, overlapping each other, and inserted into a leathery substance, which forms an expanded margin round the animal, being either smooth, imbricated, or spiny.

The genus Chiton was founded by Linnæus in 1758, and included in his division multivalves. The few living examples which were then known, have now increased to more than 200 species. The fossil examples of this genus were not noticed until some time afterwards; they are now represented in nearly all the principal groups of strata, and amount to upward of forty species.

The following abstract, in chronological order, of the history of the discovery of fossil Chitons in the various strata, with descriptions of two new species from the Upper Silurian of Dudley, I have translated from an article, by Professor L. De Koninck, in the "Bulletins de l'Académie Royale des Sciences, de Belgique, 26^{me} année, 2^{me}, sér. t. 3, 1857."

With this abstract I have incorporated additional information respecting species discovered since the publication of M. De Koninck's paper.

The first species of fossil Chiton was discovered in 1802, by Defrance, and described by Lamarck under the name of *Chiton Grignonensis*, that name being derived from a locality celebrated for the great number of fossils found there; the strata in which it occurred belonging to the "Calcaire grossier" of Paris, or middle division of the tertiary formation.

In 1834, Mr. Conrad made known a species (*Chiton antiquus*), from the tertiary formation of Alabama, United States.

In 1836, M. Puzos, and M. le Comte Duchastel found some remains of Chiton in the carboniferous formation near Tournay; these fragments enabled Count Münster to establish a new species, which he described and figured in 1839, under the name of *Chiton priscus*. This discovery was considered to be of some importance by palæontologists, who did not expect to find species of Chiton in palæozoic strata; however, in the latter part of the year 1840, M. Guido Sandberger announced the probable existence of the genus Chiton in the Devonian formation of Villmar. In 1842, the same geologist added two new species, under the names of *C. subgranosus*, and *C. fasciatus*, to the list, which he then published, of Devonian fossils from the same locality; one of these species is probably identical with that which M. F. Roemer has mistaken for *Bellerophon expansus*., Sowerby, and which was named *Chiton cordiformis* by M. Sandberger in 1845.

Prof. De Koninck himself described, in 1843, three new species of this genus procured from the carboniferous formation of Belgium, to which, in 1845, M. le Baron de Ryckholt added some others he discovered in the same formation; at the same time time, making known the existence of a Chiton from the tertiary formation of Italy, described by M. Cantraine under the name of *C. subappeninus*,—a species which may, however, prove to be indentical with that from near Turin, published in 1847 by M. Michelotti, under the name of *C. miocenicus*.

In 1844, and before the publication of the work of M. de Ryckholt, Mr. King announced the occurrence of a Chiton found by Mr. Loftus in the Permian formation at Tunstall Hill, Durham. This species he described in 1849, and named *C. Loftusianus*.

Previous to this date, M. Philippi made known the occurrence of two

other species, *Chiton siculus*, Gray, and *C. fascicularis*, Linn., in the Tertiary strata of Sicily.

After these discoveries Mr. Salter, in 1846, added another much more remarkable example, that of a species of *Chiton* from the lower beds of the Silurian strata at Coolin, Cong, in the county of Galway. This he named *Helminthochiton Griffithii*, proposing a new generic term to include the elongated fossil forms.

In 1848 Mr. Searles Wood described and figured in his magnificent Monograph on the Mollusca from the Crag of England, three species of fossil *Chiton*, one of them, *C. strigillatus*, being new, *C. fascicularis*, Linn., and *C. Rissoi*, Payr, identical with species living in our seas at the present day.

About the same time M. Eudes Deslongchamps discovered in the Great Oolite or Bathonian of Langrune, the posterior or anal plate of a species of Chiton, which he named *Chiton Koninckii*, this being the first discovery of the genus in secondary strata.

In 1852 M. Terquem added a new link to the chain uniting the Palæozoic Chitons to those of the present epoch, by the discovery of *C. Deshayesii*, a new species from the middle Lias of Thionville.

After this Mr. F. A. Roemer described and figured, in 1855, a new species of Chiton obtained from the upper part of the Devonian strata near Grund, which he named *C. lævigatus;* and figured another species without naming it; this Professor De Koninck has proposed to designate as *Chiton tumidus*.

In 1856 another species was obtained from Permian strata at Tunstall and Humbleton Hill, which was described, in 1857, by Mr. J. W. Kirkby, under the name of *Chiton Howseanus*.

Professor De Koninck, in 1857, described, by the names of *Chiton Grayanus* and *C. Wrightianus*, two new species, of great interest, from the Upper Silurian formation nearly Dudley,—these remarkable examples, by their occurrence, in the Wenlock limestone, furnishing another link to the chain: thus leading on from the Lower to the Upper Palæozoic epoch.*

In March, 1859, Mr. J. W. Kirkby described, in the "Proceedings of the Geological Society of London," four additional Permian species

* Professor De Koninck's description of these British species, with the accompanying illustration, Plate II., will be found at the conclusion of this article.

from Tunstall and Humbleton Hill, Durham. One of these he refers to Chiton proper, under the name of *Chiton* (?) *cordatus;* the remaining three he refers to the genus Chitonellus, viz., *C. Hancockianus, C. distortus,* and *C. antiquus.*

In a paper read before the Geological Society of Dublin, April, 1859,* I made known the discovery of a Chiton of larger dimensions than any previously met with, of which plates, belonging to several individuals, were obtained by the fossil collector to the Geological Survey, Mr. C. Galvan, and myself, from the carboniferous limestone of Lisbane and Rathkeale, in the county of Limerick. This species I described by the name of *Chiton Thomondiensis.*

Mr. Kirkby, in a note to his paper of March, 1859, and a further communication with which he has favoured me, alludes to the additional, and almost simultaneous, discovery of Chitons in the carboniferous limestone of England. Mr. J. H. Burrow having collected an interesting series of plates from the Lower Scar limestone of Settle, in Yorkshire, these plates he believes to belong to several undescribed species, one of which he has named *C. Burrowianus.*

In September, 1859, whilst attending the meeting of the British Association at Aberdeen, I was shown, by Mr. Charles Moore, of Bath, some loose plates of Chiton, with other very interesting fossils, obtained by him from a Triassic deposit near Frome, Somersetshire. They have not yet been described, but will add, at least, an additional species to the doubtful one noticed by Dr. Geinitz as occurring in that formation.

Having, therefore, now concluded this short account of the various species of fossil Chiton, showing their occurrence through nearly all the principal strata, the following list, in stratigraphical order, of all the known species up to the present time, with their localities, will give their range in geological time.

Class—Mollusca.

Fam.—*Chitonidæ.*

Upper Tertiary.

1. Chiton siculus (*Gray*). Sicily.
2. ,, fascicularis (*Linnæus*). Sicily; Sutton.
3. ,, Rissoi (*Payrandeau*). Sutton.

* "Journal of the Geological Society of Dublin," vol. viii., part ii., p. 167; and "Natural History Review," vol. vi., 1859, p. 330, Plate XXVIII.

4. Chiton strigillatus (*Wood*). Sutton.
5. ,, { miocenicus (*Michelotti*). Turin.
   { subapenninus (*Cantraine*). ?
6. ,, subcajetanus *Poli*, (ex fide *D' Orb*). Turin.
7. ,, transenna (*Lea*). Virginia.

Lower Tertiary.

8. Chiton antiquus (*Conrad*). Alabama.
9. ,, Grignonensis (*Lamarck*). Grignon.

Great Oolite, or Bathonian.

10. Chiton Koninckii (*Eudes Deslongch*). Langrune.

Lias.

11. Chiton Deshayesii (*Terquem*). Thionville.

Trias.

12. Chiton (?) Cottai (*Geinitz*). Bunter Sandstone.
13. ,, A small and undescribed species, found by Mr. C. Moore, near Frome, Somersetshire.*

Permian.

14. Chiton Loftusianus (*King*). Durham.
15. ,, Howseanus (*Kirkby*). ,,
16. ,, ? cordatus (*Kirkby*). ,,
17. Chitonellus Handcockianus (*Kirkby*). Durham.
18. ,, distortus (*Kirkby*). ,,
19. ,, antiquus (*Howse*), sp. ,,

Carboniferous Limestone.

20. Chiton concentricus (*De Koninck*). Visé.
21. { ,, gemmatus (*De Koninck*). Visé.
    { ,, ,, var. mosensis (*De Ryckholt*).
    { ,, ,, viseticola (*De Ryckholt*).
    { ,, ,, legiacus (*De Ryckholt*).
    { ,, ,, eburonicus (*De Ryckholt*).

* Mr. Charles Moore has favoured me with the additional information of his having collected examples of the genus Chiton in the following formations in England, in which they had not hitherto been observed, viz.:—*Bradford clay*, Hampton, near Bath, a single plate; *Upper Lias*, near Ilminster, about a dozen separate plates, all belonging to one species; and in the Triassic beds near Frome, above alluded to, where the plates of a small, and not uncommon, species occur.

22. Chiton priscus (*Münster*). Tournay.
23. ,, nervicanus (*De Ryckholt*). ,,
24. ,, turnacianus (*De Ryckholt*). ,,
25. ,, mempiscus (*De Ryckholt*). ,,
26. ,, (Chitonellus) cordifer (*De Kon.*). Tournay.
27. ,, Thomondiensis (*Baily*). Co. Limerick.
28. ,, Burrowianus, MS. (*Kirkby*). Settle, Yorkshire, and probably other species from that locality.

Upper Devonian.

29. Chiton lævigatus (*F. A. Roemer*). Grund.
30. ,, tumidus (*De Kon.*). Grund.

Middle Devonian.

31. Chiton corrugatus (*G. et F. Sandberger*). Villmar.
,, cordiformis (*G. Sandb.*)
,, priscus (*G. Sandb.*; non *Münster*).
,, Sandbergianus (*De Ryckh.*)
,, sagittalis (*G. et F. Sandb.*). Villmar.
,, *n. sp.*, Plymouth (*Geol. Surv. Collection*).

Upper Silurian.

33. Chiton Grayanus (*De Kon.*). Wenlock limestone, Dudley.
34. ,, Wrightianus (*De Kon.*). ,, ,,

Lower Silurian.

35. Chiton (Helminthochiton) Griffithii (*Salter*). Cong, Co. Galway.

By the above list it will be seen, that although the number of fossil species of Chiton is relatively small, when compared with that of the recent, yet they are represented in almost all the series of sedimentary rocks, the Cretaceous formation being the only exception in which they have not as yet been discovered. It is most probable, however, as predicted by Professor De Koninck, that this gap will soon be filled,—it being very improbable that these animals, whose appearance on our globe dates so far back in time as the Lower Silurian, and continuing through all the other formations up to the present day, should have been unrepresented in that geological period. The foregoing list also shows that the Chitonidæ were most abundant in the Carboniferous and Permian strata of the Upper Palæozoic period, and comparatively few in the in-

termediate strata. Approaching the present epoch they again become abundant in the Tertiary formation, and attain their maximum formation in the seas of the present day.

The following are the descriptions of two new species of Chiton from the Wenlock limestone of Dudley, by Professor L. De Koninck.

1. *Chiton Grayanus* (*De Koninck*), Pl. II., Fig. 1*a*, *b*, *c*, *d*.

The dorsal cerames or intermediate plates of this species, which are the only ones with which I am acquainted, are formed of two lateral parts, perfectly plane, of a nearly square form, and united together by an angle a little more than a right angle. The dorsal carina is most developed; the anterior part of each plate is slightly crenated; the test appears to have been very thin. Their external surface is ornamented by a very great number of fine parallel striæ, or lines of growth; on the lateral and anterior sides of each plate, and between them, there are extremely thin ribs, covered with small granulations. Each of these plates appears to have undergone a suspension of development at about the middle of its growth. This interruption is indicated by a striation much larger and deeper than the others, which are all nearly equal in strength. The median and lateral areas are very nearly equal, and divide each side of the plate into two parts.

It is probable that if this species was furnished with apophyses, they were very small, as I have not been able to discover any trace of them on the various specimens I had the opportunity of examining.

Relations and differences.—This Chiton presents a greater similarity with *C. priscus*, Münster, and *C. Mempiscus*, De Ryckh. It differs from both, however, by the lateral margin of its plates being more even, by the slight thickness of its test, by the absence of apophyses, and, especially, by the fineness and great number of striæ covering its surface.

