FIRST REPORT

OF THE

EAST KENT NATURAL HISTORY SOCIETY

ADOPTED AT

A Meeting held [illegible]

Canterbury:

PRINTED BY [illegible]WARD, KENTISH GAZETTE OFFICE.

1859.

The light of other days

George Dowker

George Abbott MRCS
Tunbridge Wells
1899.

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OFFICERS FOR 1859.

PRESIDENT:

SIR WALTER JAMES, Bart.

VICE-PRESIDENTS:

MATTHEW BELL, Esq.
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ALDERMAN J. BRENT.
G. HOFFMAN, Esq.

TREASURER:

E. F. S. READER, Esq., Sandwich.

HON. GEN. SECRETARY:

G. DOWKER, Esq., Stourmouth House, Stourmouth.

COMMITTEE:

REV. H. L. JENNER, Preston.
DR. PITTOCK, Margate.
MR. J. T. HILLIER, Ramsgate.
MR. GEORGE RIGDEN, Canterbury.
MR. A. B. ANDREWS, Ditto.
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MR. E. TUCKER, Grove, Margate.

LOCAL SECRETARIES AT PRESENT APPOINTED:

Isle of Thanet	J. T. HILLIER, Esq.,
Sittingbourne	Dr. J. GRAYLING,
Canterbury	Rev. B. S. MALDEN.
Dover	EDW. KNOCKER, Esq.,
Deal and Sandwich	E. F. S. READER, Esq.
Herne Bay	CAPT. BOWDEN, R.N.
Folkestone and Hythe ..	
Ashford	
Faversham	

East Kent Natural History Society.

———:o:———

CORRECT LIST OF MEMBERS.

April, 1859.

Addley, Mr. J.	Bredland, Sturry.
Andrews, Alfred B., Esq.	Westgate, Canterbury.
Andrews, T., Esq.	St. George's-terrace, Canterbury.
Astley, E. F., Esq., M.D.	Marine Parade, Dover.
Austen, B., Esq., jun.	Guildford Lawn, Ramsgate.
Banks, Edward, Esq.	Shoulden, Deal.
Baskerville, Miss	Eddington, near Herne Bay.
Beard, Mr. F.	Horton Chapel, Canterbury.
Bentley, Mr. D.	High-street, Margate.
Bentley, Mr. T.	High-street, Margate.
Bell, Matthew, Esq.	Bourne Park, near Canterbury.
Blake, George, Esq.	Northumberland House, Margate.
Bland, William, Esq.	Hartlip, Sittingbourne.
Brent, Alderman J.	Canterbury.
Bridges, Sir Brook Wm., M.P.	Goodnestone Park.
Brooke, W., Esq.	Cecil-square, Margate.
Bottle, Mr. A.	Townwall-street, Dover.
Bowden, Captain	Hanover-square, Herne Bay.
Bowden, Mrs.	
Burton, Carr, Esq.	Chapel Hill Lodge, Thanet.
Burton, Lady	Sacket's Hill, Thanet.
Bolton, W., Esq.	Sturry.
Canterbury, Very Rev. the Dean of	Deanery, Canterbury.
Caught, William, Mr.	Cavendish-street, Ramsgate.

Clements, Mr. Henry	High-street, Canterbury.
Cotton, Henry, Esq.	Dent de Lion, near Margate.
Cox, Captain C. J.	Fordwich House, Fordwich.
Cox, Mrs. C. J.	
Coxhead, Mr.	1, Elgar-place, Ramsgate.
Crofton, A., Esq.	St. Lawrence, Thanet.
Crookes, J. F., Esq.	Harewell, Faversham.
Chaffey, Mr.	Doddington, Faversham.
Cates, Miss	Garlinge, Thanet.
Davis, Mr. G. T.	Canterbury.
Dean, Mr. Henry Maxted	Canterbury.
Dentry, Mr. John	Union Crescent, Margate.
Delmar, Rev. W. B.	Elmstone Rectory.
Dombrain, Rev. H.	Deal
Dowker, George, Esq.	Stourmouth House, near Wingham.
Dowker, Mrs.	
Drew, John Henry, Esq.	Biggin-street, Dover.
Drew, Mrs.	
Drury, Mr.	Canterbury.
Diggle, J., Esq.	Laurestone-place, Dover.
Edwards, James B., Esq.	Deal.
Elgar, James, Esq.	Wingham Green.
Elliott, James, Esq.	Dymchurch.
Evans, William, Esq.	Marine Terrace, Herne Bay.
Flashman, Mr. G.	Market Place, Dover.
Foss, Edward, Esq.	Churchill House, Folkestone Road, Dover.
Foss, Mrs.	Churchill House, Folkestone Road, Dover.
Furley, George, Esq.	Barton Place, Canterbury.
Finnis, Steriker, Esq.	Biggin-street, Dover.
Giraud, F. F., Esq.	Faversham.
Ginder, Mr. Appleyard	Canterbury.
Glenny, Miss	Herne Bay.

Godfrey, Ingram, Esq.	Ash.
Green, Mrs. James	St. Margaret's-street, Canterbury.
Grayling, Dr. J.	Sittingbourne.
Grayling, Mrs.	Canterbury
Hammond, Rev. E. D.	Northbourne Rectory.
Hammond, Wm. Oxenden, Esq.	St. Alban's Court, Wingham.
Hannam, C. W., Esq.	Northbourne Court.
Hannam, George, Esq.	Bromston House, Thanet.
Higgins, R. G., Esq.	Hawley Square, Margate.
Hillier, J. T., Esq.	High Street, Ramsgate.
Hillier, Dr.	High Street, Sandwich.
Hilton, Captain T.	Nackington House, Canterbury.
Hoare, W. P., Esq.	Faversham.
Hoffman, George, Esq.	Union Crescent, Margate.
Hoffman, Mrs. G.	
Horsnail, Mr.	St. George's, Canterbury.
Hunter, W. Frith, Esq.	Cecil Street, Margate.
Hills, Mr. E.	Castle-street, Dover.
Howis, Mrs.	Wincheap, Canterbury.
Hutchesson, Rev. H. J.	Palace-street, Canterbury.
James, Sir Walter	Betshanger.
Jenner, Rev. H. L.	Preston.
Keble, Mr.	High Street, Margate.
Kenrick, Miss	Stone House, Canterbury.
Kingsford, Rev. Brenchley	Bishopsbourne.
Kingsford, Henry, Esq.	Littlebourne.
Kingsford, Mrs.	
Knocker, Edward, Esq.	Castle Hill, Dover.
Londesborough, Lord	Charlton Terrace, London.
Ladd, Mr. George Wm.	Burgate Street, Canterbury.
Lake, Robert, Esq.	Milton, Canterbury.
Lambert, Captain	Canterbury.
Linford, Mr. J., Jun.	Canterbury.

Light, Rev. W. E.	Marine Parade, Dover.
Mosse, Rev. S. Tenison	Vicarage, Buckland, Dover.
Mackie, Lewis, Esq.	Sittingbourne.
Mackeson, H. B., Esq.	High-street, Hythe.
Masters, Mr. Frank	Canterbury.
Mason, Mrs. Charles	High-street, Canterbury.
Malden, Rev. B. S.	St. George's Rectory, Canterbury.
Mead, Charles, Esq.	Fordwich.
Moody, Harry, Esq.	Chartham.
Moore, Rev. T.	Cecil Street, Margate.
Mummery, Mr. P.	Strond Street, Dover.
Munn, Major Wm. Augustus	Throwley, Faversham
Munn, Mrs.	
Marston, Rev. C. D.	Christ Church Parsonage, Dover.
Martin, J., Esq.	Chilham.
Moxon, W., Esq.	Brook House, Dover.
Neame, Mrs. Alfred	King's Bridge, Canterbury.
Newton, Miss Amelia	Clarence House, Herne Bay.
Newton, Miss Annie	Clarence House, Herne Bay.
Plummer, Stephen, Jun., Esq.	Canterbury.
Perceval, John, Esq.	High-street, Herne Bay.
Perceval, Miss	High-street, Herne Bay.
Piddock, Mr. George	Westbere.
Philpott, William, Esq.	New Road, Canterbury.
Pittock, Dr. G. M.	Crescent Place, Margate.
Price, Dr. William	Northumberland Place, Margate.
Prior, Miss	Hawley Square, Margate.
Puckle, Rev.	St. Martin's Hill, Dover.
Payn, W. H., Esq.	St. Martin's Hill, Dover.
Perkins, Mrs.	Victoria Terrace, Canterbury.
Rammell, Thomas, Esq.	Sturry Court.
Reader, E. F. Stratton, Esq.	Market Place, Sandwich.
Rees, Rowland, Esq.	Sutrana Villa, Folkestone Road, Dover.

Reid, James, Esq.	Canterbury.
Rice, Rev. J. M.	Dane Court.
Rigden, George, Esq.	Burgate-street, Canterbury.
Robinson, Mrs.	Hawley Square, Margate.
Rouse, Mr. Thomas	Buckland, Dover.
Standring, Esq.	Hawley-street, Margate.
Sankey, Robert, Esq.	Canterbury.
Sankey, F. H., Esq.	Wingham.
Sankey, Mrs. F. H.	
Sankey, Miss	Wingham.
Sankey, Mrs. William	1, Camden Crescent, Dover.
Sankey, H. T., Esq.	Canterbury.
Scott, Rev. F. F.	Sibertswould
Sheppard, J. B., Esq.	Medical Hall, Canterbury.
Sherriff, Francis, Esq.	Hawks Lane, Canterbury.
Sillery, R., Esq., M.D.	Charlton Lodge, Dover.
Slater, Frederick, Esq.	Kenfield, Petham.
Slater, Mrs. F.	
Smithett, R., Esq.	Hengrove, Thanet.
Smithett, Mrs.	Hengrove, Thanet.
Smithett, Miss	Hengrove, Thanet.
Soper, Mr.	Churchfield House, Margate.
Stead, T. F., Esq.	High-street, Ramsgate.
Stein, Charles, Esq.	National Provincial Bank, Dover.
Stilwell, James, Esq.	Marine Place, Dover.
Sillery, Esq., M.D.	Charlton Lodge, Dover.
Spencer, Peter, Rev.	Temple, Ewell, near Dover.
Tainch, E. C., Esq.	Addington Square, Margate.
Taylor, Mrs.	North Street, Herne Bay.
Thomson, R. E., Esq.	Kenfield, Petham.
Thompson, G. T., Esq.	Camden Crescent, Dover.
Thornton, W. H., Esq.	Hawley-street, Margate.
Tucker, Mr. E.	2, Grove, Margate.
Walter, O. C., Esq.	Broadstairs, Thanet.