Dimensions.—Length of the dorsal plate about 12 millimetres; breadth of each side 10 mm., which gives for the complete animal an approximate length of from 80 to 90 millimetres, and a mean breadth of 16 to 18 mm.

Locality.—This species has been discovered by Messrs. Gray and Fletcher in the Wenlock limestone, near Dudley.

2. *Chiton Wrightianus*, De Koninck (Pl. II., fig. 2, *a*, *b*, *c*).—The form of the dorsal plates of this species is subtriangular, the posterior edges making very nearly a right angle. The lateral angles are rounded,

and the anterior edge is very sinuous. All the plates are supplied with a well-marked median carina, and appear to have been without apophyses. The surface is covered with a small number of deep equidistant striæ. The test is slender. The median area is larger than the lateral one.

Relations and differences.—This *Chiton* very much resembles *C. Loftusianus*, King, but differs from it in the regularity of the striæ of the median and lateral areas, and by the more marked sinuosity of the anterior edge of its plates.

Dimensions.—The length of each dorsal plate is about 8 millimetres and the breadth 12 mm.

Locality.—This species was found by Mr. Gray with the preceding one; it is, however, scarcer even than that.

EXPLANATION OF PLATE I.

Fig. 1*a*, *Chiton Grayanus*, De Kon., nat. size, with fragments of four dorsal plates, from the collection of Mr. Gray; 1*b*, a plate, seen from the anterior side; 1*c*, half plate, enlarged; 1*d*, complete specimen hypothetically restored, and slightly enlarged.

Fig. 2*a*, *Chiton Wrightianus*, De Kon., nat. size, showing two dorsal plates compressed; 2*b*, dorsal plate, seen on the posterior side; 2*c*, restored specimen, taking as a base the *Chiton Loftusianus*.

NOTES ON DUNLOPEA.

Dr. E. Perceval Wright exhibited to the meeting an annulose animal, which had been taken in India by Mr. Dunlop, one of their Associate Members, and which he believed to belong to a new order of the group Turbellaria,—the straight alimentary canal and the absence of the anal orifice reminding one of the Rhabdocœla; while the apparent absence of cilia, and the peculiar worm-like form, give the animal a very Helminthoid appearance. Dr. Wright proposed to lay before the Linnæan Society a full account of this curious creature, when he would fully discuss the question of its proper position among the Annuloida; for the present, he would propose to name the genus after his friend A. Dunlop, Esq. It may be briefly characterized as follows:—

Dunlopia (*nov. gen.*)

Body flattened, ribbon-like, transversely wrinkled, one portion gradually tapering to a tail-like extremity, the other tapering but slightly,

and ending by projecting on each side, somewhat in the form of the head of the *Zygæna malleus*. No eye-dots or apparent anal orifice. Mouth (?) situated on the ventral portion, about midway between the two extremities, in the midst of a four- or five-lobed foliaceous appendage, strongly resembling the branchiæ of *Doris*. Living in the earth, and crawling in damp weather on the ground.

1. *D. Fureedpoorensis* (*n. sp.*)

So called after the district in which it was found. About 4 inches in length. Dorsal surface of a greenish-brown colour, with a line of light yellowish-brown running longitudinally along its central portion. Ventral surface of a lighter shade of colour. Central portion and (?) oral tuft of a light-yellow colour.

2. *D. Grayii* (*n. sp.*)

This and the following species have been examined through the kindness of Dr. Gray, of the British Museum, who, when he saw the specimen of *D. Fureedpoorensis*, at once recognized the animal, and, after a search of a few moments, produced a drawing of this species, which was

discovered by Dr. Cantor in China, and is alluded to in his Catalogue of the Plants and Animals of that country. From the peculiar triangular head-lobes, and the brownish colour of the body, marked with yellow, this species can be easily distinguished from the foregoing one.

Dr. Cantor refers to a different species, found in 1836 by Mr. Griffiths, under stones in the Naga Hills, and to another observed in Bengal (*vide* "Ann. and Mag. Nat. Hist.," 1842, vol. ix., p. 277).

The above woodcut is from a coloured drawing by Dr. Cantor, in the collection of the British Museum. The original specimen is also in the same collection.

3. *D. Cantoria* (*n. sp.*)

This species, named after Dr. Cantor, who appears to have been the first to draw attention to this curious form, is the largest of the three species at present known. It was discovered by Mr. Fortune, the well-known Chinese traveller.

In length it is more than double that of either *D. Grayii* or *D. Fureedpoorensis;* and the expanded hammer-head-like portion is exceedingly well-marked.

There is something highly characteristic in the manner in which the peculiar longitudinal band (which seems to be of a different structure from the rest of the body) terminates towards the hammer-headed extremity: in *D. Fureedpoorensis* it ends without expanding laterally; in *D. Grayii* it expands as shown in the previous figure; while in *D. Cantorii* it terminates in the manner here represented.

There appears to be no trace of this genus in the fine collection of annulose animals at the Jardin des Plantes, Paris. Full details, with carefully drawn-up specific descriptions, will shortly be forwarded to the Linnæan Society; in the meantime, this brief notice may cause some attention to be paid to these little animals, which doubtless are common on the continent of Asia; and the author would be happy to receive specimens, so that he may be enabled to complete his account of the group. He is led to believe that, in addition to the localities given above, they occur likewise in the neighbourhood of Kandy (Ceylon) and near Calcutta.

The following paper by John Barker, A. B., M. B., M. R. I. A., Hon. Sec., was read (*vide* p. 23, *antea*):—

ON THE TEMPERATURE OF PLANTS.

The subject of the temperature of plants has occupied the attention of many physiologists; and, although repeated experiments have been made from the time of John Hunter to the present day, we are still at a loss in the matter: as yet no definite determination has been come to, of the causes which give rise to a specific difference between the temperature of growing vegetation and that of the surrounding air. In one case the proposition has been fully determined,—I mean, wherever oxygination is taking place, as in germination, fructification, and the growth of fungi. The process of malting exhibits the first: here a large quantity of carbonic acid and water is produced, and this process is generally represented by the formula—

$$\underset{\text{Starch.}}{2\,(C_{12}H_{10}O_{10})} + 20 = CO_8 + \underset{\text{Sugar.}}{C_{12}H_{12}O_{12}} + 8HO.$$

In the growth of fungi, too, the process is one of oxygination. Payen has found products of ammonia, oxygen, carbonic acid, water, and sugar; and heat has been proved to have been given out in their growth. In the fructification of many plants, the temperature has exhibited a very marked increase: thus, Hubert and Bory de Vincent have observed, especially in the spathe of the *Arum cordifolium*, during fructification, a rise of 34°; here, too, oxygen was being combined so as to form carbonic acid; for in the formula of the essential oils then developed, a larger amount of carbon and hydrogen was required, than furnished by cellulose. But such are not the questions on which I wish to engage the attention of the meeting, but one, I think, of a higher physiological import,—whether, consequent on the action perpetually going on during vegetable growth, while cellulose, woody fibre, &c., are being formed, is there a change of temperature?—and, if so, can we at all come at a proximate determination as to its amount? If such a cause of change of temperature exists, we must be prepared to find it marked to a great extent by evaporation, radiation, and the shifting of the fluids of plants; and although, at first sight, it might be supposed to be an easy matter to determine this question, and the simple introduction of a thermometer or thermo-electric needle into the growing tissues might be imagined to be all that would be necessary to prove the truth of the result; yet so many disturbing accidents interfere with these experiments, as to fully account for the results of the best observers on this subject—some recording positive, some negative answers, to the question. Evaporation has generally got all the credit of the low sensible temperature of plants, and this has followed, I think, too hastily from the experiments of Hales and others; but in certain particular growths this cannot account for the observed low temperature. In certain melo-cacti little or no evaporation can take place from their globular surface, no cooling influence from their parched and scanty resting place; and yet we are told that they contain a fluid, always cooler than the surrounding air or soil. In those luscious fruits of the tropics, how cool are they! much cooler than any other portion of the plant; and, surely, they can be subject to little evaporation from their surface: besides, I doubt much if, on the whole, absorption does not balance evaporation in vegetable life. We know how arid are those portions of the land divested of vegetation; and in those districts denuded of their forests, the rivers have decreased in volume. In our own country, are there not many traces of large rivers,

where insignificant streams now trickle through a waste of rocks and shingle? The shifting of the fluids of a plant is another disturbing source in the determination of this question, as these fluids generally rise from a soil always differing in temperature from the surrounding air. This, however, cannot be the whole source of this difference, especially in surface-growing plants, in arid and sandy places, where it is remarkable that they are very often succulent, and always cooler than the soil or air.

Let us look now to the chemical (say vital) changes which go on in growing plants; and, if a *vera causa* exists, we are bound to give every credit to it; and I think it can be shown that a very considerable amount of cooling influence arises—that is, the specific heat of the resultants produced is greater than their components—purely from chemical causes. Although this has not as yet received proper scientific attention, it has attracted the observation of many travellers. Sir E. Tennent in his work on Ceylon, says—"that sufficient admiration has hardly been given to the marvellous power thus displayed by the vegetable world, in adjusting its own temperature, notwithstanding atmospheric fluctuations—a faculty in the manifestation of which it appears to present a counterpart to that exhibited by the animal economy, in regulating its heat. So uniform is the exercise of the latter faculty in man, and the higher animals, that there is barely the difference of 3° between the warmth of the body, in the utmost endurable vicissitudes of heat and cold; and in vegetables, an equivalent arrangement enables them in winter to keep their temperature somewhat above that of the surrounding air, and in summer to reduce it far below it. It would almost seem as if plants possessed the power of producing cold, analogous to that exhibited by animals in producing heat; and of this beneficial arrangement man enjoys the benefit, in the luxurious coolness of the fruits which nature lavishes on the tropics." Again, he says:—"The faculty of maintaining a temperature below that of the surrounding air, can only be accounted for by referring it to the mechanical process of imbibing a continuous supply of fresh moisture from the soil, the active transpiration of which imparts coolness to every portion of the tree and its fruit." "Dr. Hooker, in the valley of the Ganges, found the fresh milky juice of the *Mundar Calotropis* to be 72°, while the damp sand of the bed of the river where it grew was from 90° to 104°."

It is, I believe, a received doctrine with chemists, that action and

re-action are always equal and opposite; and Dr. Wood has laid down the law, which I believe has been fully justified by his experiment,—that whatever may be the amount of heat produced by the chemical action of two substances when combining together, an equal amount of heat would be absorbed (or cold produced), by their separation. In some inorganic combinations, chemists were aware of this, as in the case of the decomposition of oxide of silver by light giving rise to a depression of temperature; but the above proposition was, I believe, first proved by Dr. Wood's experiments. Now, what are the changes which take place in the formation of vegetable tissue? For the most part, cellulose is formed, sugar, too, and oxygen, are produced; carbonic acid is decomposed; and water, also, bears a part.

Carbonic acid, we know, is never formed from its elements without the production of heat; therefore, its decomposition must produce an equal amount of cold. A well-known authority in chemistry concludes —"that in every part of the vegetable products of acids, neutral bodies, cellulose, starch, fats, oils, resins, bases, and sanguineous matters, one character universally prevails—that, namely, of the deoxygination of the materials, and the liberation of oxygen."

Some part of the oxygen is supposed to arise by the decomposition of water; and we know that the union of oxygen and hydrogen gives rise to intense combustion; in this case, also, its liberation from water would exert a cooling power of great intensity. From experiments by Grassi, we know that 1 grain of hydrogen evolved, in combustion, 347 units of heat; 1 grain of carbon, 79 units of heat. Desprets also proved that 1 grain of oxygen, uniting with hydrogen, would raise 5310 grains of water one degree; and that 1 grain of oxygen uniting with carbon, to form carbonic acid, would raise nearly 4000 grains of water one degree; hence, if water and carbonic acid were decomposed, what a large amount of cooling effect would result!

The chemical changes that take place in the growth of plants are generally laid down as follows:—

$$12CO_2 + 10HO = C_{12}H_{10}O_{10} + 24O,$$

from which we might infer, that every grain of carbonic acid decomposed would lower 4000 grains of water one degree.