Wharton, Mrs.	The Rectory, Sturry.
Wharton, C., Esq.	Kemsdale, Boughton.
Wheeler, Rev. R. T.	Minster
Wheeler, Mrs. R. T.	
White, Rev.	Dover.
Wightwick, T. N., Esq.	Dane John House, Canterbury.
Willis, Mrs.	Shepherdswell, near Dover.
Wilson, Mrs.	3, Caroline-square, Margate.
Wilson, Rev. Charles Carus	Eastry.
Willy, A., Esq.	Cecil-square, Margate.
Walker, Mrs.	Hawk's Lane.
Way, E. T., Esq.	South Eastern Railway, Dover.
Wood, W., Esq.	Sydenham House, Sturry.

CORRESPONDING MEMBERS.

Bree, C. R., Esq.	Editor of the *Naturalist*, Stowmarket, Suffolk.
Stainton, H. B., Esq.	*Weekly Intelligencer*, Lewisham.
Waterhouse, —, Esq.	British Museum.
Newman, E.. Esq.	9, Devonshire-street, Bishopsgate, N.E.

ASSOCIATES.

Baker, Mr.	Cattle Market Place, Sandwich.
Coppen, Mr. E.	Sibertswould.
Ellse, Mr. R.	Burgate Lane, Canterbury.
Kennett, Mr. W.	Fordwich.
Gordon, Mr.	Dover Museum.
Keeler, Mr. R.	Elham, near Folkestone.

Prospectus of the Committee.

The committee, in inviting the co-operation and support of all who reside in this division of the county, and who are interested in or have a taste for Natural History in any of its branches, beg to draw their attention to the objects for which the Society has been established.

The Natural History of every county or part of a county necessarily bears some important relation to the country at large, and the science in general; that of Kent, from its geological characters, its geographical position, with its rivers and sea-girt shore, has a high reputation in this respect. The abundance and variety of its Fauna and Flora have long been recognised. To develop and encourage a more general and practical knowledge of these features of the district is a primary object of the Society. At the same time, it proposes to cultivate and apply a more extended and enlarged acquaintance with the general principles of the science, without which the study of local details is incomplete and comparatively unsatisfactory.

The love of Natural History is common to all grades of society, and its pursuit has ever had an influence for good upon its followers; the Society therefore aims to associate all classes in its roll of members. With this view a high subscription has been avoided, and it is hoped that the larger number who may thus be induced to

subscribe will maintain the finances of the Society in a satisfactory and effective condition.

The objects and advantages of the Society, with the mode in which they are to be carried out, may be further briefly stated thus—

1. To associate and assemble ladies and gentlemen, whether naturalists, or merely imbued with a taste for the pursuit, irrespective of the particular branch of the study they are interested in, for the purpose of mutual information, and the promotion of the science. This will be effected by periodical meetings held in the principal Towns in rota, by local meetings amongst members in convenient neighbourhood to each other, and by occasional excursions to collect specimens and investigate objects of interest.

2. To hold out inducements to the labouring classes by free membership and rewards to study the beautiful works of Creation.

3. To circulate Journals upon Natural History.

4. To collect specimens and distribute them through the different local museums.

5. To collect and diffuse by publication correct data of every interesting fact relating to Natural History that may occur in East Kent. By these means it is hoped that those who are engaged in the agricultural pursuits for which this county is justly celebrated, will more accurately ascertain and be enabled to remove some of the causes that injure and destroy produce.

Many similar Societies are flourishing in other counties, and it is confidently trusted that the success of the East Kent Natural History Society will not be less than that of any of them.

REPORT

FOR THE YEAR 1858.

—o—

YOUR Committee have great pleasure and satisfaction in presenting to your notice the first Report of the affairs and proceedings of the Society.

The Report of the Society, and its progress during this first year of its existence, may be summed up under the following heads :—

First, your Committee congratulate the Society on the steady increase of its Members, which now reach the number of 163.

Your Committee have endeavoured to carry out the objects of the Society, by holding Meetings at the various towns in the district, hereafter to be mentioned, which Meetings have been attended with great success.

They have further promoted the usefulness of the Society, by electing several Associates and Corresponding Members.

The circulation of journals connected with Natural History has been attended with partial success ; but owing to the large increase of its Members since the commencement of the society, the circulation has been much retarded. Your Committee would here urge on the

Members the necessity of carefully attending to the directions for book circulation, and facilitating it as much as possible by giving notice to the Secretary of any Book they would not wish to receive.

The following periodicals have been circulated by the Society:—The Naturalist, the Geologist, the Zoologist, the Phytologist, the Annals and Magazine of Natural History, the Quarterly Journal of the proceedings of the Linnæan Society, the Quarterly Journal of Microscopical Science, the Natural History Review.

From the Society possessing no Museum of its own, no progress has yet been made towards collecting specimens of Natural History; but your Committee hope that the trustees and public interested in our local museums will avail themselves of the aid of this Society in collecting desiderata for their respective Museums, and in arranging and classifying the objects, so as to render them not only interesting but instructive.

Your Committee hope that the labours of the Local Meetings may be more systematised, so that the Flora and Fauna of their respective neighbourhoods may be thoroughly explored.

The First General Meeting of the Society took place at the Guildhall Concert Room, at Canterbury, on Thursday, the 8th day of April, 1858, Major W. A. Munn in the chair; on which occasion Captain C. J. Cox, F.B.S., F.E.S., delivered the introductory address. An interesting collection of objects connected with Natural History was exhibited by Rev. F. F. Scott, Messrs. J. T. Hillier, J. Reid, Captain Cox, E. F. S. Reader, G. Dowker,

C. Bewsher, A. B. Andrews, W. Masters. At the close of the proceedings, Mr. W. Kennett, of Fordwich, was elected an Associate, he having exhibited a well-assorted case of Butterflies and Moths.

The Second General Meeting of the Society took place at Margate, on the 17th of June, G. Y. Hunter, Esq., the Mayor, in the chair. G. Hoffman, Esq., read a most interesting paper on Fungoid Growths, alluding in particular to that which attacked the vine, the Odium Tuckerii (named after their distinguished townsman), illustrated diagrams. Dr. G. M. Pittock read a paper on some observations he had made on the reproduction of some of the Marine Zoophytes, illustrated by diagrams and specimens. Mr. Tucker read a short paper on the Diatomacea found at Margate, as well as remarks on the Flora of Thanet, illustrated by diagrams of the Diatomacea and specimens of the Flora. There were exhibited at the Meeting many rare and beautiful Zoophytes from the aquaria of Messrs. Rowe. Pittock, Hillier, and Tucker; a collection of Moths and Butterflies from the Margate Museum; some rare Shells and Caterpillars by Captain Cox; and many other specimens of the Flora and Fauna of Thanet.

The Third General Meeting of the Society took place in a marquee erected on the Sandhills near Sandwich, under the presidency of the Rev. F. F. Scott. A paper was read by the Secretary, Mr. G. Dowker, on the peculiar natural features of the district where they assembled; and the Meeting then dispersed on a botanical ramble over the Sandhills, and re-assembled at a déjeuner in the

marquee. Mr. Baker, of Sandwich, was elected an Associate, for the valuable collection of Stuffed Birds he there exhibited. The thanks of the Society were voted to the Earl of Guilford, for his permission to assemble on his farm.

The Fourth General Meeting of the Society took place at Dover, on the 24th of August, on which occasion a most successful excursion to Cop-point, near Folkestone, was made the great feature of the day. A large party assembled, under the guidance of Mr. H. B. Mackeson, of Hythe, who gave a most interesting description of the geological features of the district. The meeting and dinner took place at the Maison Dieu, under the presidency of Sir Brook W. Bridges, Bart., M.P. Major W. A. Munn read a paper on the Honey Bee, giving the results of several of his original observations, and illustrated by several specimens of bees, with their comb and hives, &c. Mr. Roberts, of the Dover Collegium, read a paper on the Teredo Destructor; and the Rev. F. F. Scott a letter written by the late Mr. John Chaffey, of Doddington, describing a curious anecdote of the common wood Owl and domestic Cock.

In addition to these, Local Meetings of the Members in the vicinity of Margate and Canterbury have been held monthly in their respective Museum-rooms.

Lastly, your Committee would congratulate your Society on its present financial position.

Treasurer's Account, for the Year ending December 31st, 1858.

DR.	£.	s.	d.
Subscriptions Received	55	10	0
Ditto Unpaid	21	0	0
	76	10	0

CREDITOR.	£.	s.	d.
Advertisements	0	16	6
Use of Room at Meeting	1	10	0
Books of circulation	5	16	0
Stationery	0	17	0
Printing	2	17	8
Ballot Box and Balls	1	12	0
INCIDENTAL EXPENCES.			
James Reid	0	8	11
A. B. Andrews	0	12	0
J. T. Hillier	1	19	4
E. Knocker	0	16	6
Treasurer	1	0	0
Secretary	3	1	6
Assistant Secretary	5	0	0
Balance	43	2	7
	76	10	0

EAST KENT
NATURAL HISTORY SOCIETY.

TITLE AND OBJECTS OF THE SOCIETY.

The objects of the East Kent Natural History Society shall be the Collection and Diffusion of Practical and Theoretical Knowledge respecting Natural History, in all its Branches, both in relation to the particular District, and the General Science.

RULES AND REGULATIONS.

MEMBERSHIP.

1. The Society shall consist of Ordinary, Honorary, and Corresponding members, and of Associates.

2. Every candidate for admission into the Society, as an ordinary member, must be proposed in writing by two members, and the election shall be by ballot, taken at any Meeting of the Committee, or at a General Meeting—one black ball in five to exclude.