In the formation of pertine we have—

$$64\,(CO_2) + 48HO = C_{64}H_{48}O_{64} + 112O;$$

In protiene we have—

$$36\,(CO_2) + 25HO + 4N = C_{36}H_{25}N_4O_{10} + 87O.$$

I would, therefore, conclude from these views, that a vast amount of cooling influence is produced by the fixation of carbon and the decomposition of water which the vitality of the plant is capable of effecting: how much that may be, might in some degree be estimated by the amount of heat given off by the combustion of the dried plant; and if we take Mr. M'Clean's estimates of the quantity of coal capable of being formed annually by forest growth as our data, we may come to some degree of approximation as to this amount. He states that a three-foot seam of coal would require 1000 years to produce it by the growth of a forest on its site. Now, an acre of such seam would give 5000 tons; and this, reduced, would result in 14 millions of units of heat absorbed per *hour*, by an acre of a growing tropical forest, and this calculation does not include the amount of heat absorbed by the decomposition of water.

In all this we see a compensating influence in vegetable life, similar, but opposite, to that which occurs in the animal creation; and, as in the case of the production and decomposition of carbonic acid by animal and vegetable life, so likewise I would infer, that the heat produced by animal existence is more than equalized by the heat absorbed by the vegetable kingdom. And here I would express my conviction, that a hitherto little noticed influence tempers, to a great extent, many tropical climes, which, without the luxuriance of growth there found, would be as arid as an African desert.

The Meeting then adjourned.

FRIDAY, APRIL 20, 1860.

Professor W. H. Harvey, M. D., M. R. I. A., F. L. S., F. R. S., President, in the Chair.

Minutes of last Meeting were approved of, and signed by the President.

W. Stokes, M. D., Regius Professor of Physic, read a paper "On some results of Disease as illustrative of Organization."

The Meeting then adjourned.

FRIDAY EVENING, MAY 18, 1860.

PROFESSOR W. H. HARVEY, M. D., M. R. I. A., F. L. S., F. R. S., President, in the Chair.

MINUTES of last Meeting were approved of, and signed by the President.

The President gave a description of a genus of Myrsinaceæ, from the Cape of Good Hope.

The President gave a description of a new mode of propagating *Trichomanes radicans*.

The following paper by A. G. MORE, F.L.S., was read:—

LOCALITIES FOR SOME PLANTS OBSERVED IN IRELAND, WITH REMARKS ON THE GEOGRAPHICAL DISTRIBUTION OF OTHERS.

THOUGH it is likely enough several of the following stations are familiar to other botanical observers, I am induced, at the suggestion of Mr. D. Moore, to offer the present fragment, such as it is, to the Association; and I am glad of the opportunity thus afforded of discussing one or two other points relating to Irish botany:—

I. *Noticed in County of Armagh during April and May*, 1854 (Province xxviii. "*Erne*" of Babington, see vol. i., p. 248, of the Proceedings).

Anemone nemorosa. A state of this plant, with its petals altogether of a dark rich purple, occurred in an open meadow at Loughgall.

Ranunculus Lingua. Lake-side at Loughgall.

Ranunculus auricomus. Hedge banks about Loughgall.

R. sceleratus. By the lake at Loughgall.

Nuphar lutea. Lake at Loughgall.

† *Chelidonium majus.* Near Loughgall, but, as usual, in suspicious stations only.

Thlaspi arvense. Cultivated ground at Loughgall.

Lepidium campestre. Among crops at Tartaraghan; ditto, var. *longistylum*, with many stems springing from a biennial root, and the style, about twice as long as the notch, occurred in a cultivated field near Loughgall. This variety is likely to be mistaken for *L. Smithii*, but for its scaly pouch.

Cardamine sylvatica. Shaded ditch sides near to Tartaraghan.

Barbarea arcuata. Road sides in several places near Loughgall; easily known by the widely spreading pods, and flowers larger than those of *B. vulgaris*.

†*Barbarea intermedia* (*Bor.*). Abundant in some cultivated fields near Tartaraghan, on the way to Lough Neagh.

Viola canina of Fries and Bab. Banks of Lough Neagh.

Viola tricolor. On sandy road-side banks on the way to Lough Neagh.

Arenaria trinervis. Hedges near Loughgall.

Acer campestre. About Loughgall.

**Geranium pyrenaicum.* A few plants only by the road-side, on the hedge-bank, not far from a cottage a little north of Loughgall; not, I believe, wild here.

Vicia angustifolia. In loose, sandy ground, close to Lough Neagh; an apparently promising locality, but which yielded hardly anything uncommon.

Lathyrus palustris. On several islets along the south shores of Lough Neagh; Rev. G. Robinson, who showed me the plant growing.

**Prunus Cerasus.* In field-hedges about Loughgall, but not wild.

Geum intermedium. Copses in the park at the Manor, Loughgall; accompanied, as usual, by *G. rivale* and *G. urbanum.*

Rubus Cæsius. Banks of Lough Neagh.

Alchemilla vulgaris. In several places in open fields and copses at Loughgall.

†*Cornus sanguinea.* On a small islet in the Loughgall Lake, at the end nearest the village. I did not at the time think it had been planted, but the station, perhaps, requires verifying.

†*Smyrnium Olusatrum.* Near Loughgall, but, as in most of its habitats, liable to suspicion.

Cicuta virosa. With *Arundo stricta* on the little islets along the south banks of Lough Neagh.

Ægopodium Podagraria. Most abundant on hedge-banks, and in shrubberies everywhere about Loughgall.

†*Sambucus Ebulus.* About the ruins of an old building close to Lough Neagh.

Viburnum Opulus. About Loughgall.

Galium boreale. Banks of Lough Neagh.

Asperula odorata. Banks of Lough Neagh.

**Carduus Marianus.* In small enclosures, waste ground, &c., always near buildings.

Centaurea Cyanus. Cultivated fields, Loughgall.

†*Tanacetum vulgare.* Near Lough Neagh, but not far from habitations.

Filago minima. Sandy ground near Lough Neagh.

Petasites vulgaris. Damp meadows near Loughgall. In Galway I have often observed it about cottages and in shrubberies; never wild. For what purpose can it have been cultivated there?

Vaccinium Oxycoccos. Bog near Tartaraghan.

Andromeda polyfolia. "Bog near Tartaraghan," Rev. G. Robinson, spec.!

Veronica scutellata. Near Loughgall.

V. montana. Copse within the park at Loughgall Manor; banks of Lough Neagh.

V. polita. Loughgall.

**V. Buxbaumii.* A weed in the flower borders at Loughgall Manor.

Lathræa Squamaria. In a small copse within the park at Loughgall Manor.

Lithospermum officinale. In hedge-banks in several places near Loughgall, but sparingly.

L. arvense. Tartaraghan, in cultivated ground.

Lysimachia vulgaris. In profusion about Lough Neagh.

Littorella lacustris. Lake at Castle Dillon; shores of Lough Neagh.

Myrica Gale. Islet off south shore of Lough Neagh.

Epipactis (might be *E. media*). Abundant in some copses within the park at Castle Dillon.

Allium ursinum. In a copse in the park at Loughgall Manor.

Arum maculatum. Plentiful about Loughgall.

Luzula sylvatica. Banks of Lough Neagh.

Cladium Mariscus. All round Loughgall Lake.

Scirpus sylvaticus. Damp meadows near Loughgall.

Eleocharis acicularis. Banks of Lough Neagh.

Eriophorum vaginatum. In the bogs near Tartaraghan.

Carex ovalis. Near Tartaraghan.

Carex curta. Near Tartaraghan; Rev. G. Robinson!!

Carex remota. Ditch sides near Loughgall, &c.

C. intermedia. By the lake at Loughgall; islet in Lough Neagh.

C. stricta (*Good*). By the lake at Loughgall abundantly; also a var. with more slender, drooping, stalked spikes, somewhat resembling the *C. cæspitosa*, var. *retorta* of Fries, but our plant has the narrow leaves of *C. stricta*, into which it can, upon the spot, be traced by intermediate links; it is probably only a starved state of *C. stricta*.

C. Œderi. Loughgall; islet in Lough Neagh.

C. ampullacea. Loughgall.

C. vesicaria. Loughgall and Castle Dillon Lakes, and at Lough Neagh.

C. sylvatica. Loughgall.

C. præcox. Ditto.

C. paludosa. Lake-side at Loughgall.

Ditto, var., which I believe to have been *C. spadicea*, differing from the type in having more slender and often stalked fertile spikes, in bearing flowers with two and three stigmas in the same spike, and in the long beak of the glumes. In this state the plant somewhat resembles *C. acuta.*

Carex hirta. Banks of Lough Neagh, the only place where I observed it.

Arundo stricta. On several islets along the Armagh shore of Lough Neagh; Rev. G. Robinson, who pointed out the plant just protruding its panicle, at the end of May.

Melica uniflora. Wood at Loughgall.

[**Vulpia* (*Festuca*) *bromoides*]. Tartaraghan, but apparently sown with the artificial grass, among which it grew.

[**Bromus commutatus.*] With the former, and under similar suspicion.

Polystichum aculeatum. Near Loughgall, but rare.

P. angulare. With the former, and far more common.

Osmunda regalis. Near Tartaraghan; Rev. G. Robinson!!!

Ophioglossum vulgatum. Loughgall, near the lake.

Equisetum sylvaticum. Very plentiful, even along open road-sides and in fields, near Loughgall, Tartaraghan, &c.

II. *Found in County of Mayo, August,* 1854.

1. At or near Hollymount (Province xxvii., "North Connaught" of Babington):—

Nasturtium amphibium.
Stellaria glauca.
Crepis paludosa.
Andromeda polyfolia.
Rhynchospora fusca.
Chrysanthemum segetum. A weed among potatoes in the cottage gardens.

**Avena strigosa.* With the former, but might have been the remains of former cultivation.

2. On the banks of Lough Carra (also in Province xxvii.):—

Viola canina (of Fries and Bab.).

Antennaria dioica.

Plantago maritima, var. Roots of this variety, brought from the county of Galway, have in cultivation produced broad and channelled leaves, similar to those of the ordinary *P. maritima.*

Sesleria cærulea.

Gentiana verna.

Lycopodium selaginoides.

Rhamnus catharticus.

Most of these plants are very abundant at Castle Taylor, and in other parts of the Burrin limestone, but far less luxuriant and scarcer at Lough Carra. In ditches by the road-side, close to the lake, grows in profusion another scarce plant, *Myriophyllum verticillatum.*

3. Upon an islet called "Canova" in Lough Corrib (Province xxvi. "North Atlantic," of Babington):—

Dabeocia polyfolia.

Lastrea æmula.

Cotyledon Umbilicus.

Sedum anglicum.

Pinguicula lusitanica.

Hypericum Androsæmum.

Pinguicula vulgaris.

Thalictrum flexuosum.

Parnassia palustris.

Hieracium umbellatum. A var., with phyllaries blacker than usual, and the whole plant tinged with lurid purple.

Galium boreale.

Drosera anglica.

Schœnus nigricans.

Myrica Gale.

Orobus tuberosus.

Galium saxatile.

Veronica officinalis.

Melampyrum pratense.
Asperula odorata.
Luzula sylvatica.
Viburnum Opulus.
Rhamnus catharticus.
Festuca elatior.
Osmunda regalis.
Carduus pratensis.
Carex Œderi.
Lysimachia vulgaris.
Erythræa Centaurium. With many other more common species.

4. Cong Abbey (Province xxvi.) :—

Orobanche Hederæ.

III. *Plants observed in County of Clare, end of July,* 1854 (Province xxiv., "Lower Shannon" of Babington).

1. Near Kilmacduagh :—

Carduus pratensis.
Cladium Mariscus.

2. At Corrofin :—

Senebiera didyma.
Eupatorium cannabinum (Inchiquin),

3. At Miltown Malbay :—

Sagina maritima.
Senebiera didyma.
Anagallis tenella (var. *carnea*). On the sand-hills, indigenous here.
Viola lutea (a luxuriant form). Plentiful on the sand-hills. My specimens have the exact stipules of *V. lutea,* with the terminal lobe quite entire. Except in its more luxuriant foliage, the Miltown violet does not differ from what I have from "Dalmahoy Hills," near Edinburgh, gathered by Dr. J. Mitchell.

4. Towards Lahinch :—

Equisetum Telmateia.
Eq. sylvaticum.
Althæa officinalis.
Viola lutea (Lahinch sands).

5. Cliffs of Moher:—

Viola lutea (on the turf).

Sedum Rhodiola.

Silene maritima (of stouter habit than usual, and with leaves scabrous at their edges, the panicle bearing three flowers).