3. The Annual Subscription, to be paid by ordinary members, shall be Ten Shillings; the subscription shall become due on the 1st of January in each year, and shall

be paid in advance for the current year. Any member neglecting to pay his subscription, for three months after it is due, shall be applied to by the Secretary, and if the subscription remains unpaid for three months after such application, he shall cease to be a member of the Society; but without prejudice to the right of the Society to such subscription and arrears.

4. The Committee have power to admit, without ballot, on the nomination of two members, any Lady who shall be desirous of becoming an ordinary member, and her subscription shall be Five Shillings.

5. Any persons distinguished for their researches in Natural History, for their liberality to the Society, or for their connection with similar societies may, on the recommendation of the Committee, be elected honorary or corresponding members of this Society, provided they do not reside within the district: such honorary and corresponding members shall not be subjected to any of the expenses of the Society, and shall have no vote in its affairs.

6. In order to encourage the study of Natural History among individuals, of the class of mechanics, &c., residing in the district, the Committee shall have power to admit individuals of that class as associates, provided they shall first communicate some information or observation on Natural History, exhibit such specimens or present them to the Local Museums, as shall by their merits satisfy the Committee. Such associates shall enjoy the privileges of honorary members.

MANAGEMENT, AND BUSINESS MEETINGS.

7. The affairs of the Society shall be conducted by a Committee of Management, which shall consist of a President, Vice-Presidents, Treasurer, and an Honorary Secretary. and not less than six Members, who shall all be chosen at the Annual Meeting. Three Members of such Committee shall form a quorum. The Meetings shall be at least quarterly.

8. An Annual Meeting shall be held on the first Saturday in April in each year, at Canterbury, for the purpose of electing the officers for the current year, receiving the Annual Report of the Committee, and conducting the general affairs of the Society.

9. Special General Meetings may be summoned by the Committee, or by the Secretary, on the requisition (in writing) of any six Members of the Society, the specific purposes of the Meeting being stated in the notice, which shall be sent not less than one week before the time of such Meeting.

10. All questions discussed at the Meetings shall be decided by a majority of votes ; and if upon any question the votes shall be equal, the Chairman of the Meeting shall have the second or casting vote.

11. In the event of any vacancy occurring in the Officers or Committee, between the Annual Meetings, the same shall be filled up by the Committee.

12. In order to facilitate the objects of the Society, the Committee shall be empowered to appoint any Member Local Secretary for the town or district he may reside in. Such Local Secretary shall be ex officio a Member of the Committee.

SCIENTIFIC MEETINGS AND EXCURSIONS.

13. To promote the interest and usefulness of the Society, four or more subscribing Members of the Society, in conjunction with Local Secretary, may make arrangements for organizing and holding Local Meetings, under the sanction of the Central Committee; notice to be given of such Meetings at the General Meeting.

14. Ordinary periodical meetings of the Society for the purpose of reading papers, exhibiting specimens, etc., or the discussion of subjects connected therewith, shall be held in the principal towns of the district, in rota, at such times as the Committee shall appoint; ten days' notice of such meeting shall be sent to every member. Each member shall have the power of introducing a visitor to the meetings, on entering the name in a book to be kept for that purpose. Every donation of Ten Shillings, in addition to the subscription, shall entitle a member to introduce two additional visitors. Any of these ordinary periodical meetings, as the committee shall appoint, may be so arranged as to comprehend an excursion or excursions for the purpose of practically investigating the objects of interest in the district; every person to bear his own expenses at these excursions.

15. A minute of the proceedings of all meetings shall be entered by the secretary in a book kept for that purpose.

PUBLICATIONS.

16. The committee shall have power, with the sanction of the author, to publish any paper or communication read before the meeting, but the author shall have liberty to reserve his right of property therein.

COLLECTION OF SPECIMENS.

17. Until the Society has a depository for that purpose, the objects of Natural History presented to the Society shall be distributed, as the committee may direct, among the public Museums of the district.

CIRCULATION OF BOOKS AND FORMATION OF A LIBRARY.

18. At least one Periodical connected with Natural History shall be circulated amongst such members of the Society as desire to receive it, and after circulation shall be deposited, together with any books presented to the Society, or purchased from the surplus funds, in some place that shall be determined by the Committee under arrangements that shall make them available for reference to the members of the Society.

CANTERBURY:

PRINTED BY J. WARD, "KENTISH GAZETTE" OFFICE, HIGH-STREET.

REPORT

OF THE

PROCEEDINGS OF THE THIRD MEETING OF THE YEAR

OF THE

EAST KENT

Natural History Society,

HELD AT THE

TOWN HALL, HERNE BAY,

ON

August 9th, 1859.

———:o:———

SIR WALTER JAMES, BART., IN THE CHAIR.

———:o:———

(From the Kentish Gazette of the 16th August.)

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CANTERBURY:

PRINTED BY J. WARD, 31, HIGH STREET.

EAST KENT NATURAL HISTORY SOCIETY.

The third general meeting of this society for the present year took place on Tuesday at Herne Bay. The weather was the reverse of favourable, and yet, whether we regard the interest evinced in the proceedings or the numbers present, this must be pronounced the most successful meeting which the society has hitherto experienced. At each succeeding gathering the proceedings attract larger assemblages—a very healthy symptom, showing that the society not only fosters a taste for natural science, but is also extending that taste in quarters where previously it did not exist.

According to the programme on Tuesday, a dredging boat was to proceed from Whitstable to Reculver, calling at Herne Bay. The morning was, however, so rough, and the wind so unfavourable, that this part of the arrangement was abandoned. Fortunately a land excursion had been also organised, and about thirty ladies and gentlemen accordingly met at Reculver at 11 o'clock, and walked along the beach to Herne Bay.

Mr. Mackeson, who accompanied the party, kindly undertook some explanation of the geological sections ex-

hibited in the cliff. He stated that he had not particularly studied the London clay deposits, but that he borrowed his descriptions from the admirable paper of P. Prestwich's, in the Geological Journal. On descending the cliffe at Reculver we found it composed of an argilacious sand, having large tabulated blocks of some indurated portions of sand stone, projecting at the base of the cliff, and under these were found large quantities of brittle bivalve fossil shells—this is called the Thanet Sands. Passing along towards Herne Bay this strata gradually dips to the N. West, and at a point called Bishop Stone, or Old Haven Gap, two miles east of Herne Bay, the following section is met with:—1. Brown and yellow clay mixed with ochrous flint gravel. 2. London clay in beds of brown colour, containing numulites. 3. Thin irregular bed of green ferruginous clay with round black pebbles, 2 to 3 inch. 4. Very light yellow sands with tabular concreted masses of sandstone, underlaid by a mass of dark clay with very friable shells, are dispersed in patches. 5. Small flint pebbles with a very irregular series of ferruginous sandstone, full of casts of shells. Mr. Mackeson explained that we were in the London clay formation, called the eocene, which overlaid the chalk or cretaceous beds, and which formed a large basin, and it is supposed that the Paris, London, and Hampshire beds, formed originally one vast bed of a gulph (the shells contained in them partaking more or less of the character of shells found in such marine situations), and that the London bed had been separated from the others, by the up-heaving of the chalk which now intervenes. One characteristic of the London clay fossils is that of containing tropical fruits; the particular appearance of these in certain situations favours the belief that they were then deposited by some estuary. (The number of ~~tropical fruits~~ fossils found in these deposits exceeds one thousand). The London and Paris basins differ principally in the latter containing limestone, which is

absent in the former; thus London is a city of brick and tile, while Paris possesses stone buildings. Various specimens of fossil shells, wood, septaria, selenite, were picked up by the excursionists. The party taking this walk of the beach but few botanical specimens were found, and none worthy of note.

At the meeting were exhibited—by Captain Cox, a beautiful collection of moths and specimens, connected with entomogy. Mrs. Taylor, fossils from Herne Bay, land crab from Calcutta. Miss Denne, of Reculver, sent some interesting specimens of fossil wood from the chalk and Thanet sands, with other fossils. Mr. Cummings and Mr. Wetherel likewise exhibited some beautiful specimens. Mr. Dowker and Mr. J. Reid exhibited some microscopes with entomological preparations. Mr. Dowker exhibited a collection of fossils from the chalk and London clay.

At two o'clock the party (who now received numerous additions) reached Herne Bay, and took lunch in a room in the Town Hall.

At three the doors of the Town Hall itself were thrown open for the public meeting. The hall was speedily filled by a most respectable audience, probably not less than 500 persons being present. A number of beautiful drawings, of large size, decorated the platform. They were intended to illustrate the paper read to the meeting, and were executed by Mrs. Cox. Below the platform were arranged on tables a great variety of objects of natural history, collected chiefly at Herne Bay and the neighbourhood, many of them being of great interest.

Among the company present were Sir Walter James, Bart., Lady James and family, Major and Mrs. Munn, Capt. and Mrs. Cox, Rev. D. Butler and Mrs. Butler, Rev. H. L. Jenner, F. H. Sankey, Esq., Capt. Bowden, R.N., Mr. and the Misses Bowden, Geo. Dowker, Esq., J. Reid, Esq. and Mrs. Reid, H. B. Mackeson, Esq., A. Wetherel, Esq., Mr. and Mrs. C. White, S. Cooper, Esq., — Newton, Esq.,

Mr. W. Evans and family, C. Devon, Esq., Captain and Mrs. Connor, Rev. W. Blandford, Rev. — Dale, Dr. Appleton, Wm. Wacher, Esq., Col. Blaxland and family, Mr. Regg, Mr. Manning, Lieut. Coppin, Mr. Spicer, Miss Slarke, Mr. Frankland, Mr. Lake, Mr. E. Collard, Mr. Wicks, Mr. Ridout, Mr. George, Miss A. Newton, &c., &c.