6. Re-entering the Burrin district:—

Dryas, Sesleria, Geranium sanguineum, &c.

7. At Black Head, the south-west extremity of Galway Bay:—

Alsine verna.

Crithmum maritimum.

Asplenium marinum.

Cystopteris fragilis.

Saxifraga hirta. My specimens agree exactly with others from Kerry, except that the sepals are perhaps a little more pointed in the Black Head plant. It differs remarkably from *S. hypnoides* in its palmate stem leaves, and the close, short rosettes of the barren shoots.

Statice occidentalis. My friend Mr. Babington considers the plant found at Black Head to belong to this species, rather than to *S. Dodartii*, and believes that all the other Irish localities recorded for *S. Dodartii* do really only produce *S. occidentalis;* they are—Ballycotton, Cork; Tramore, Waterford; Howth, Dublin. *S. Dodartii* must, therefore, be expunged from the Irish Flora.

8. Between Ballyvaughan and Kinvarra, along the upper road:—

Marrubium vulgare.

Nepeta cataria.

Orobanche rubra.

Alchemilla vulgaris.

Gentiana verna.

Cystopteris fragilis (frequent).

Cerastium arvense (a var. with its leaves almost glabrous, but stem slightly pilose, occurred near the shore, towards New Quay. Very near to, if not identical with, the var. "*strictum*," of Arran).

The present seems a fit occasion to notice one or two corrections required in a paper upon the Flora of Castle Taylor, in "East Galway," which was read before the Botanical Society of Edinburgh, in April, 1855 (Proceedings of Bot. Soc., p. 26).

As to the number of northern plants occurring at Castle Taylor, I find, on reference to the fourth volume of the "Cybele Britannica," that two species, *Saxifraga hypnoides* and *Gentiana verna*, are to be removed from the "highland" to the "Scottish" and "intermediate" (i.e. mid-British) types. Similarly, *Lycopodium selaginoides* and *Galium boreale* are to be counted as "highland" (or alpine), instead of "Scottish" (i.e. northern) species.

Plantago maritima looks slightly different from the sea-side plant; the same variety occurs at Lough Carra, Mayo (see above); the *Hieracium* is *H. iricum*, not *H. Cerinthoides*. Adding *Drosera anglica*, *Equisetum variegatum*, *Parnassia palustris*, *Pinguicula vulgaris*, to the northern plants, we should have still nine for the highland, and twelve for the Scottish type (including the intermediate).

The species to be referred, "secondarily" (see Cybele, iv., 509) to the same groups are—1. Tothe high land *Cystopteris fragilis* (B. h.), which, it will be seen, has not been deducted from the Scottish type plants, as it is so much more abundant in the north. 2. To the Scottish type belong, secondarily, *Gentiana campestris*, *Comarum palustre*, *Geum rivale*, *Habenaria viridis*, *Sparganium minimum*, *Scirpus cæspitosus*, and *Eriophorum vaginatum*. *Geranium sanguineum*, *Carex stricta*, and *Vaccinium Oxycoccos*, similarly marked B. i. in the Cybele, will complete the list of northern species found at Castle Taylor.

From the Atlantic type plants have now to be deducted *Drosera intermedia* and *Hypericum Androsæmum* (marked E. and E. b.) *Sedum anglicum* may be added to this group; this will reduce its number from six to five, being about half of the Atlantic type plants which occur in all Connaught, as marked in a list kindly checked for me by Mr. D. Moore.

The two *Ophrides*, *O. muscifera* and *O. apifera*, are now to be counted among the English rather than Germanic type, being marked E. g. in the Cybele Britannica.

On the other hand, we shall have still three species, *Orchis pyramidalis*, *Monotropa Hypopitys*, and *Bromus erectus*, to represent the flora of the south-east of England, besides seven other plants marked with the small g. by Mr. Watson, viz., *Ophrides* 2, *Spiræa Filipendula*, *Ænanthe Phellandrium*, *Gentiana Amarella*, *Potamogeton plantagineus*, *Lastrea Thelypteris*.

Considering how few of Watson's Germanic type plants reach Ireland (nine only having been found by Mr. D. Moore, and of these but six in Connaught), and looking at the wide English range of the three species above named, I cannot but think they should be classed with the Ophrides, as lime-loving plants, belonging to the English rather than to the Germanic type.

From what has been said, it is hoped that any botanist who is desirous of weighing the characteristics of the "Burrin Flora" may now be enabled to make a somewhat better estimate than that attempted by myself six years ago.

The striking differences between the vegetation of the granitic and micaceous districts of Connemara, and of Kerry, when compared with the flora of the "limestone plain," which lies between them, are very remarkable; whether suggestive or not of a more recent elevation of the latter, or whether the influence of climatal conditions and of the subsoil, be sufficient to account for their features.

A few more corrections remain to be made respecting individual plants, mentioned as found at Castle Taylor; and may I here be permitted to remark that, however mortifying, it is the plain duty of any naturalist who has once chronicled an error to take the first opportunity of setting it right. A mistake cannot too soon be acknowledged, which, if left standing, may unintentionally mislead others.

Of the supposed additions to the Irish Flora, as given in my paper, four are at least unsatisfactory, viz., *Epipactis media*, which, upon a re-examination, I am inclined to refer rather to *E. latifolia*, though in some respects it resembles *E. ovalis*, a plant that might well be expected at Garryland. Let us hope that any botanist who shall have the opportunity will not forget to search diligently for this scarce species. *Potamogeton lanceolatus:* my specimen differs altogether from the Anglesea plant. I am disposed to think what I gathered was a remarkably slender variety of *P. oblongus*. I have seen the same from Scotland, sent to me as *P. lanceolatus*. *Alopecurus agrestis* and *Lolium italicum* (with probably *Bromus commutatus* and *Vulpia bromoides*) were no better than "Colonists," sown unintentionally or by design, and which, possibly, may not be permanently established.

Iris fœtidissima and *Geranium pratense* were too probably planted where I saw them.

Tragopogon pratense was, I believe, *T. minus* (certainly not the *T.*

majus of Jacquin). *Carex acuta* must also be expunged. The supposed *Hieracium cerinthoides* was above stated to be *H. iricum*.

Euphrasia gracilis seems to belong rather to *E. salisburgensis*; in either case it is the *E. nemorosa* of Grenier and Godron. But the Garryland (and Arran) *Euphrasia* differs much from what I have gathered, as *E. gracilis* on the heaths and downs of Kent. This latter is apparently the *E. ericetorum* of Jordan, but I do not suppose that either is specifically distinct.

Arenaria serpyllifolia, var. *leptoclados*. In cultivated ground at Castle Taylor, gathered at the time for the typical *A. serpyllifolia*, which has much larger capsules, &c.

Fumaria pallidiflora (Jord.). In potato ground at Castle Taylor. The pedicels of my specimen are strongly reflexed; it is decidedly not *F. Borœi*. The plant appears to have been noticed near Galway by Dr. Graham, in 1838 (see Proceedings of Edinburgh Bot. Soc., in Third Annual Report, p. 55).

Polystichum aculeatum, *Equisetum limosum*, *Draba verna*, and *Alnus glutinosa*, have also to be added to the list. As it was my object to confine my remarks to the one kind of soil, it is as well to mention here that the neighbouring hills of Roxburgh, &c., of quite a different formation and vegetation, were designedly excluded from the district of Castle Taylor.

A paper by Mr. John Sim, published in "The Phytologist" for last December (N. S., No. 60), seems to call for some remark, inasmuch as there are recorded, as Irish, five species of plants, which no other botanist seems to have met with in Ireland, viz., *Caucalis daucoides* (near Carlow), *Melica nutans* (near Belfast), *Sedum villosum* (near Galway), *Stachys germanica* (at Galway), and *Inula conyza* (two miles east of Limerick).

From a communication, with which the writer has favoured me, and which he has kindly permitted me to make use of, it would seem that his observations date many years back, and that, unfortunately, no specimens were preserved of the plants in question.

Caucalis daucoides.—From the station given, "in a plantation," it seems likely some other plant (perhaps a *Torilis*) was mistaken for it.

Melica uniflora was, in all probability, the grass gathered by Mr. Sim near Belfast, and not the far scarcer *M. nutans*. Professor Dickie has kindly informed me that the former species occurs in that neigh-

bourhood; and I believe I may add he is of the same opinion with myself.

Sedum villosum Mr. Sim himself thinks must have been *S. anglicum*.

The locality whence *Stachys germanica* is reported, is "close to the College at Galway, and not far from what then (1853) were the rudiments of a botanical garden." Still it was most likely introduced by accident, whether brought with building materials, or mixed with other seeds sent to the garden. Its partiality for a limestone soil is well known.

The *Muscari* is also admitted by Mr. Sim to have been somewhat near to houses, so that its claims to take rank as a native cannot be much furthered by its occurrence near Fermoy, any more than those of *Vinca major* and *V. minor*, mentioned as occurring along hedges.

In another instance, in the same paper, sufficient care does not seem to have been exercised in distinguishing between really wild plants and those escaped from cultivation. I am indebted to Professor Dickie for the information that *Sibthorpia europæa* does indeed grow "naturalized," as it were, within the precincts of the Botanic Garden at Belfast, the wonder being that it should bear the severe winters of the north of Ireland.

Fœniculum officinale, too, mentioned by Mr. Sim "as apparently wild near Galway," is an encroaching plant, and readily becomes naturalized wherever the soil is sandy, such localities being more frequent on the coast. Without wishing to dispute its being possibly indigenous in the south of England, I conceive that we cannot be too careful in the case of a pot-herb, formerly in such general use, as fennel.

May not even *Allium Babingtonii* (spite of its high flavour) have been cultivated by the ancestors of the present inhabitants of Arran, and of the west coast of Ireland—just as *A. Ampeloprasum* is still grown in the west of France? And though my friend Mr. D. Moore has gallantly stood up as champion for *Narcissus biflorus*, I hope he will forgive my urging on the other side that Lloyd, in the west of France, does not allot it a place among the indigenous plants of his district. Possibly the "holy men of old," who founded the numerous churches in the Isles of Arran, had better taste in flowers than in vegetables, if they cultivated *Narcissus biflorus* for its beauty, and *Allium Babingtonii* as the leek best suited for their "*omelettes*." *Certes!* a very little of it would go a long way.

Geranium pyrenaicum is not given by Lloyd as a plant of the west of France, and De Candolle assigns it a distribution somewhat more eastern than the longitude of Britain. I have not yet, even in England, had the good fortune to meet with the plant in such situations as might pass unchallenged. Way-sides and river-sides seem hardly sufficient to establish the claim of a doubtful native.

The mistake of the range of *Pistia Stratiotes* having been given by De Candolle, instead of that of *Stratiotes aloides*, is now sufficiently well known: hence one obstacle is removed to the *Stratiotes* being held native in Ireland; but there still remain against this the facts of it being a plant of Eastern distribution in England, on the Continent hardly reaching so far west as France; and that it easily shifts for itself if merely thrown into water, and would soon (like the Anacharis) extend many miles if aided by a current; though, while so little is known of its history in Ireland, we must not be too suspicious.

There can be no doubt that much remains to be done in the way of removing from the list of Irish plants many species that have been unjustly enrolled in it; and it should be remembered that no less interest attaches to clearing up an error than to adding a new species to the Flora. If the former task be truly the more difficult, it is also of even greater importance in a scientific point of view, and the negative characteristics of a Flora are often the more valuable.

But, surely, it is to a more perfect acquaintance with the stations and range of the plants themselves in Ireland that we must look, before we venture upon any conclusions, however guarded. May the accomplishment of a "Cybele Hibernica" be the hope and the effort of every Irish botanist! Mr. Babington has already marked out the proposed "*provinces*" in a most judicious and painstaking manner (see p. 248 of the first volume of these Proceedings). Let us see what can be done towards filling in the numerals. Where so many blanks lie ready, there is the less fear that any labour will be in vain.

The PRESIDENT read a paper, by J. T. MACKAY, LL. D.—

ADDITIONAL PLANTS FOR FLORA HIBERNICA.

1. *Alyssum calycinum.* Found by me on a sandy bank at Portmarnock in 1837.

2. *Geranium pratense.* Found at Glenarm in 1836 or 1837, soon

after the publication of Fl. Hibernica, by Mr. D. Moore, who sent me specimens.

3. *Chara latifolia.* Found in Belvedere Lake, county of Westmeath, in 1841, by Mr. D. Moore, who sent me specimens.

4. *Agrostis spica-venti.* Found near the Scots' Church, Sandymount, in August, 1859.

5. *Lactuca virosa.* Found near the Martello Tower, between Blackrock and Kingstown, in September, 1859, by a person who brought me specimens.

6. *Neottia gemmipara.* I inserted this plant in Flora Hibernica on the authority of Mr. Drummond, who found it at Dunboy, near Berehaven, county of Cork, in 1810, but had not then seen a specimen of it. It was lost to the botanical world until 1834, when it was again discovered in another locality in the same county by Dr. Armstrong, of Castletown, Berehaven, who sent me a specimen by Captain Broughton. *Spiranthus cernua* of Richard. *S. cernua,* Linn. Trans., 19, t. 32.

The Meeting then adjourned.

FRIDAY EVENING, JUNE 15, 1860.

Professor W. H. Harvey, M. D., M. R. I. A., F. L. S., F. R. S., President, in the Chair.

The Minutes of last Meeting were approved of, and signed by the President.

W. B. Brownrigg, Sc. Sch., A. B., read a paper entitled, "Notice of the occurrence of *Teredo Norvegica* at Tankardstown, county of Waterford."

W. H. Baily, F. G. S., read a paper—

ON A NEW SPECIES OF SOLARIUM FROM THE UPPER GREENSAND, NEAR DORCHESTER.

The following is the description of this beautiful little species of Solarium, from the Cretaceous formation:—

Class.—MOLLUSCA. Order.—Gasteropoda.

Genus.—*Solarium* (*Lamarck*).

Solarium Binghami (*Baily*) (*nov. spec.*) Pl. I., Fig. 2, *a–d.*

Sp. Char.—S. testa parva discoïdea-depressa; spira prope plana;

anfractibus (6) clathratis marginibus bicarinatus tuberculatis, umbilico magno profundo margine tuberculosa ornato; apertura angulosa.

Diagnosis.—Shell small, discoidal; spire nearly flat, consisting of 6 whirls, their margins bicarinated and ornamented with varices or tubercles; whirls decussated with longitudinal and transverse lines; umbilicus large and deep, its margin being ornamented with a row of tubercles, gradually decreasing in size; mouth angular.

Affinities and Differences.—This pretty little Solarium differs specifically from all other described forms, being distinguished from *S. moniliferum* (Michelin) by its very depressed spire, and large, deep umbilicus; and from *S. albensis* (D'Orbigny) by its depressed spire and reticulated sculpturing. Its nearest affinity is, however, with these, and, more remotely, with *S. ornatum* (Fitton),—all species from the Gault, the two former being from foreign localities, the latter a British species.

Dimensions.—Elevation, $\frac{2}{10}$ inch. Diameter, $\frac{4}{10}$ inch.

Locality and Stratigraphical Range.—This beautifully preserved fossil shell was collected from the Upper Greensand at Bingham's Melcombe, near Dorchester, by the Rev. C. W. Bingham, a gentleman who has enriched the museum of that town with many contributions, and to whom I have much pleasure in dedicating it.

EXPLANATION OF THE FIGURES, PL. I., FIG. 2.

2. *a.* *Solarium Binghami*, side view, natural size.
   b. ,, ,, side view, enlarged three diameters.
   c. ,, ,, under surface, enlarged three diameters.

Dr. J. Barker, Hon. Sec., read a paper "On the structure of Muscle in the Œsophagus of Lion."

The Rev. Thomas Hincks, B. A., Corresponding Member of the Dublin University Zoological and Botanical Association, read the following—

SUPPLEMENT TO THE LIST OF ZOOPHYTES IN THE "NATURAL HISTORY OF IRELAND, BY W. THOMPSON, ESQ." (VOL. IV., 1856); WITH DESCRIPTIONS OF NEW SPECIES. PLATE III., FIGS. 1 TO 7.

In the present paper I propose to include a list of the *Hydroida* and *Polyzoa*, which have occurred on the Irish coast since the publication of the fourth volume of Mr. Thompson's "Fauna" in 1856, and de-

scriptions of the new species, which I have obtained amongst Mr. Hyndman's dredgings from the coast of Antrim.

I trust that the many excellent naturalists of whom Ireland can boast, and who have proved their ability so conspicuously in the various departments of the science, will pardon my Saxon audacity in trespassing on a territory which belongs of right to them.

Within the last few years a great number of new zoophytes have been found on the English coasts, most of which may be expected to occur in Ireland. But as yet, a large proportion of them seem to have escaped detection, or, at least, have not been recorded by Irish observers.

Of the family *Campanulariadæ* alone, no less than twelve new species have been published since Mr. Thompson's fourth volume was issued. Of these, six are included in the supplementary list which I am about to lay before the Society. Six still remain to reward the diligence and acuteness of collectors.

Large additions have also been made to the families *Coryniadæ* and *Tubulariadæ*, in which, no doubt, the Irish Fauna should participate.

Turning to the *Polyzoa*, the greatest increase of species has taken place in the case of the *Membraniporidæ*. There seems, indeed, to be scarcely a limit to the forms of *Lepralia*. The researches of naturalists have been constantly adding of late to this multitudinous and beautiful tribe, and there is reason to believe that the field of discovery is very far from being exhausted. In this paper nine species of *Lepralia* are recorded as Irish, which do not appear in Mr. Thompson's list, of which two are new to science, and one has only been known previously as a Crag fossil. The latter is amongst the produce of Mr. Hyndman's deep-water dredgings. There is every probability that many more of the Crag forms may be obtained by careful investigation, and those who may have opportunities of dredging should be on the look-out for them. Mr. Busk's admirable monograph, published by the Palæontographical Society, affords a ready means of identifying the species.

Of *Membranipora*, seven species are included in my catalogue which are wanting in the "Irish Fauna," and of these two are new.

Few genera demand more careful study than *Cellepora*. A considerable number of undescribed British species exist, but much difficulty attends the determination of them. The eye is bewildered by the amount of structure which often appears on the surface of the polyzoary, and does not readily seize upon the distinctive characters. Dr. Johnston

fixed upon the genus the stigma of the *fronti nulla fides*, and subsequent naturalists, following his lead, seem to have credited the common *C. pumicosa* with an unlimited variability. Mr. Thompson himself inclines to regard the *C. ramulosa* and *C. Skenei* as two of its multitudinous "states" (vol. iv., p. 470).

An examination of the minute characters will at once show that this view is quite untenable, and that "dissimilarity of habit" is by no means the only point which separates them.

Many crustaceous forms seem to have been overlooked from their resemblance, on casual inspection, to the *C. pumicosa*.

The Trinity College collection and Mr. Hyndman's dredgings furnish many specimens of *Cellepora;* but I have not been able to satisfy myself fully about them, and content myself for the present with recording one or two of the most marked forms.

The Antrim deep-water dredgings have also yielded a large number of the *Cyclostomata*, chiefly belonging to the genera *Tubulipora* and *Alecto;* but these I am obliged to reserve for future examination. One fine new *Alecto* is described in a subsequent part of this paper.

Some of the recently discovered *Polyzoa* are exceedingly minute and inconspicuous, and may readily escape detection. Such are the *Buskia nitens* (Alder), which seems to be very generally distributed, and which occurs in the Isle of Man; and the *Scruparia clavata* (*mihi*), which has been found both in England and Scotland.

There is every probability that close investigation would add these and many more of the minuter forms to the Irish list. I venture also to prophesy that the beautiful *Mimosella gracilis*, hitherto found only on the shores of Devon and Cornwall, will be met with in some of the more sheltered bays in the south of Ireland. It must be sought in the Laminarian Zone, and where the *Halidrys siliquosa* is abundant—the favourite haunt of the Vesicularian Polyzoa.

Mr. Thompson's catalogue enumerates 145 species of Hydroida and Polyzoa as natives of Ireland. A strict revision, however, with our present knowledge, would remove several of these from the list. In this paper 42 additional species are recorded, bringing up the whole number of Irish (published) species to 187.

It may stimulate the zeal of Irish collectors to mention that more than 100 British forms have not yet found a place in the Fauna of their country, while there can be little doubt that careful research would bring to light large numbers of new species.

The materials at my command for the preparation of this paper have been—the results of deep-water dredging off the coast of Antrim, by Mr. Hyndman; the collection of zoophytes belonging to Trinity College; the lists of Hydroida, by Professor Wyville Thomson, published in the Report of the Belfast Dredging Committee; miscellaneous papers by Allman, Hassall, &c.

List of Species.

Class.—HYDROZOA.

Order.—CORYNIDÆ.

ATRACTYLIS (Dr. Strethill Wright).

ramosa (*Eudendrium ramosum*, Van Beneden). On an old buoy, Harbour of Derryquin, county of Kerry.

Allman, Proc. Roy. Soc. Ed., December 6, 1858.

TUBULARIA

gracilis. Howth and Lambay. The Rev. A. Irvine's Catalogue of Dublin Bay Zoophytes; Nat. Hist. Rev., vol. i., p. 244. (On the authority of Dr. Hassall.)

Dumortierii. On *Flustra truncata*, Belfast Bay. Prof. Wyville Thomson. Rep. of Belfast Dredging Com. for 1857.

Order—SERTULARIDÆ.

SERTULARIA

fallax. Dalkey and Howth. Irvine's Catalogue.

Gayi (Lamouroux); *polyzonias* var. β Johnston. Dublin Bay (Trin. Coll. Coll.).

PLUMULARIA

Catherina (Johnston). Howth (Trin. Coll. Coll.). Belfast Bay, Prof. Wyville Thomson.

echinulata. Dublin (Trin. Coll. Coll.).

CAMPANULARIA. Section α. (*Laomedea* of Lamouroux.)

flexuosa (Hincks). Very abundant on *Fucus nodosus* between tide-marks. Wyville Thomson.

Loveni (Allman). Carrickfergus, on weeds and wood close to low-water mark; Monkstown, near Cork, on the pier. W. T.

longissima (Pallas). Portmarnock (Trin. Coll. Coll.). [Confounded with *dichotoma*, until distinguished by Mr. Alder. Catal. of Northumberland and Durham Zoophytes.]

lacerata (Johnston). North of Ireland, Prof. W. Thomson.

angulata (Hincks). Youghal (Trin. Coll. Coll.). At the Leeds

Meeting of the British Association, in 1858, I described this species, which I had obtained on *Zostera marina* in the Isle of Man. On examining the collection of Zoophytes belonging to the Museum of Trinity College, I have detected characteristic specimens of it, which were obtained by Miss Ball, I presume, at Youghal in 1836. They are referred to *L. gelatinosa*, and are also parasitic on the *Zostera*.

Note.—Professor W. Thomson has included in his "List of North of Ireland Hydroida" (B. D. Rep. for 1857) the *L. Flemingii* of Milne-Edwards. But this is not a true species. Fleming has erroneously described the *L. gelatinosa* of Pallas (Edinburgh Phil. Journ., vol. ii.) as having cells with an even rim (the very delicate crenations having escaped his observation), and on this false diagnosis Milne-Edwards has founded his *L. Flemingii*.

CAMPANULARIA. Section *β*, *unbranched*. (*Campanularia* of Johnston.)

Johnstoni (Alder). Dublin (Trin. Coll. Coll.). North (Wyville Thomson).

C. Hincksii (Alder). North, in deep water, common (W. Thomson).

Note.—Mr. Thompson has included in his Catalogue the *C. volubilis* of Lamouroux. At the time when his observations were made, the species of *Campanulariadæ* had been very imperfectly investigated, and several very distinct forms were confounded under the Linnean name *volubilis*. Mr. Alder, in his Northumberland Catalogue, has retained this designation for the "*small climbing coralline, with bell-shaped cups*," of Ellis—a deep-water form, with *twisted*, not annulated, stem and pedicles, blunt and shallow marginal denticles, and smooth ovi-capsules. He has assigned the name *Johnstoni* to the *volubilis* of the "British Zoophytes."

The figure of *volubilis* which is given by Solander, and which is copied by Lamouroux ("Exposition Methodique"), is, no doubt, a representation of the branched variety of *C. Johnstoni*, but the *description* is evidently founded on specimens of *both* forms.

It is impossible to say which species Mr. Thompson may have had before him. The true *volubilis*, however, has been noticed in the north by Prof. W. Thomson.