Sir Walter James, president of the society, took the chair. In opening the proceedings he said that before introducing Captain Cox to the meeting, he would make a few remarks of a general character. And first he would state to the members how very grateful he felt for the honour they had conferred on him by electing him to the office of president for the year. (Cheers.) He felt that he was not a naturalist—that he was not entitled from his study of these subjects to hold the office which had been conferred on him. Their choice must, he thought, have been dictated by his general position, or some other circumstance of that kind. At the same time, he could assure the meeting that he was anxious to promote the study of natural history by any means in his power. (Cheers.) He was glad that the society had been originated with large and general views, such as were expressed in its title "The East Kent Natural History Society." In other neighbourhoods it was common to meet with societies having certain limited objects—floral societies, botanical societies, &c., but he had not met elsewhere with any society formed on so broad a basis as their own. (Hear, hear.) His own studies had not been of that strict character which would entitle him to speak with authority on scientific questions, but he would offer to those present one piece of advice as to the noble study which they desired to prosecute. The advice he referred to came from the most eminent naturalist of the day, with whom he (the president) had some slight acquaintance, and whom he had had the pleasure of meeting in society; he meant Professor Owen. It was this:—"Select, if you please, the particular branch of science which you wish to make your study, and at the same time

that you select this, if you wish to be a man of detail, if you wish to enter into the minutiæ, do not neglect general and large views." (Cheers.) Desultory pursuits alone would never make a man a naturalist, but they were invaluable when combined with knowledge of detail. (Hear.) Nothing in nature stood on a single prop. To confine ourselves to detail would lead to narrow views, and would therefore be unwise. The right course was to study a single branch of science as Captain Cox had done, and then endeavour to connect it with the whole broad scope of nature organic or inorganic. (Hear, hear.) Having said thus much he would call upon Captain Cox to address the meeting. (Cheers.)

Captain C. J. Cox then delivered his promised lecture on "The Metamorphoses of Insects as exemplified in the changes of the Moth and Butterfly." ~~He said~~ :—

If I were to ask of the society now present in the room this simple question, "Can you at all inform me whence come those destroying blights we meet with every spring, and which do so much damage to our gardens, to our orchards, to our plantations, and hedge rows, to our cereal grains, and esculent crops," I am afraid but very erroneous answers would be given to my appeal. It would be said they came from the air, or the wind brought them; or the hot, close, and cloudy atmosphere engendered them, and if I ventured upon a doubt as to the facts given me, I should be met with, "But my gardener (a man of observation) told me so, and therefore it must be true," or my neighbour farmer Giles, who lives on his own farm, says they are bred in the air, and farmer Giles goes to church and never tells a story, so I must believe him. Now, it will be my duty to endeavour to dispel these illusions, and I must begin by stating that the air has no more to do with engendering these insect pests than in bringing the barn door chicken from the egg or our domestic animals from their parents. The fact is, all life must spring from life—there is no such thing as spontaneous formation; all these various

minute creatures are known to science, they are all named, their various tribes are registered in our annals of Natural History, and when I tell you that amid the myriad little beings that hum through the air each year adds but little to our general knowledge, so energetic has been the pursuit, so accurate the observation, so extensive the research, you will no doubt feel great surprise, and still more that so much knowledge should have been collected and yet so little diffused among the general public.

I cannot picture or imagine to myself any one thing in creation more astounding or more wonderful (where all is truly marvellous and beautiful), than the progressive developments of insect life, or a subject that affords a more unmixed and pleasurable delight to the scientific student or passing gleaner.

Before, however, I enter into the subject of this day's paper, I think it right to mention that the chief object of our society is not so much to have rare and subtle points of vital existence and vital phenomena brought before its notice for discussion, but rather, looking to the general and popular features of our gatherings, to consider it as a stepping stone for beginners, receiving into its ranks the earliest aspirants for nature's knowledge, assisting them by simple and practical lessons, given under circumstances the most advantageous, and at times, like the present, the most agreeable. This, therefore, must be my apology for addressing you in a very elementary strain for the sake of those young naturalists, those youthful travellers along the intricate and ever varying, ever captivating path of God's most beautiful creation.

These immense swarms of destructive insects that seem to come into the world merely for our personal annoyance are the offsprings of insects of the past season; the eggs from which these creatures were hatched were laid by a careful instinct, as it is called, of the anxious parent during the previous year; and it is only those who have witnessed the solicitude displayed by many insects during this

act that the truth can be fully appreciated. Last year I witnessed a very interesting sight, the large Tortoishell (Vanessa Polychloros) was depositing her eggs upon a small branch of elm; before laying an egg she hovered for a short time over the spot, then stooped, laid her egg, and glided off, returning again and again for the same purpose. The sight was so interesting that I called to my family close by to come and see it. Before they arrived a sand martin, flying past, came so close to her as to frighten her away. Having waited a short time without again seeing her, I approached the branch and cut it off; just then the insect returned, and also my party had come to my call; we watched with deep interest the maternal solicitude of the poor insect. She no longer hovered with gently vibrating wing, but dashed about in a most excited state, seeking the spot where her little treasures had been deposited; having waited some time, I replaced the branch on the tree; she immediately returned to it with most apparent joy and deposited a fresh supply of eggs. When we consider that the parent dies almost immediately after laying her eggs, we are lost in wonder and amazement at the power instilled into these little beings that should lead them to seek those spots only where, when the genial warmth of the sun matures the eggs, and the young larvæ escape, they can at once find food that is suitable to their new state of existence. Caterpillars generally feed upon one kind of food, any other is injurious, and consequently they frequently die from starvation rather than feed upon that which is not suited to their species. In depositing the eggs frequently much care is bestowed to conceal them; they are laid in deep cracks, under the ledges of bark, or beneath the leaf, or those which have to seek their food at the roots of plants are deposited on the ground. These eggs are laid by means of an instrument called an ovipositor; it is a long flexible tube, apparently endowed with great sensitiveness. When the insect is observed to lay her eggs, in many cases this instrument is thrust out to a very great length; she then touches all around her as far as it will reach, passing

it into every small hole and crevice, and should the place suit her natural instinct each time it is thrust in an egg is deposited A very singular instance of this lately occurred to me. A pretty moth called the Brindle Beauty Biston Hirtaria was confined in a box, from which, the previous year, a brood of the larvæ of the Poplar Hawk had come out, leaving the empty shells attached to the under surface of the top; in the course of the night she deposited a beautiful green egg in each of the little vacant cells. In a fortnight these were hatched, and the two sets of empty shells are on the table for your inspection.

Eggs vary much in form—some are oblong, some square, some round, many most beautifully ribbed with from six to over forty ribs longitudinally arranged side by side; these ribs are also frequently crenulated and have an exquisite opaline appearance under the common microscope. The color of eggs also varies much—some have various tints of green, some chocolate, some flesh colour, some pure white with every intermediate tone, and others are black. Some of these eggs are laid singly on a tree or plant, others on separate leaves, others in clusters on leaves or around the stem. These latter when hatched live together in a colony until nearly full grown, when they separate and wander away for their final repasts and ultimate changes into the pupa or chrysalite state.

In selecting places for depositing their eggs, I beg of you to ponder and reflect for one moment upon the marvellous principle implanted by an Allwise and Almighty hand in the bosoms of these poor little female insects, that leads them with unerring solicitude to deposit them in such places and upon such trees only, as when after many days or many months of repose the tiny larva finally eats its way out of its imprisoned cell, to find its natural food at hand, and in a fit state for its supply; the time the egg may lie dormant varies from a few days to very many months.

All animal life springs from life, and all life has its origin in an egg; this egg may be hatched within the body when the young come into the world a type of their parent.

This system of giving birth is called viviperous, in contradistinction to the oviperous, as, where eggs are laid by most insects and all birds, and the young are brought forth by the application of heat, either naturally, as when the bird sits upon the egg, or the natural temperature of the air brings out the young larvæ, or artificially, as when heat is applied; therefore on the application of a certain amount of heat the vital principle, until now dormant, is called into active existence. To watch the progress day by day of the development of life is of intense interest, and the following simple arrangement is all that is necessary.

Take a tin square box eighteen inches over and eight inches deep, fill it half full of sand; have a ledge outside that it may drop only four inches into another box containing water; this may stand upon four legs—on keeping an oil lamp under it with a screw to raise and lower the wick, and with a thermometer in the bath to regulate the heat, which should for twenty-one days never fall in the twenty-four hours below 96° Fahrenheit. You will find that the eggs (if vitalized) will be opening and the little chicks coming out. Now from their size it would be very difficult to observe the changes going on in the eggs of moths except under the microscope; but if a sufficient supply of birds' eggs were placed in the tin box by taking one out every six hours and breaking it, the whole system becomes revealed, and from the simple fertilized cell through all the marvellous developments of parts, until the little chicken, with its primitive clothing, a type of its parent, comes forth, we can trace the organic progress. The feathers no doubt differ in colour to the adult plumage, but here we have similarity of form, and an internal organization for all practical purposes of strong resemblance. But if by the aid of the microscope we watch the advancing germ in the egg of a moth, instead of finding, as progressive growth brought the little creature nearer to its period of liberation, it took on the form of a winged and perfect insect, we should see a little worm-like body, and if we watched its exit we should find it biting its way out by enlarging the aperture it had

made by means of a strong pair of mandibles as they are called, which act in a somewhat similar way to a pair of scissors. Now it is the changes which this little worm has to pass through until it finally spreads its light and beautiful wings, an image of all that is lovely, either to bask beneath the glowing sun, or to poise at twilight over flowers, inhaling from nature's laboratory the sweetest incense of its floral haunts, that we shall now proceed to illustrate.

The insect being hatched it is now called a Larva, from Larva a mask. This name was given to it by the great Swedish naturalist Linnæus, who thought that the caterpillar condition of an insect masked as it were its future state. In our language we have restricted the word caterpillar almost exclusively to the Larva of moths and butterflies. Grubs more especially refer to the beetle; maggots and gentles, to the order of flies; but the word larva is used to express the caterpillar state of all orders of insects, and so we shall use it on this occasion in reference to our subject.

We do not intend to give an anatomical description of the Larva, for when I tell you that this insect contains no fewer than 4,065 muscles, the very enumeration is quite overwhelming; but to understand the remarkable changes which are now about to take place it is very essential that we should have some general idea of those organs which play so conspicuous a part in the metamorphosis of insect life.

A caterpillar is divided into thirteen segments, or joints; these joints allow the insect to have perfect motion in every direction. The first joint consists always of the head; the second, the first pair of pro or fore legs, and first pair of spiracles or breathing holes, which I shall presently describe; third, the second pair of fore legs; fourth, the third pair of fore legs; fifth, the second pair of spiracles; sixth, the third pair of spiracles; seventh, the fourth pair of spiracles, and when present 1st pair abdominal legs; eighth,

the fifth pair of spiracles, when present 2nd pair abdominal legs; ninth, the sixth pair of spiracles, when present 3rd pair abdominal legs; tenth, the seventh pair of spiracles, when present 4th abdominal legs; eleventh, the eighth pair of spiracles; twelfth, the ninth pair of spiracles; thirteenth, the anal legs, these are always present.