RETICULARIA (Wyville Thomson).

serpens (Hassall). Common on *Sert. abietina* (Trin. Coll. Coll.).

COPPINIA

arcta (Dalyell). (Trin. Coll. Coll.) North, on *Plum. falcata* (W. Thomson).

In the Appendix to the "Natural History of Ireland" the editor has inserted two new species, which I have described in the "Annals of Natural History," vol. xi.—*Campan. parvula* and *C. caliculata*. Prof. Allman has since obtained the latter in rock-pools, Courtmasherry Harbour, and has given an interesting account of the Gonophores (which I had not seen) in the "Proceed. Roy. Soc. of Edin. for the Session 1857–8."

The re-discovery of *C. parvula* is a desideratum, as the only specimen hitherto found—a very fine one, spreading over the surface of a Nitophyllum from the north of Ireland, was accidentally lost.

Class.—POLYZOA.

Order.—INFUNDIBULATA.

Sub-Order.—CHEILOSTOMATA.

BUGULA (Oken).

turbinata (Alder). Malahide (Trin. Coll. Coll.).

This form, which had been confounded with the *Bugula avicularia*, was discriminated by Mr. Alder, who has given a description and figures of it in the "Microscop. Journal," vol. v., p. 174, pl. 17, figs. 1–4.

fastigiata (Fab.). Clontarf (Trin. Coll. Coll.). Separated from the *B. plumosa* (Johnston) by Mr. Alder. "Northumb. Catal.," p. 59.

BEANIA

mirabilis (Johnst.) Antrim, in a valve of *Pectunculus* from deep water.

MEMBRANIPORA

Pouilletii (Audouin). Antrim, Belfast Dredging Report for 1858; List of Polyzoa, by Rev. T. Hincks.

spinifera (Alder). Ditto.

coriacea (Busk's Catal.). Ditto.

solidula, n. sp. (Alder and Hincks). Ditto.

imbellis, n. sp. (Hincks). Ditto. Recorded as *M. simplex* in the "B. D. R." for 1858.

Rosselii. Antrim (amongst Mr. Hyndman's dredgings, T. H.).

Lacroixii (Busk's Catal.; *Flustra distans* of Hassall). Kingstown Harbour. Hassall. Annals, Nat. Hist., vii., p. 369.

Dr. Johnston's figure (pl. 57, fig. 11) of the *Flustra distans* very fairly represents *M. Lacroixii*, as developed in sheltered situations. The cells are then *completely surrounded* by very delicate spines, which bend inwards. Mr. Busk's description, "*occasionally a marginal spine on each side above*," does not apply to the species in its perfect state.

LEPRALIA

reticulata. Antrim, B. D. R., 1857. List of Polyzoa, Hincks.

fissa. Ditto.

annulata. Ditto.

pertusa. Ditto.

Landsborovii. Ditto, 1858.

Woodiana (Busk, Polyzoa of the Crag). Ditto.

eximia, n. sp. (Hincks). Ditto.

alba, n. sp. (Hincks). Antrim.

discoidea (Busk). Antrim.

CELLEPORA

armata, n. sp. (Hincks). Antrim, B. D. R. 1858.

tubigera (Busk). On stems of Zoophyte, &c. (Trin. Coll. Coll.).

avicularis n. sp. (Hincks), (Trin. Coll. Coll.)

Note.—Hippothoa sica (Couch). Mr. Thompson has recorded this (supposed) species as found in Belfast Bay; there is little doubt, however, that it is not a distinct form at all, but only an injured or immature state of one of the *Æteas* (Anguinaria). In this genus the creeping fibre swells out into clavate expansions, from which the cells spring, and when the latter are absent it bears the closest resemblance to a Hippothoa. I believe that Mr. Couch's *H. sica* was founded on specimens of *Ætea recta (mihi)*, in which the cells were partially developed or had been broken off, a small tubular portion only remaining.* This species I have obtained abundantly in the Isle of Man, and it may be expected to occur on the Irish coasts.

* I have found *Ætea recta* in this condition on Pinnas from the coast of Cornwall, the scene of Mr. Couch's researches.

Sub-Order.—Cyclostomata.

Alecto

incurvata, n. sp. (Hincks). Antrim, on stones from deep water. B. D. R. 1858, List of Polyzoa (Hincks), where it is recorded as a *Tubulipora*.

Sub-Order.—Ctenostomata.

Farrella

dilatata, n. sp. (Hincks). [*Avenella dilatata (mihi)*. B. D. Rep. for 1858.] Antrim, on shell.

Order.—HIPPOCREPIA.

Lophopus

crystallinus. Pond in Zoological Gardens, Dublin. Allman, Monograph on the Fresh-water Polyzoa, 1856.

Plumatella

elegans (Allman). Mill-pond, Bandon, county of Cork. Allman, Monograph, &c.

Descriptions of New Polyzoa.

Fam.—Membraniporidæ.

Genus, *Membranipora.*

I. *Membranipora imbellis, n. sp.* (Hincks). Plate III., Fig. 1.

Cells ovate, distinct, broad below, with a membranous covering, no calcareous expansion; margin raised, much thickened, and beaded; ovicell very prominent, frosted, with a rib or raised edging round the front; no spines or avicularia.

The examination of a large number of specimens from various localities, exhibiting a striking uniformity of character, has convinced me that this form should be accounted a species, and that it is not a mere variety of *M. Flemingii*. The cells are larger, less crowded, and more distinct than in the last-named species, and the covering is altogether membranous; the rim is raised, and adorned with a beading, the inner edge slightly crenulate; the lower margin is wider than the rest; the ovicell is prominent, with a rib, or raised line, which forms a border round the front of it; the enclosed area is frosted. I have never detected, even in the youngest and freshest specimens, any trace of spines or avicularia. The polyzoary is generally dull and opaque, and coarse

in texture. The size and distinctness of the cells, the absence of the calcareous expansion, the shape of the ovicell, and the want of spines and avicularian appendages, are constant characters which separate this species from *M. Flemingii*.

Common on shells, &c. Coast of Antrim (Mr. Hyndman).

II. *Membranipora solidula, nov. sp.* (Alder and Hincks).

Cells oval, with membranous covering, opaque, and rather solid; margin delicately beaded, set round with many spines; ovicell —— ?

The cells of this species are of an oval shape, very slightly produced above. The margin, which is scarcely raised, is adorned with a very delicate and pretty beading. The covering of the cell is altogether membranous, and lies very much on a level with the margin, so that the polyzoary presents a very flat surface. Commonly, four spines are present at the upper end of the cell, but in some cases the margin is armed with them throughout. The texture is peculiar, and the polyzoary has a dull and somewhat waxy appearance.

Antrim, on shells.

Genus. *Lepralia.*

I. *Lepralia eximia, n. sp.* (Hincks). Plate III., Figs. 3, 3*a*.

Cells large, ovate, distinct, granular, punctured round the margin; mouth subquadrate, with a raised peristome, rising into a point at each side, a broad, rounded denticle within the lower margin; ovicell globose, prominent, punctured.

This fine species, which grows in irregular lobulate patches, has large and well-defined cells, granular, and with a single row of punctures round the margin; they are disposed in regular lines. The orifice, which is rudely quadrate, has a raised peristome, which rises at each side into a point, and within the lower margin there is a single broad and rounded denticle. The ovicell is globular and thickly punctured. My specimens exhibit neither spines nor avicularia.

Dredged by Mr. Hyndman off the coast of Antrim.

II. *Lepralia alba, n. sp.* (Hincks). Plate III., Fig. 2, 2*a*.

Cells subovate, broad, somewhat depressed, granular; mouth rounded above, lower margin straight, with a central notch; an avicularium on each side, about half way down the cell, mandible acute, pointing upward;

ovicell small, depressed, closely united to the cell above it, surface finely granular.

On shell, coast of Antrim.

III. *L. disciformis, n. sp.* (Hincks).* Plate III., Fig. 4, 4*a*.

Cells ovate, punctured, ranged in lines, which radiate from a central depression; mouth small, arched above, lower margin straight, with a notch in the centre, peristome raised; 4 to 6 spines round the upper margin; below the mouth, and a little to one side, a mammillary prominence, bearing on the top of it a minute avicularium, mandible pointing downwards; ovicell recumbent, silvery, thickly punctured, its sides prolonged so as to surround the mouth.

In this curious species, which grows in rudely sub-circular patches, the cells are regularly rowed, and radiate from a depression in the centre of the polyzoary. The sides of the ovicell form a wall round the mouth.

On shells, coast of Antrim.

IV. *Lepralia Woodiana* (Busk).

This species has been lately described and figured by Mr. Busk in his "Monograph on the Polyzoa of the Crag," p. 42, pl. 7, figs. 7 and 8, and was only known as a *fossil* previous to its occurrence amongst Mr. Hyndman's Antrim dredgings. From this rich material I have obtained one or two specimens on shell, which correspond in all respects with Mr. Busk's figure. *L. Woodiana* must, therefore, take its place as a member of our recent Fauna.

Fossil.—Coralline Crag (Searles Wood).

Recent.—Coast of Antrim.

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* Since the above has been in type, I have learnt from Mr. Busk that the form here described is the same as his *L. discoidea*, figured in the "Microscopical Journal," Plates XXII. and XXVII. of the *Zoophytology*. These figures, however, do not fully represent the characters, and are superseded by the one which accompanies this paper, and which is also from Mr. Busk's hand. To complete the description, the following additions must be made:—*On one or both sides of the cell, when perfect, a peculiarly formed avicularium, with a very long dependent mandible. These are almost invariably wanting in the older cells. The small subcentral avicularium is also sometimes absent.*

The name *discoidea*, of course, has precedence, and has been inserted in the List of Species.

Fam.—CELLEPORIDÆ.

Gen. *Cellepora.*

I. *Cellepora armata, n. sp.* (Hincks). Plate III., Fig. 5.

Polyzoary adnate, spreading; cells smooth, sub-erect (except towards the margin), ventricose, distinct, orifice orbicular, slightly produced below; peristome thin and raised; a stout rostrum in front, with an avicularium at one side, immediately below the apex, mandible acute, and pointing upward; large spoon-shaped avicularia distributed over the polyzoary, in the intercellular spaces.

In this species the avicularium is placed at the top of the rostrum, looking to one side. The broad triangular mandible points upward. The rostrum is much stouter and more obtuse than in *C. pumicosa.*

Localities.—Coast of Antrim, on shell (Mr. Hyndman); Dogger Bank and coast of Devon (T. H.).

II. *C. avicularis, n. sp.* (Hincks).

A Cellepora occurs in considerable plenty on Irish zoophytes, &c., in the Trinity College Collection, which seems to be undescribed. The following are its characters:—

Polyzoary encrusting or spreading, variable in its mode of growth; cells ovate, ventricose, smooth, orifice orbicular, with a deep sinus in front, a short, conical rostrum below the mouth, with an avicularium, set obliquely, near the top of it, mandible acute; in fertile cells a process on each side just below the ovicell, and attached to it, bearing an (oval?) avicularium; ovicell prominent, with large punctures somewhat semicircularly disposed; spatulate avicularia thickly scattered amongst the cells.

Occasionally there occurs on the polyzoary a very stout, conical rostrum, bearing a large avicularium, with broad triangular mandible.

Ireland, encrusting stems of zoophyte, &c.

Sub-Order.—CYCLOSTOMATA.

Fam.—TUBULIPORIDÆ.

Gen. *Alecto.*

I. *A. incurvata, n. sp.* (Hincks). Pl. III., Fig. 6.

Polyzoarium adnate, linear, curved, tapering; cells biserial, alternate, bent towards the side, orifices opening out laterally; surface obscurely punctate.

Polyzoarium closely adnate, narrow, unbranched, more or less incurvate, attenuated towards the point of origin; the cells are biserial (except towards the base of the polyzoary, where they form a single row), and separated by a median line; they bend towards the sides, and project slightly beyond the polyzoary, the orifices opening out laterally.

On stones, coast of Antrim, deep water, not uncommon.

Sub-Order.—CTENOSTOMATA.

Fam.—Vesiculariadæ.

Gen. *Farrella.*

I. *F. dilatata, n. sp.* (Hincks). Pl. III., Fig. 7.

Cells tubulous, sessile, thick, of equal size throughout, opaque, springing from one extremity of a fusiform expansion of the fibre, which is closely adherent, and set round with a number of flattened spinous projections.