These joints, or segments, are covered by a skin containing a peculiar principle, called chitine; this skin serves as a skeleton for the attachment of muscles, the same as our osseous structures, or the bones of birds, but with this exception, the bones which form our skeleton, and those of birds, &c., are always internal, but with larvæ they are always external; that is to say, this tegument, which has more or less density, takes the place of bone—it is therefore called the dermoid skeleton. The density of the skin is greater in the centre of each segment, where it joins to its neighbour, and is very soft and pliant; thus giving great freedom of motion to the animal. The skin is sometimes naked, at others thinly or thickly studded with long or short hairs. The skin is very little elastic, so that upon the internal growth of the larva, it becomes highly compressed, and were it not for the beautiful contrivance of nature, the little animal would be suffocated by its own growth. To avoid this, when a sufficient degree of tension is given to the skin, the animal becomes sluggish, refuses to eat, and in about thirty hours the skin splits down the back, and the larva comes out with a bright and more beautiful covering. It now rapidly increases in size, feeds voraciously, and in the course of six or seven days becomes so compressed again in its straightened tunic, that it ceases to feed, and the skin again bursts asunder. There are generally from three to six of these dermoid, or skin changes during the period of larval existence.

To render clearer the changes we are about to explain, it is very essential that we first take a brief survey of the general organs of the larva as we find them during the period of its existence. We will therefore examine them in the following order:—Locomotion, vision, mastication,

digestion, vascular system, respiratory system, reproducing system, nervous system.

ORGANS OF LOCOMOTION.

The caterpillar of the moth and butterfly has always eight, and never more than sixteen legs—one pair is placed, as I have told you, upon the 2nd, 3rd, and 4th segments (these are always present, and are called true legs); on the 7th, 8th, 9th, 10th, these may altogether be absent, as in looping larva, or only one or more pairs, the missing ones being absent always in pairs and commencing from the seventh segment, proceeding backwards. The last pair of legs is seated on the 13th segment and is never absent; these are called false or membranous legs. The first three pairs of legs are called the pro legs, fore legs, or Thoracic legs; the four next are called the abdominal legs; the last pair the anal legs.

If we examine the pro legs we shall find them short, jointed, and conical, the apex terminating in a hook. These legs are never used except when the larva is in progression; they are employed to catch the uneven surfaces over which the insect has to walk. When at rest these hooks are turned inwards and join those on the other side; the head dropping forward rests upon the first pair, as you can perceive in the numerous specimens before you.

The abdominal legs, when present, are of more use; they are membranous, short, thick, and conical, with the apex cut off, so as to leave a broad base for the insect to walk upon. It is in the sphinx larva (of which there are several in the room) composed of two pieces somewhat semi-circular, both edged with a row of fine sharp hooks, the external ones directed inwards, the internal ones directed outwards. They can walk flat footed, or have the power of turning their legs inwards, so that by touching the opposite foot can compress between the two small twigs, up which they ascend to feed upon the leaves. The anal foot is somewhat similarly formed, but is larger and

fatter, and has very strong adhering powers. Thus we have seen the first three pairs are articulated, the remainder are membranous; the three first, a rude type of what the perfect insect will ultimately possess, the five others will entirely disappear in the first great change to pupa life.

ORGANS OF VISION.

The organs of vision in larvæ are very different to what we shall find them in the perfect insect; they now are only simple in their construction, consisting only of a single lens, and are placed on the side of the head near the mandibles, and vary in number, scarcely ever exceeding six, but amounting to thousands when the insect has perfected its final condition.

ORGANS OF MASTICATION.

Whilst in the larvæ state the insect has a very different mouth-piece to what it will ultimately possess: it has now one adapted to the condition it which it has to exist. It must feed from vegetable or animal substances. By the laws of its economy it must attack our vegetable world out of doors, and our animal products within. In the larval condition I believe there is no tree, flower, or shrub that has not its parasite in the shape of some devouring caterpillar; and our woollen stuffs, our clothes, and our blankets our museums of animals, our collections of birds, our cabinets of insects, all are fit and proper food for larval life, and all are preyed upon: INDEED, IT IS BUT FOLLOWING THAT GRAND AND MUNIFICENT LAW OF NATURE, THAT THAT WHICH IS DEAD IS USELESS AND MUST AGAIN BE WROUGHT UP IN THE MIGHTY ALEMBIC OF PROGRESSIVE LIFE—EVERY ATOM OF DUST PASSES THROUGH SOME PHASE OF THE MARVELLOUS CHEMISTRY OF NATURE, TO BE OF USE AND BENEFICIAL TO THE LIVING RACES; AND THE LIVING RACES WOULD SOON CEASE TO EXIST WERE THE CHANGING AND DISSOLVING HAND OF DEATH TO BE STAYED BY SOME ALMIGHTY FIAT OF HIM WHO RULES THE UNIVERSE.

If we examine the mouth of the caterpillar we shall find some little difficulty at first in understanding the

different parts; but supposing we take our own mouth for an example—the upper lip represents the labrium, the lower lip the labium; the upper jaw being divided into two, form the mandibles which act laterally and like a pair of scissors, the lower jaw being equally divided form the maxillæ, or feelers. Inside the lower lip there is a small nipple shape protuberance; this is the fusculus, or spinaret, and here exudes that plastic matter which, hardening as soon as it escapes, becomes silk, varying in quality as regards the insect producing it, and the manner in which it spins its cocoon, same as in Bombyx Morii or a common silk-worm. This larva spins an uninterrupted web, but others, as in Corpini Saturnia make short ends so that the silk cannot be wound off; but science, no doubt, will soon obviate these apparent difficulties, and thus rescue a very large amount of most valuable property from its present useless condition. I wish you particularly to remember the formation of the mouth in the larva; it is called a mandibulate, from using mandibles in cutting off its food.

ORGANS OF DIGESTION.

By the aid of these mandibles, or scissors, the larva cuts off its food; this is then passed into the mouth and down the œsophagus, or gullet, into the stomach; from here it passes down the rest of the alimentary canal. It receives secretions from the salivary glands, bile ducts, &c., and also from the membranous surfaces of the parts through which it passes; thus it is acted upon in a somewhat analagous way to the food taken by a higher order of animals. The œsophagus, or gullet, and stomach is very large to receive the immense quantities of food these ever devouring creatures take in. Their periods of rest seem but short, their time being devoted to one object, to eat as much as they can whilst in this transitionary state. To give some idea of the voracity of larvæ, Count Danolo in his history of the silk-worm, states that when first hatched it only weighs one hundred parts of a grain; in thirty days it

has done feeding and weighs 95 grains. It has thus in this short space of time increased its bulk 9590 times, and if we consider the digested food it has passed away, it has eaten 15,000 times its weight of food.

The larva of a Privet Hawk weighed 170 grains; therefore it had consumed 13,600 times its weight; and a fine larva of an Atropos, or Death's Head Moth, weighing 210 grains, 16,800. But Lyonet found that the larva of Cossus Ligniperda, which remains nearly three years in that state, increased to 72,000 times its original weight, and if we consider the time it was growing, feeding the whole time, it could not have consumed less than 100,000 times what it weighed when it first left the egg. Well may they leave a desolated tract for a while behind them where they abound, and are free from those compensating media which nature, in her wild and unfettered province, almost invariably supplies, the poison and the antidote—the overwhelming accumulations of larvæ, the unusual collection of birds, and other insects which prey upon them.

THE ARTERIAL, OR VASCULAR SYSTEM.

This, in the insect arrangement, is very simple. It consists of one large dorsal vessel, that can be very easily discerned in larvæ that have smooth skins. It runs from the tail to the head, where it divides into two or three branches. In each segment there is a valve which allows the blood to flow in, but prevents it returning. The blood is thin, transparent, and colourless, having small corpuscules or blood globules, floating in it; these are also colourless. The blood, it is said, passes along this great dorsal vessel before it arrives at the head, when it is poured out into the neighbouring tissues; it traverses every part of the system and enters again the dorsal vessel through the valves. There is something very unsatisfactory in this theory of the arterial, or blood circulation of insects. I think it will ultimately be proved, however far it may have to travel, that it is conveyed in blood vessels, no doubt very fine, and from this cause alone has hitherto escaped observation.

RESPIRATORY SYSTEM.

Insects do not breathe through the mouth as mamalia, birds, and other tribes. They have a peculiar respiratory system of their own. If we examine the caterpillar, for instance, of the Privet Hawk Moth, Sphinx Ligustri, we shall find there are nine little yellow oval discs on each side called the spiracles, and which have already been pointed out to you when speaking of the thirteen segments. These little discs have an opening in the centre; this opening is surrounded and acted upon by a circular muscle called a sphincter muscle. If I again refer to our lip, you will have an illustration of the action of this muscle: upon the least approach of a smile, it begins to relax; if the smile turn to a laugh, a visible distortion takes place, and the mouth then opens; but should screaming hysterics follow, this poor circular muscle is then stretched to its fullest extent, and it is wonderful how it ever comes again to its engaging proportion. A sphincter muscle, then, guards each orifice; it dilates and closes it, allowing air to pass in. These orifices or spiracles communicate by short tubes with a longitudinal canal or pipe, one on each side of the larva. These tubes send off numerous branches, which divide and subdivide, allowing air to pass freely into every part and every organ of the insect system. To this I shall have again to allude presently. What I wish you to comprehend is, that by the universal ramifications of these air-tubes or tracheæ, as they are called, the juices or blood of the creature is acted upon and rendered fit for the purposes of life, as the blood of our system is affected by the air passing into our lungs, and there altered in its character to perform a similar office.

REPRODUCTIVE SYSTEM.

We shall not stop to enquire into this subject; but I may mention that the eggs of the future brood are to be discovered in the larva. We shall now enquire into the important and interesting physiology of the nervous system.

NERVOUS SYSTEM.