In this species the delicate creeping fibre swells out here and there into cell-like expansions, fusiform, adherent, and furnished round the edge with a variable number of flattened spinous processes. The cells spring from the larger end of these swellings. They are stout, sessile, and not contracted at the base, and of a dark horn colour when dried. The clavate and spinous expansions are analogous to the cell-bearing enlargements of the fibre in Ætea.

On shell, Antrim (Mr. Hyndman). Isle of Man (T. H.).

In the Dredging Report for 1858 I have recorded this species as *Avenella dilatata;* but the *Avenella* of Sir John Dalyell is a very doubtful genus, and I prefer, for the present, to refer it to *Farrella* as defined by Mr. Busk in the "Microscop. Journal," vol. iv., p. 93.

FRIDAY EVENING, JUNE 16, 1860.

PROFESSOR W. H. HARVEY, M. D., M. R. I. A., F. L. S., F. R. S., President, in the Chair.

THE Minutes of last Meeting were approved of, and signed by the President.

MR. W. BOOKEY BROWNRIGG read the following paper:—

OCCURRENCE OF TEREDO NORVEGICA AT TANKARDSTOWN, COUNTY WATERFORD.

BEING on a geological excursion last March along the coast of Waterford, in company with Mr. Theodore Cooke, we were induced to spend a day at Bonmahon, for the purpose of examining the copper mines of the district.

Being forced to take shelter from the rain, on one occasion, in the store-yard of the Mining Company of Ireland at Tankardstown, which is situated on the sea-shore, and close to Bonmahon, we chanced to notice several planks of timber, lying about, perforated in every direction by the ravages of the Teredo.

Upon inquiry, we learned that they had until a few days previously formed part of a wooden pier used for shipping the ores for Swansea, and which had been completely destroyed in about six years by these Molluscan pirates, although the greater part of it was covered by the tide only at high-water.

Through the kindly assistance of Mr. F. Bennet, one of the captains over the copper mines of the district, I succeeded in obtaining two of the planks for more particular examination; and they are now in the hands of my friend Dr. Carte, Director of the Royal Dublin Society's Museum. I found the Teredo to be the Norvegica of Linnæus, Forbes, Hanly, &c. The latter observes, in describing its habitats,—

"It must be regarded as one of our rarer shells, the greater number of collections being only provided with individuals taken from ships' timbers, and other foreign sources,—few, indeed, with specimens derived from piles of jetties, submerged trees, and other legitimately indigenous habitats."

So far as I have been able to learn, the Teredo NORVEGICA has been only *once* found on the coast of Ireland.

The instance to which I allude is that at Clonea, where Dr. Charles

Farran, of Malahide, in a letter, with which he has kindly favoured me, states that he found the pine of a submerged turf-bog full of them, having fortunately chanced to be on the coast when a very remarkable spring-tide occurred, which exposed the turf completely to view. I have also to thank Dr. Farran for the loan of the specimens which he obtained on that occasion, to exhibit to the Society this evening.

In addition, I feel bound to state, that though, in conformity with the views of Forbes and Hanly, I have represented the Norvegica which I found at Tankardstown as the SECOND instance of the species occurring on our Irish coasts, it really appears to me that these two instances are in no respect more indigenous than those found in drift-wood and wrecks of ships also on our shores, inasmuch as they are only naturalised foreigners.

APPENDIX.

CATALOGUE OF BOOKS IN THE LIBRARY,

RECEIVED SINCE FEBRUARY 19, 1860.

[Marked thus *, purchased; thus †, from the Authors; thus ‡, from Societies.]

Zoology.

†Ashworth, E. and T.: on the Propagation of Salmon.
†Bailey, J. W.: Notes on Microscopical Organisms.
Baikie, W. B.,: Historia Naturalis Oreadensis. Part 1.
Bonaparte, Charles-Lucien: Les travaux Zoologiques.
Constable on Butterflies. Vol. III.
Cuvier, G.: Lectures on Comparative Anatomy. Vols. I., II. From the late Dr. Ball.
†Donovan's Naturalist's Repository. Vols. I.–V. From Rev. A. R. Hogan, A. M. Dub. and Oxon.
†Duméril, A. M. C.: Classification des Insectes. Tomes i., ii. From the French Academy Transactions of.
Gosse, P. H., (F. R. S.): British Sea Anemones and Madrepores. Complete. From Dr. E. Perceval Wright.
*Johnston, Dr., Sir W. Sardine, Bart., and P. J. Selby, Esq.: Magazine of Zoology and Botany. Vols. i. ii.
Kirschbaum, C. L.; die Athysames, Arten der Gedendvon Wiesbaden.
Leeson, R. P.: Histoire Naturelle des Zoophytes. From J. Reay Greene, A. B.
Mayer, A. F. J. C.: Analectur für Vergleichende Anatomie. From Dr. Daniel.
Murray's Natural History of Insects. Vols. i., ii, bd.
Newman, E., F. L. S.: The Zoologist. Vols. xii., xiii., bd.; and xiv.
†Patterson, R.: Animals, how they are classified.
†Smith, F.: Catalogue of British fossorial Hymenoptera, Formicidæ, and Vespidæ.
Sprengel, W.: Abhandlungen uber Pflanzen-Thiere des Mitelmeers.
Tiedemann, F.: Zoologie. Vols. i. and ii. From J. Reay Greene, A.B.
Treviranus, G. R.: Ueber den inneru Bau der Arcahniden. Ersts Heft. From J. Reay Greene, A. B.
†Wall, W. S.: History of skeleton of New Sperm Whale.

Botany.

†Dickenson, J.: Flora of Liverpool.
†Harvey, W. H.: Marine Botany of Colony of Western Australia.
†Hazen, W.: Catalogue Hollandoise des Arbres et Plantes.
Linnœi, C.: Fauna Scevica. From J. Reay Greene, A. B.
†Moore, D.: Botanic Gardens, Glasnevin.
Raii Joaani: Catalogus Plantarum Angliæ.

Miscellaneous.

Dalton, John: Chemical Philosophy. Vols. i. and ii. From Manchester Lit. and Phil. Soc.

Dalton, John: Meteorological Observations and Essays. From Manchester Lit. and Phil. Soc.

Gastaldi, B., and Martius, Ch.: Essai sur les terrains superficiels de la vallée du Pô.

Horsfield, T.: Catalogue of Museum at the East India House. Mammalia, 1 vol. Birds, 2 vols., Lepidopterous Insects, 2 vols. From the Hon. the East India Company, through the author.

Humboldt, A., and Buch. Leopold: le Tableau Geologique du Tyrol Meridional.

Jameson, R.: System of Mineralogy. Vol. ...

Kœmpfer, E. de Beschryoing van Japan.

†Leidy, J.: Geological Sketch of Judith River deposits, and extinct vertebrata.

†Miller, Hugh: Fossiliferous deposits of Scotland.

Miller, Hugh: The Cruise of the Betsie. From W. B. Brownrigg, Science Sch., A. B.

†Mohn, H., og. Waage, P.: Omrids af Krystallografien med et Tillœg.

Phillips, W.: Mineralogy.

Purdy, John: Memoir to accompany New Chart of the Atlantic Ocean.

Stover, D. H: Leben des rilters Carl von Linné.

Report of Queen's Colleges, Ireland, 1858.

Report of Madras Exhibition, 1855.

Tables for the Registration of Periodic Phenomena. Printed by the British Association.

†Memoirs of Geological Survey of India. Vol. i., parts 1 and 3. Vol. ii., part 1. From the Survey, through the Director, Dr. Oldham. Also, Annual Report of the Director, 1858–9.

Cenni sul Museo civico di Milano.

Royal Dublin Society: (practical Science and Art). 1848–1855.

Periodicals and Proceedings of Societies.

BRITISH.

‡Geological Society of Dublin, Journal of. Vol. viii., parts 2 and 3.

‡Linnean Society of London, Journal of. Vol. iii., No. 12, and Supplement No. 2; vol. iv., Nos. 13 to 16, with 2 Supplements; vol. v., Nos. 17, 18.

‡Royal Dublin Society, Journal of. Vol. ii., parts 9 to 16; vol. iii., 17, 18, and 19.

‡Tyneside Naturalist's Club, Transactions of. Vol. iv., parts 2 and 3.

‡Royal Irish Academy, Proceedings of. Vol. vii., parts 8, 9, 10, and 11.

‡Royal Society of London, Proceedings of. Vol. ix., parts 33 and 34; vol. x., parts 35 to 40.

Dublin Natural History Society, Reports of. Nos. 1 to 3, from Dr. E. Perceval Wright.

‡Proceedings of, for 1859–60, and reprint of past Proceedings, in one vol. 8vo, 1860, pp. 130.

‡Zoological Society of London, Proceedings of. Part 28 (1859), January to March; March to June; June to December; parts 1 and 2 (1860), January to June.
‡Liverpool Literary and Philosophical Society. Vols. xiii. and xiv., 1860.
‡Manchester Literary and Philosophical Society, Memoirs of the. Vols. ix. to xv.; second series.
Proceedings of, for 1857–59, 1860, p. 1 to 252.
‡Natural History Review and Quarterly Journal of Science. Vols. i. to vii., from the editors.
Geological Society of London. 1811, 1817, 1822.

AMERICAN.

‡American Phil. Society. Vol. vi., Nos. 57 to 60; vol. vii., No. 61; and Transactions, Vol. xii., Part 2.
‡Boston Society of Natural Hist. Journal. Vol. vi., Nos. 1–4.
Proceedings of Vol. vi., (1856–59); vol. vii, (1–9).
‡Canadian Journal of Industry, Science, and Art. Vols. iv. (1859), vol vi., 25–29.
‡Canadian Naturalist and Geologist. Vol. iv. Vol. v., Nos. 1–4.
‡Philadelphia Academy of Natural Sciences. Journal. Vol. iv., Parts 1 and 3, new series; Proceedings, Vol. xi., 1859; Vol. xii. to p. 284.
Prodromus descriptiones Animalium Envertebratorum, in expeditione ad oceanum pacificum septentrionalem: W. Stimpson, partes 1–8.
‡Smithsonian Institute: Cat. of Dipt. of N. America, by Osten Sacken, 1858.
‡New York: Lyceum of Natural History. Annals, 1858, Nos. 8–13; 1859, Nos. 1–3.
‡Smithsonian Institute: Investigations, Chemical and Physiological, relative to certain American Vertebrata. By Dr. J. Jones.

CONTINENTAL.

Germany.

‡Notiser ur Salle-Kapets pro Fauna et Flora fennica: Forhandlingar, Helsinfors, 1848, 1852, 1857, 1859; through M. Nylander.
‡Verhandlungen des Zoologisch: Botanischen Verein in Wien. Vols. viii., 1858; ix., 1859.
‡Zeitschrift der Deutschen Geologischen gesellschraft. ix., 1–4; x., 1, 2, 4; xi., 1, 2, 3.
‡Jahrbücher des Vereins fur Naturkunde in Herzogthum Nassau. Vol. xiv., (1858).
‡Verhandlungen des Naturhistorischen Vereines der Preussischen Rheinlande und Westphalens, 1857, 1859.
Zeitschrift fur Allgemeine erdkunde, 1858.
‡Jahrbuch der Kaiserlich-Koneghichen Geologischen Reichsanstalt. Vol. viii., No. 1; vols. ix., x.
‡Sitzungsberichte des Kaisirlichen Akademie di Wissenschaften, Wien. Vols. xxx.–xxxix., (1860).

‡Correspondenz-Blatt des zoologisch-mineralogischen Vereines in Regensburg, 1858, 1859, 1860.
‡Abhandlungen des zoologisch-mineralogischen Vereines, 1849, and 1852.
‡Anleitung zu d. Magnetischen Beobachtungen von Kl Kreil-Wien, 1858.
‡Abhandlungen der Mathemat-Physikalischen classe der Koeniglich Bayerischen, Akademie der Wissenschaften, 1857, 1858.
‡Erinnerung von Mitglieder der math Phys. cls. der Akad. der Wissenschaften, 1859.
‡Abhandlungen Herausgegeben von der Senckenbergischen Naturforschenden gessellschaft Frankfort. Bnad. iii., lief. 1.
‡Jahres-Berischt der Schlehschen Gesellschaft für Vaterlandishe Kultur 1855–9.
‡Correspondenz-Blatt. des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens, 1855. Nos. 1 and 2.
‡Correspondenz-Blatt. des Naturforschenden Vereines zu Riga. 1855, 1856.
‡Register zu den Banden 21 bis 30. der Sitzungsberichte der mat. Naturwissenschaftenliche classe, der Kaiserlichen Akademie der Wissenschaften, iii., 1859.
‡Rede bei der Hundertjæhrigen stiftungsfeier der Königlichen Akademie de Wissenschaften, 1859.
‡Tageblatt. der 32 Versammlung deutscher Naturforscher und Arzte, 1856–1–8.
‡Sitzungsberichte der Königle Bayer Akademie der Wissenschaften-zu München, 1860. Heft 1 and 2.
‡Bulletin de l'Academie Royal des Sciences de Belgique, 1854, No. 7; and 1859, 1–12.
‡Annuaire, 1860.