The nervous system in the larva is very simple, yet plays a most important part in its vital economy, and the rapid and singular changes that take place in it, as the larva assumes its progressive forms, is not the least wonderful part of insect metamorphoses. From the lowest to the highest type of vitality, the nervous system increases in importance as we ascend the scale of creation, even up to man, whom it allies in its terrestial condition to the insignificant creature just removed above the range of inorganic matter, and which we so often wantonly crush beneath our feet, as if it were but dust or a nerveless inorganic mass. To the late Mr. George Newport we are much indebted, and I in particular, as it is from his beautiful drawings of the nervous system of the larva, pupa, and perfect moth of the Sphinx Ligustri, that I have had these diagrams copied, to assist me in my illustration; and I cannot refer to his untimely death but as a loss indeed to science; for what energy of skill, patient industry, indefatigable research and truthful delineation could surmount, Mr. George Newport's was the mind to carry out. He died just as the lustre of his genius was calling forth the approbation of his fellow-man. Although not the founder, he had much to do with the early history of the Canterbury Museum, and his memory is still cherished by many who knew him personally as a resident in that city.

Nerves are little opaque white cords. There are three sets of nerves—sensation, motion, sympathetic. Sensation carries impressions to the centre of the nervous system, as to a brain like ours, for instance. As an illustration, supposing you were to place your hand on a piece of hot iron, sensation would immediately be conveyed to the brain, the nerves of motion would be excited, and they would cause the muscles to withdraw rapidly the hand, and the pain endured would be conveyed by the sympathetic to the general system, and great bodily distress would ensue, as seen by the crying, the flow of tears, the heaving and sobbing of the breast. When these nerves unite into little

balls they are called ganglia, and these ganglia differ in composition from the nerve in having grey as well as white matter.

We have seen that the larva is divided into thirteen segments: the first segment forms the head, and contains the brain, or a substance analogous to it; the second segment contains the first of these ganglia, and each contains one down to the twelfth. These ganglia and large connecting nervous cords may fairly represent the spinal marrow. From these ganglia the nerves to the different important organs proceed. The position of this portion of the nervous system in insects lies along this under-surface just below the œsophagus and stomach; but in mamalia and birds it is contained in the back-bone or spine.

Diagram No. 1, figure one, shows its relative disposition. The red nodules are supposed to represent the nervous ganglia, and are only given this florid colour to show more clearly their definite outline. Each, you will perceive, is confined to its segment; but as some of these segments will be nearly absorbed in the change from lava to pupa, it will be necessary to observe and remember these ganglia to understand how they adapt themselves to the altered condition of the larval form. It would prove very little interesting to you if I were to enumerate the dry details of all these nerves that you see delineated. Some few it is necessary I should point out. Vide diagram.

We have now shown a rough and general distribution of the nerves; but there is one peculiarity about the nervous system I may mention, that these ganglia, I believe, with whatever other vital powers they possess, are the reservoirs for that peculiar principle which is collected during the hours of repose to sustain, and in the active duties, pleasures, and pursuits of every-day existence. If undue exertion be called forth early in the day, this nervous laboratory is exhausted before its regular time, and a consequent desire for repose is absolute. But be this as it may, there is one certain fact established, that the nervous system is in pro-

portion to the natural requirement of organic arrrangement, and this you will presently observe when I compare some of the peculiarities in the nervous system in the larva with those in the perfect insect.

Having now briefly glanced over the various organs belonging to the caterpillar, I will merely add, before we proceed to its metamorphosis, that in changing its skin all the external organs come away with it, as also the lining membrane of the spiracles, a portion of that of the tracheal and of the mouth, and all are replaced in the fresh clothed insect.

The last skin has now been shed, the larva has rapidly increased in size, its final meal has been eaten, its last particle of food digested; it now by instinct, or say rather by a marvellous power implanted by a beneficent Creator in its little system—a power, arrogant as we are in our constant assumption over the brute creation, we are entirely at a loss to comprehend or understand,—seeks the retirement of solitude, and under some carefully sheltered nook prepares for its change: each species, according to its peculiar habits, shows that one guiding principle is leading to a definite object, protection from harm, during the period it is incapable of locomotion, or protecting itself from that host of enemies that naturally prey upon it—*wise determinating principle, careful forethought, wonderful instinct—why not reason?*

Some now spin cocoons and enclose themselves in a shroud of silk, of which we despoil them for the adorning and covering of our own persons. Some bite off their long hairs and weave them up in their case; some add particles of wood, rough bark from trees, sand or earth; others suspend themselves round the waist with a silken girdle; others by the tail; others delve into the soil. Thus you see there are various ways in which they proceed, all tending to one result, the pupa state—illustrations of which are on the table for your inspection.

At this period of the larva's existence—on the eve of its change to a pupa—we shall find upon examination some important alteration. Thus, on the second and third segments,

the rudimentary wings begin to make their appearance. The creature has become much shortened and stouter. The sixteen legs are withered and dried up, no longer of use. The fourth and fifth segments have become much narrower, the third much broader. On looking at the nervous system we shall perceive the cord, instead of being straight (as in fig. 3, No. 2 diagram, below the fifth ganglion) it is now curved as in fig. 3, No. 1. This curving is in consequence of the shortening of the insect. The fourth and fifth ganglia are thus brought nearer together in short turns. The skin becomes easily detached and splits down the back, all the old covering slips off, and a new creature makes its appearance.

Last summer I had the pleasure of showing to a party of friends, assembled round our breakfast table, this most interesting sight. On examining my breeding cages I saw a fine specimen of the privet hawk in the act of changing to the pupa state. It was removed with great gentleness and care to the table. I say this, for it is a very critical time with the insect, all the parts are exceedingly soft, and the least pressure now would, most likely, produce a crippled insect. After being placed upon the table he commenced making two or three violent spasmodic movements, his skin opened down the back, the fissure extending into the sixth segment—every now and then he gave himself a short twist with the tail, and in half an hour he was free from his covering—his head, thorax, and wings were of a most beautiful silvery green; his body a pale yellow brown. The whole was covered with a secretion which rapidly dried, and as it did so encased him in a dark brown shell which soon became firm and hard: from the first to the last the operation occupied about two hours. The insect was now in its pupa, but its internal organisation had not yet completed all its changes to adapt itself to its new condition. Mr. Newport has given a series of drawings showing the great alteration that takes place almost from hour to hour. Fig. 2, plate 2, shows the state immediately after the change; fig. 1, thirty-six hours after; fig. 2, thirty days

after ; fig. 1, eight months after. But this only holds good as regards those pupa which lie dormant after the first stage is completed, which takes about sixty hours to accomplish ; they are then in a state of repose, and the nervous system seems to remain almost inactive until the warmth of the vernal sun awakens the slumbering world to life and fresh vitality.

The insects that change to the winged state in a few days have no period of rest. The larva of the small tortoishell butterfly, Vanessa urticæ, as soon as it is full fed, hangs itself up by the tail, changes to the pupa, and in nine or ten days the beautiful imago is seen sporting through our gardens. Thus the period in which the insect may remain in the pupa state varies very much, from a few days to one, two, or I believe even more years. Just previous to its exit we shall find on examination that the insect has now a very different aspect to what it had when first it took on the pupa form, the legs and antennæ are formed, the spiral trunk complete, the eyes, those wonderful and beautiful objects, are perfected, the first ganglion and brain are one, the fourth, fifth, and sixth ganglia are united; and thus bear out what I before alluded to, that the largest nervous developments are found where the greatest demand is made for nervous power—look at the brain, surrounded with highly developed organs; the thoracic ganglia, to supply the powerful wings during the period of action. Thus all parts being perfected, the imprisoned insect splits the pupa case down the back, the legs, antennæ, and wing covering become lose and detached, and the liberated prisoner creeps from his earthly shroud, but his wings have yet to expand ; all is there, every little scale or feather that gives thos beautiful hues to its outstretched pinion are in a measure closely compressed. The insect as soon as it escapes from its tenement climbs up any object at hand, and then the completion of the process takes place. The wing I must inform you now is very soft and has several large vessels in it, they form the ribs. As the tracheal vessels communicate freely, I believe the process of expansion is entirely owing

to the propulsion of air into these vessels or tubes by which they are dilated to their fullest extent; the wing now rapidly becomes dry and hard during this period, and while hanging down the points nearly touch at the tip, but as soon as they are dry they take their natural position, according to the habit of the insect. This operation lasts from half an hour to two hours.

We will now examine some of the new or altered structures we meet with in the perfect insect.

1. The trunk or proboscis. This takes the place of the old mandibles, the parts where these were situated send out two long tapering processes, hollow or concave on the inner side. These processes uniting form a tube through which the insect can suck up the honey and nectar from the flower cup; when at rest this tube curls up like a watch spring.

2. The antennæ. These are two beautifully articulated objects, projecting from the back part of the head, immediately above the eyes. Of what use they are to the insect, or what function they perform, we are quite in the dark. They serve one purpose, however, to assist us in our classification. They terminate in a knob, with a point, or are tapering. The first belongs to the day flying insects or butterflies, the second to the sphingidœ or evening lovers, the third to the night roving species or moths. This division is pretty correct as far as it goes, yet some sphingidœ fly by day as well as by night. The little humming bird, Macroglossa Stellatarum, we often see hovering over a flower, especially in the chalky districts; and the beautiful convolvulus hawk, I have never captured but after dark. Several moths also fly by day, the pretty and common moth, Plusia gamma, is a good example. The shape of the antennæ apparently differs but little among the diurnæ or butterflies, nor even very much in the sphingidœ; but among the moths there is greater variety; some are beautifully pencilled, some are triangular, some like a tapering, pointed hair. The antennæ of the females is generally more slender.

3. The eye. This in insects is an exquisite object for study. Why nature has been so profuse in her bounty as to give from 4 to 20,000 eyes to an insect we cannot in the least understand, nor why the caterpillar should only have twelve, and the moth 14 or 15,000; but such is the case, and although we cannot comprehend why the Great Designer in his wisdom has so arranged it, yet we are able to appreciate the structural mechanism and marvel at its beautiful design. The diagram before you is a beautiful section of a compound eye, copied from a drawing made by Strauss Durchheim.

You perceive from the brain the optic nerve is thrown off (*a*); from its periphery or convex surface a set of short nerves arise; they form a membrane, the general retina of the eye (*c*); before this membrane there is another called the chorroid (*d*), with its pigmentum or colouring matter. This differs in colour; in the cockchafer it is of a brilliant red, in others green or intense black. From the expansion of the retina (*c*) the true optic nerves arise (*e*); they proceed forwards and then enter the ocelli or little eyes. In each eye we find a hexagonal chrystallised substance like the vitreous humour of our own eye; upon this we have a double convex lens, then a little black line which may be said to resemble the iris, and finally the cornea or external transparent coat of the eye. The eye of insects is immoveable, but with this combination of power, and the eyes being seated on the lateral side of the head, they have the facility of viewing objects in almost every direction, and which no doubt must materially assist its flight.

4. The silk gland; having no longer the necessity for exuding that material, becomes altered in its function, and now supplies the mouth with saliva, becoming a salivary gland.

5. The legs, as you see by this diagram, are very different to what they were in the larval state: they are now only six in number, are distinctly jointed, each joint being bold and perceptible, and each separate part having a distinct

form and use. In fact, the legs of insects are very serviceable to assist in their classification.

6. The appendage to the stomach which we find in the perfect insect seems to be for a reservoir; in the bee it carries honey, and is the prize schoolboys seek for in the destruction of bees. What office its possesses in moths I am at a loss to state, as they are not like the industrious bee, a provident race, carrying home in their little sacs the pilfered honey from the floral nectary, and storing it up for winter's use in the hive; but no doubt every thing is so beautifully constructed by the Great Architect of the universe for some definite end, that, although unknown to us, it has its proper and allotted duty to perform.

7. The wings. We now come to the last and most important addition to the insect; I mean the wings. They are four in number, membranous, with strong ribs passing through them, the whole more or less clothed with little feathers or scales, reflecting every colour under the sun—an object of beauty and admiration.

I must now conclude, having thus traced the insect through its various changes, and seen it at last dressed in all its perfect and exquisite clothing. Yet before I resume my seat I may mention that from insect life, philosophers have believed in the transmutations of metal, from the golden change which some insects exhibit in the pupa state (*vanessa urticæ*); and poets have borrowed the sweetest imagery of comparison from all that is lovely in insect life, and precious in the untarnished beauty of human loveliness. The ancient Greeks were alive to some of these transformations, and, with the classic poetry of their race, they figured the beautiful image of the insect in its metamorphosis as emblematic of the transit of the human soul—now for a while, like the creeping larva, feeding upon food more or less coarse, with ample satiety or famished appetite—then as the shrouded chrysalis in its hardened cerecloth. This is no bad emblem of that state to which all insect life must enter, and all humanity be subject to. Now there is a period of un-

certain probation, a calm and solemn inertia, disturbed at last by the insect wakening into a new condition, and stretching its light and beautiful pinions to the air. And man, according to his doom, an abject nothing, or rising on the wing of immortality into that glorious, new, and beautiful existence, permeating that realm where darkness never reigns, and ascending to glories eternal and everlasting.

In conclusion Captain Cox observed that the branch of study to which he had called their attention was rich in most interesting matter; and if he had failed to interest his audience on that occasion, the fault rested with him, and not with the subject. Captain Cox, in the course of his address was frequently applauded, and sat down amidst prolonged cheering.

The President said that it now became his pleasant duty to propose a vote of thanks to Captain Cox for his very interesting and able lecture. (Loud cheers.) Captain Cox had said that if the audience had not been interested the fault must rest with him, and not with his subject. He (the President) believed he could assure him that he need be under no apprehension of the kind, for not only was the subject most interesting in itself, but it had also been most ably treated. (Renewed cheers.) It appeared to him that Captain Cox afforded an example of that rule of study to which he (the President) had adverted in his former remarks, and that he had not only studied a particular subject with diligence, but had also evinced a catholic and a generous spirit. One who could lecture in such a manner must have formed an extensive acquaintance not only with Natural History generally, but also with science in itself. He (the President) fully concurred in the observations which had been made as to the true end of such studies—"to look from Nature up Nature's God." (Hear, hear.) He remembered reading in Paley's "Natural Philosophy" an argument based on the supposition that if a savage were to find a watch, he would, while viewing its movements and admiring its intricate construction, naturally conclude that

the watch had a maker. In the present state of society they might go further, and imagine that savage, finding first a part of the watch, then going a little further and finding another part, and so on. As he picked up the various pieces he would say, not only that they came from the same hand, but also that they had been made upon the same type and the same plan. (Hear, hear.) Captain Cox had said that the caterpillar was invariably formed of thirteen segments. That fact reminded him of another equally significant. Let them look at the neck of the giraffe, so long as to enable it to feed upon the branches of trees, and compare it with the neck of the little mole which burrowed in the earth. Wide as was the difference between the two, the neck of the mole was composed of precisely the same number of segments as that of the giraffe. (Hear.) It was only of late years that naturalists had taken this catholic view of nature. Formerly Cuvier, while he looked into the questions of final causes and the uses of things, did not rise to the great discovery that all things were made on the same type. The philosophy of final causes was that of the useful, but there was a higher philosophy than that of the useful—it was conformity to one Supreme Will. (Cheers.)

The Rev. — Jenner seconded the proposal for a vote of thanks, which was accorded with loud cheers.

Captain Cox, in acknowledging the compliment, expressed a hope that the society would receive numerous accessions of members, especially among the younger branches. The subscription had been fixed extremely low, in order that they might have the hundreds and not the units. (Cheers.)

Major Munn was happy to have the opportunity of adding his testimony to the ability with which the lecture had been marked. Captain Cox had mentioned a friend of his who was a great "nigger-killer." He (Major Munn) was the person alluded to, and he must plead guilty to the charge. He did so the more confidently as the slave trade had been suppressed and the audience having borne with

him so long in spite of his character would, he hoped, bear with him a little longer. (Laughter). The nigger was, in fact, a black caterpillar which destroyed the turnip crop, and he had been fortunate enough to make an implement which enabled the farmers to get rid of the destroyer. Apropos of the lecture which they had heard with so much pleasure he would relate one or two anecdotes which occurred to him. A bishop went with his chaplain to a certain village to catechise the children. Their answers pleased him, and at the end of the examination the bishop said to one of them, "Little girl, you have answered very well. Now would you like to ask me a question?" She replied "Yes, if you please, Sir; how many legs has a caterpillar?" The bishop turned to his chaplain who was as wise as himself, or probably as many of the audience before they entered the room. At last he said "Little girl I give it up. Can you tell me?" She answered "Yes, Sir, I have counted them, there are sixteen." That was a kind of experimental philosophy which might be recommended for imitation. An old gentleman who was nearly blind, used to take walks in his garden, guided by a stick and generally accompanied by his daughter. Feeling along with his stick one day he hit a gooseberry bush out of which flew a hedge sparrow. The daughter looked into the bush and there found a nest with four eggs, and the bird had begun to sit. The next day she again went to look at the nest, and was greatly alarmed to see "a horrible frog" sitting in the nest, and the eggs were smashed. Next day her brother came home and she took him to the spot. The frog was still there and he pushed it out. Two days afterwards, to the surprise of everybody, the frog got into the nest again, and there remained until the bush was cut down. (Laughter.) It was a very remarkable thing that a frog should have chosen a rough gooseberry bush to ascend and a nest for its home. Some persons might suppose that "froggy would a wooing go" in spite of difficulties. Perhaps, however, the true solution was that the flies congregated round the decaying gooseberries and that

the frog chose that spot to pick them off at his leisure. As the leaves fell off the spot became very oppressive, and as the frog placed himself in a very inconvenient position in order to get a little air, his stay there became the more surprising. And that brought him (Major Munn) to the motion which had been put into his hands—a vote of thanks to the Local Committee. The society had not laboured under the same difficulties as the frog in obtaining refreshments—(laughter)—and they were indebted to the Local Committee for the excellent arrangements of which they derived the advantage. (Cheers.)

Mr. Mackeson, in seconding the motion, hoped that no sense of modesty would prevent Captain Cox from informing the society to whom they were indebted for the artistic representations illustrative of the lecture. (Hear, hear.)

Mr. G. Dowker, hon. secretary, read the names of the Local Committee:—Captain Slarke, Captain Bowden, R.N., Mr. Newton, Mr. Evans.

It is needless to say that the motion, as also the following ones, was carried unanimously.

Mr. Newton moved a vote of thanks to the exhibitors of the highly interesting objects in the room. He believed the society were indebted to Mrs. Cox for the drawings which had attracted so much admiration. (Cheers.)

Mr. F. H. Sankey briefly seconded the motion.

Mr. Dowker expressed the gratification he had felt in listening to the excellent and learned discourse of Captain Cox, and observed that the Society also owed much to Mr. Mackeson, who so kindly and so ably explained the geology of the district, giving explanations on a subject which, he admitted, he had not made particularly his study. (Cheers.)

Mr. Reid seconded the motion.

Mr. Mackeson, in the course of his reply, remarked upon the varied strata to be found in this county, such as could not be met with in a journey of many miles on the continent

thus rendering Kent a highly favourable locality for the study of geology. (Cheers.)

Capt. Bowden said that on him devolved the very pleasing duty of thanking Sir Walter James for his kindness in taking the chair on that occasion. (Cheers.) He (Captain Bowden) was a very poor naturalist, as their president had declared, though they might judge from the remarks which had fallen from him that day, Sir Walter James was better acquainted with the subject than he would allow. (Hear, hear.) He (Captain Bowden) felt proud and happy to see him there, and hoped it would not be the last time by many that they would have that pleasure. (Cheers.)

Captain Cox, in seconding the motion, observed that while he had been dealing with common-place details, Sir Walter James had given them those beautiful general principles on which alone their studies could be advantageously based. (Hear, hear.)

The vote having been carried amidst loud cheering,

The President responded, and in doing so expressed his regret that unavoidable engagements had prevented his attending the previous meetings of this year. He was glad that Capt. Cox had seconded the last motion, for he had shown to him (the President) the greatest kindness and hospitality, and as he had just received from him a public expression of thanks, he begged to tender to him publicly his private thanks. (Cheers.)

Some time was occupied by the members in inspecting the various curious and interesting objects in the room, after which the proceedings terminated.

J. Ward, Printer, "Kentish Gazette" Office, Canterbury.

ERRATA.