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‡Bulletin de l'Académie Impériale des Sciences de St. Petersbourg. Tome i., 1–17.
‡Bulletin de la Société Imperiàle des Naturalistes de Moscou. 1859, 2–4; 1860, 1.
‡Nouveaux Memoires de la même. Tome xii., 1860, xiii., liv. 1.

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‡Wikströms Ars-Berättelse om Botaniska Arbeten och Upptäckter, 1852.
‡Kongliga Svenska Fregatten Eugenies Resa Omkring Jorden. C. A. Virgin, 1851–53, iii. Imperfect.
‡Botaniska Notiser för ar 1857, Nos. 7–12; 1858, 1–10 (wanting 1857, 5 and 6).
‡Nyt Magazin för Naturvidenskaberne. Christiania, 1856, 1859.
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‡Kongliga Svenska Vetenskaps-akademiens Handlingar. 1857.

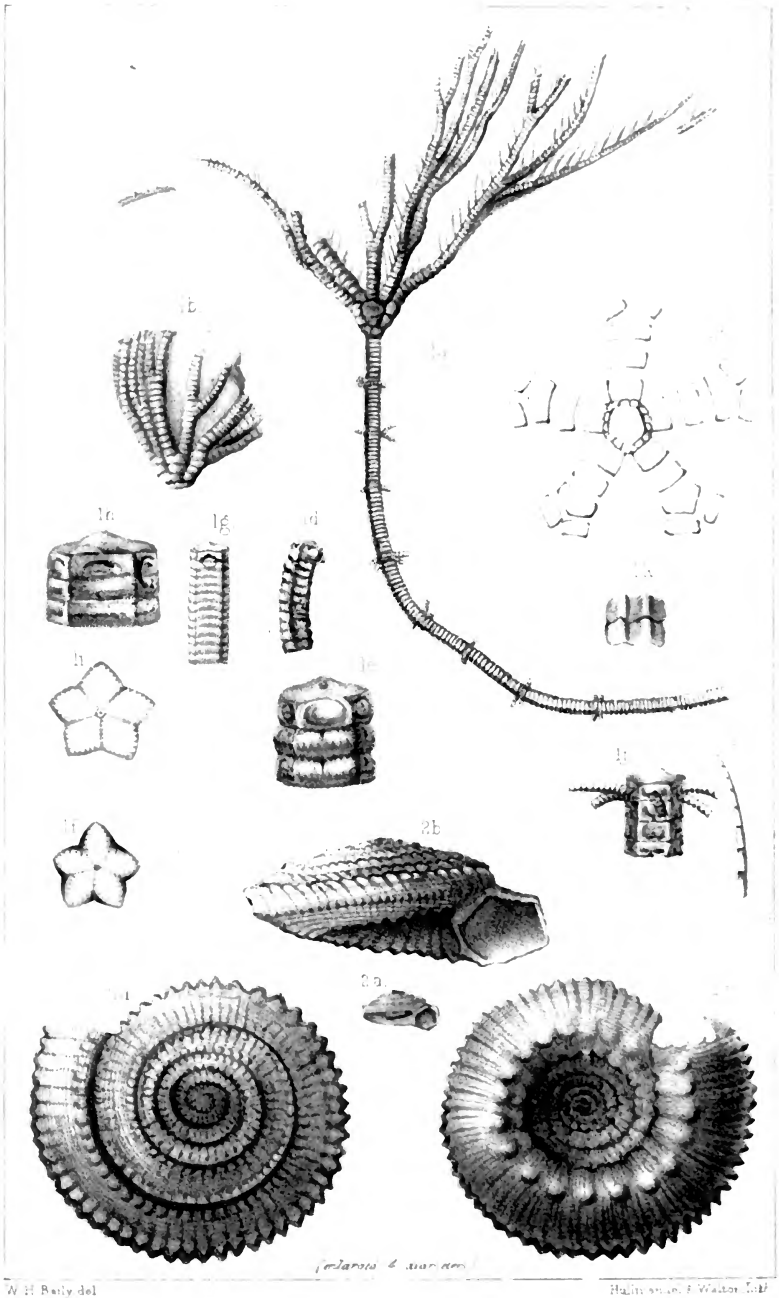


Fig 1 Pentacrinus Fisheri *Forbes*.
2. Solarium Bingham. *Baily*


NATURAL HISTORY.

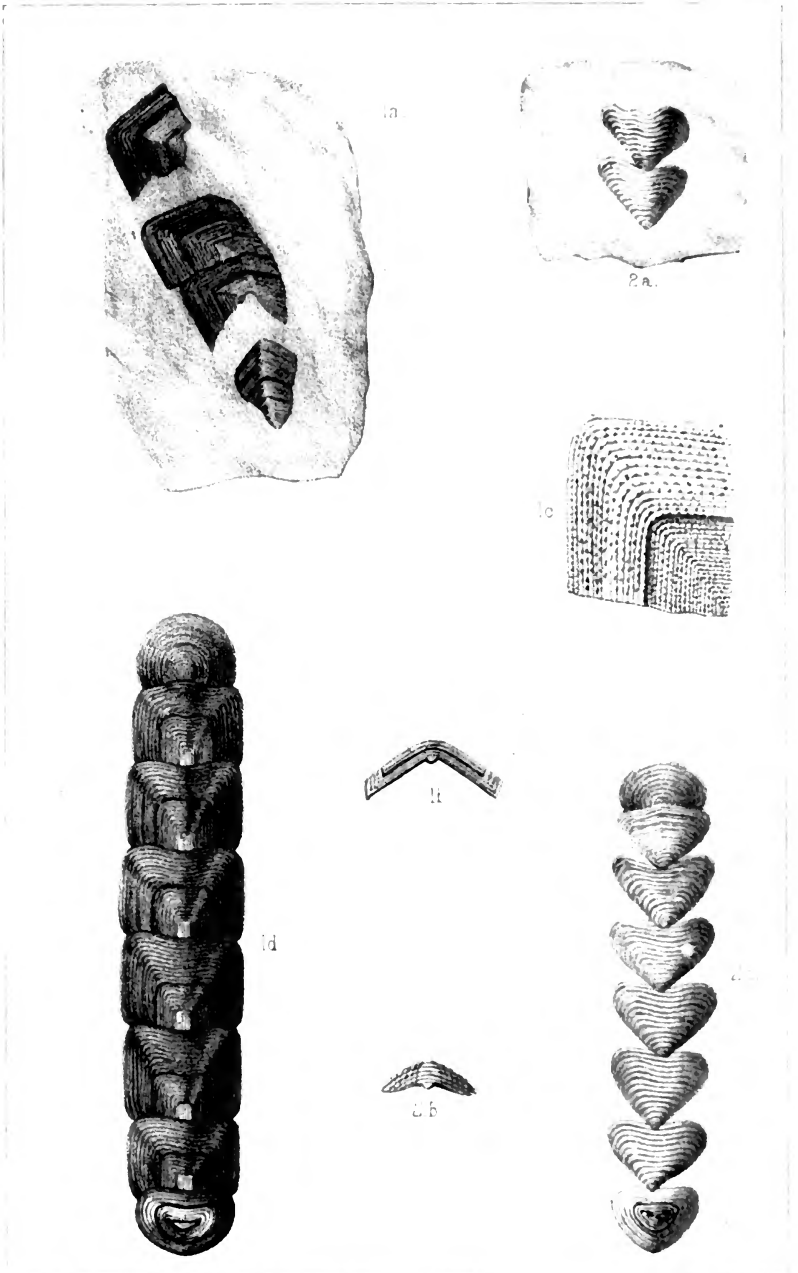
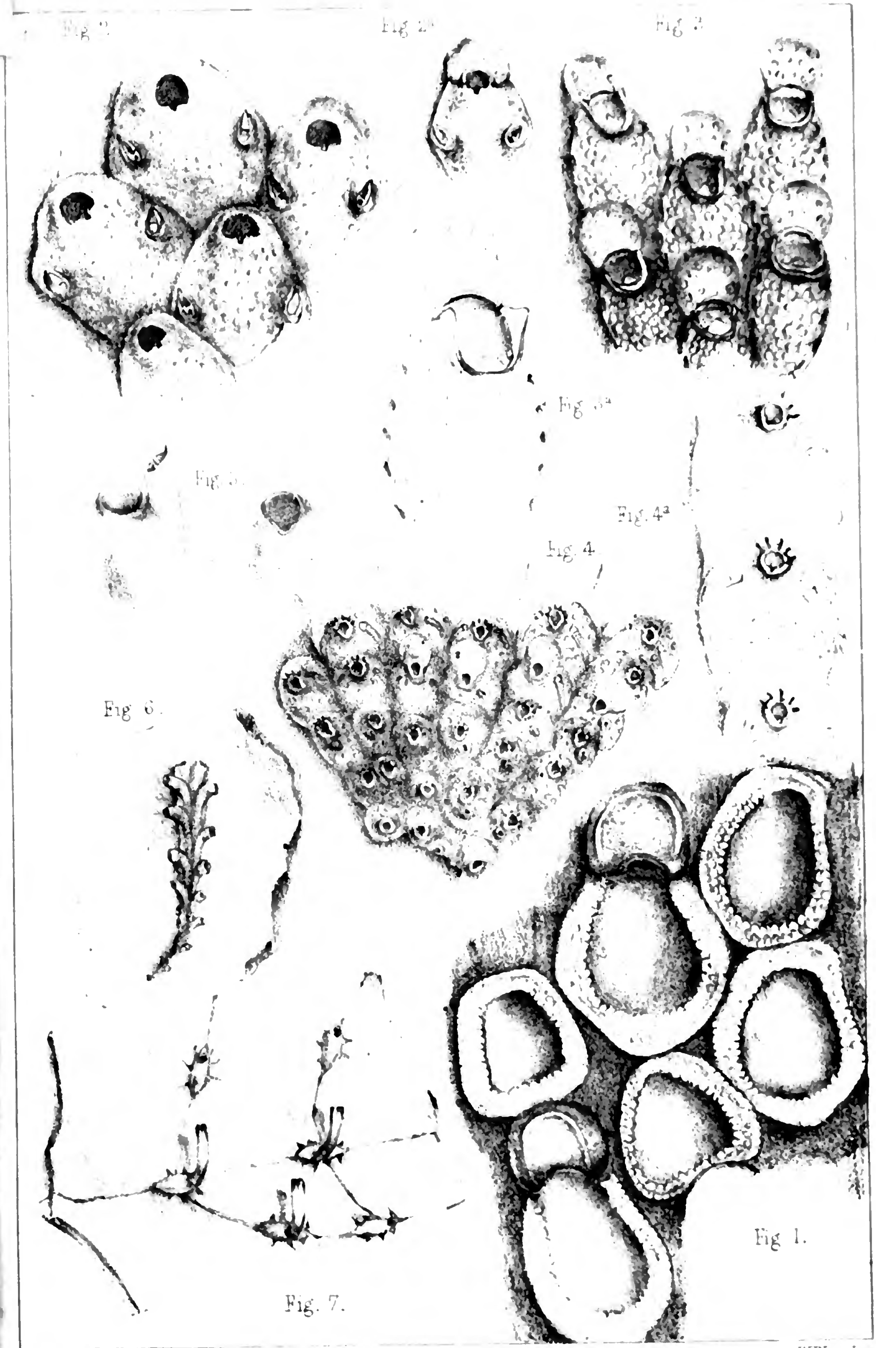


Fig 1 Chiton Grayanus *de Kon*
„ 2 „ Wrightianus.



T. Hincks & G B del.

W. West. Imp.