In page 16, thirteenth line, for Corpini Saturnia, read *Saturnia Carpini;* and for Count Danolo, three lines from the bottom, read Count Dan*dolo.*

Page 20, six lines from the bottom, the and should be *us.*

EAST KENT

NATURAL HISTORY SOCIETY.

SESSION, 1860.

REPORTS

OF

Meetings Held & Papers Read,

AND JOURNAL OF

GENERAL TRANSACTIONS.

GEORGE DOWKER, Stourmouth, Secretary.

Canterbury:

Printed by JANE WARD, "Kentish Gazette" Office, High Street, and Published by the EAST KENT NATURAL HISTORY SOCIETY.

List of Officers for the Year

1860-61.

PRESIDENT:

SIR NORTON J. KNATCHBULL, Bart.

VICE-PRESIDENTS:

Sir Walter C. James, Bart.
Sir B. W. Bridges, Bart., M.P.
Matthew Bell, Esq.
W. O. Hammond, Esq.
Major W. A. Munn.
Captain C. J. Cox.
A. Crofton, Esq.
J. T. Brooks, Esq.
J. Brent, Esq.
G. Hoffman, Esq.
W. Hall, Esq.
The Very Rev. the Dean of Canterbury.
The Mayor of Canterbury.

TREASURER:

E. F. S. READER, Esq.

SECRETARY:

GEO. DOWKER, Esq.

COMMITTEE:

Rev. H. L. Jenner.
Dr. Pittock.
Mr. J. T. Hillier.
Mr. G. Rigden.
Mr. A. B. Andrews.
Mr. J. Reid.
Mr. F. H. Sankey.
Mr. J. Martin.
Rev. J. Mitchenson.
Rev. J. Hutchinson.
Mr. E. Tucker.
Mr. J. Linford.

LOCAL SECRETARIES:

Isle of Thanet	J. T. Hillier, Esq.
Sittingbourne	Dr. J. Grayling.
Canterbury	Rev. B. S. Malden.
Dover	Edward Knocker, Esq.
Deal and Sandwich	E. F. S. Reader, Esq.
Herne Bay	Captain Bowden, R.N.

FIRST ANNUAL MEETING.

—:o:—

CANTERBURY, APRIL 18, 1860.

—:o:—

(*Reprinted from the "Kentish Gazette" of April* 24, 1860.)

The first annual meeting of the members and supporters of this interesting society was held at the Assembly-rooms, Guildhall-street, on Wednesday afternoon. Among the members present we observed the Very Rev. the Dean of Canterbury, Captain and Mrs. C. J. Cox, Matthew Bell, Esq., — Thompson, Esq., Mr. G. Dowker, Mr. J. Brent, Mr. G. Rigden, Mr. A. B. Andrews, Mr. John Martin, Mr. John Linford, Mr. Wm. Kennett, Mr. John Bateman, Rev. F. T. Scott, Miss E. Kenrick, Mr. James Reid and family, Rev. F. J. Leachman, Mr. F. H. Sankey and Miss Sankey, Rev. C. Warton, Miss Perkins, Mr. F. Slater, Mr. L. Forrest, Rev. J. Mitchinson, Mrs. and Miss Chaplin, Rev. C. W. Bewsher, Mr. Thomas Addley, and Mr. E. S. Dean. The list of visitors comprised Mrs. and Miss Croasdill, Mr. J. W. Horsley, Mrs. F. T. Scott, Mr. Batemen, Miss Brent, Mrs. R. L. Jones, Mrs. Mitchinson, Miss Alford, Miss Warton, Mr. and Miss M. A. Perkins, Messrs C. & E. Neame, Mr. J. Rigden, Mr. John Admans, Mr. W. Bear, Mr. J. Horsley, Mr. M. Horsley, Mr. J. S. Lipscomb, Mr. A. T. Duval, Rev. H. P. Wright, Rev. P. and Mrs. Maitland, the Misses Furley, Mrs. J. B. Kearney, Mr. S. J. Lucas, Mr. E. J. Woodrow, Mr. E. J. Baker, &c., &c.

In different parts of the room were arranged a large number of interesting specimens illustrative of different branches of the science of Natural History. We particularly noticed a collection of sea anemonies from Mr.

Dowker, of Stourmouth, including the following varieties: —Actinolobia Dianthus, plumose anemone, in three varieties; Sagartia Bellis or daisy anemone; Sagartia Troglodites or cave-dweller; Sagartia Miniata, scarlet fringed anemone; Actinia Mesembrianthenum, the Beadlet; Actinia Fragascea or strawberry; Thealia Crassicornus or dahlia; and a Cerianthus Lloydii or vestlett. A Ball's dredge was likewise exhibited by Mr. Dowker, together with a collection of fresh-water and marine British shells, and several of the Society of Arts microscopes. A fine collection of Lepidoptera from Captain Cox's collection, together with living specimens of the larva of the oak lappet—Gastropacha Quercifolia—on the branch of a blackthorn bush, which it so closely resembled as to deceive the eye of any but the practised entomologist. These larva had but just roused from their long winter sleep. Mr. Horsley sent a collection of birds' eggs; and Mr. Gordon, of Dover, a curious white polecat—Mustela putorius—which had been taken in the neighbourhood of Waldershare. Mrs. Mitchinson sent Bradbury and Evans' beautiful book of the British ferns—Nature printed. A collection of fossils from the neighbourhood, contributed by the Rev. B. S. Malden, Rev. J. Mitchinson, Messrs Horsley and J. Reid. Mr. Malden sent also for exhibition a very unique book of illustrations of shells, from the cathedral library. Mr. Martin sent a collection of the wild flowers in bloom in the neighbourhood, with their generic and specific names; among them we particularly observed a specimen of marchantia polymorpha. Mr. Kennett, of Fordwich, one of the associates, contributed a beautifully assorted collection of everlasting flowers of last year's growth from his own garden, principally composed of varieties of Helichrysum gnaphalium. A beautiful and rare series of coloured illustrations of British Mycology, by Mr. Hussey, was contributed by the Rev. H. S. Jenner. Various popular and interesting works on Natural History were sent by Mr. J. Reid, Captain Cox, and Mr. G. Dowker.

In the absence of the President, the Very Rev. the Dean

of Canterbury was unanimously elected to preside, and opened the proceedings by referring to the disappointment they must all experience by the unavoidable absence of Sir Walter James.

Mr. Dowker read the following letter which Sir Walter James had addressed to Capt. Cox, explaining the circumstances which had rendered it impossible for him to attend the meeting:—

Betteshanger, Sandwich, April 12.

Dear Captain Cox—I explained fully to you yesterday the various circumstances which render it necessary for me to be in London on Wednesday, the 18th instant. I must trust to your great kindness to make my excuses to my friends at Canterbury. The naturalist has always had a delightful pursuit, but these days have added new interest to this study, and have carried us back far into the records of past time. May each succeeding generation open up fresh sources of knowledge, and lead us nearer to Him from whom all true science has its origin. Faithfully yours,

Walter C. James.

Captain Cox offered some additional explanations respecting the absence of the President.

The Chairman said it only remained for him, therefore, to call upon the Secretary to read the report.

Mr. Dowker again rose and read the following report of the committee for the past year:—

In presenting to your notice the second annual report of the proceedings of the society, your committee would direct your attention to its present state, its objects, and the means that have been adopted to further them. And it is hoped that there is much cause for congratulation, in the interest that has been awakened, in the welfare of the society in the different towns where the meetings for the past year have been held. At the same time, your committee would urge on all members of the society the importance of a continuance of those active exertions which have contributed so much towards its advancement.

Important and interesting events in connection with Natural

History have taken place in our immediate neighbourhood during the past year, and it is hoped that advantage will be taken of the facility this society affords, in investigating any Natural History facts, which may be brought to light in the district.

The first general meeting of this society, for the past year, was held in St. George's Hall, on the 8th of April, 1859, on which occasion the annual report was read and adopted.

Sir Walter James, of Betteshanger, Kent, was unanimously elected to fill the office of President for the year. A vote of thanks was accorded to Sir Brook W. Bridges for his kindness in filling that office during the past year. A vote of thanks was also passed for the services rendered by the vice-presidents, as also to the secretary, treasurer, and committee.

The Rev. the Dean of Canterbury having been elected to the chair, the Rev. F. T. Scott read a very interesting paper on the "Honey Bee," prefaced by some admirable remarks on the present state of the society, and its future prospects. The room was filled with illustrations of the Natural History of the district, exhibited by Messrs. Reid, Andrews, Dowker, Martin, Major Munn, Masters, Horsley, Malden, Castleden, Keeler, and Pettit, and Captain Cox.

The second general meeting of the society took place at Ramsgate, on which a dredging expedition was successfully carried out, after which a meeting was held in the Music Hall, A. Crofton, Esq., in the chair. Mr. Austin read a paper on the "Ornithology of the Isle of Thanet," illustrated by a fine collection of birds. J. T. Hillier, Esq., read a paper on the "Sea Anemonies" found on the Thanet Coast. This paper was copiously illustrated by diagrams and living specimens. There were exhibited stuffed birds, hornets' nests, birds' eggs, Aquaria, together with the results of the dredging expedition.

The third general meeting of the society took place at Faversham. After an excursion through the Syndale and Kade's woods, the party assembled at the Assembly-rooms, Faversham, under the presidency of J. F. Crookes, Esq. Major W. A. Munn read a paper on the "Oyster," which was illustrated by dissections by F. G. Giraud, Esq. There were exhibited a fine collection of British birds, the collection of

the late Mr. Chaffey of Doddington. A collection of shells fossils by Mr. Hall. Microscopes, wild flowers, and the entomological specimens collected on the day. Mrs. Chaffey presented a donation of books to the society.

The fourth meeting of the society was held at Herne Bay. A party of excursionists met at Reculver, and proceeded from thence to Herne Bay under the cliff, the geological features of which were explained by Mr. Mackeson. The party assembled in the Town-hall, Sir Walter James the president in the chair.

Capt. C. J. Cox gave a lecture on the "Metamorphosis of insects as exemplified in the changes of the moth and butterfly," beautifully illustrated by diagrams. There were exhibited specimens of fossils from the chalk and London clay by Mrs. Taylor, Miss Denne, Mr. Wetheralt, Mr. Cumming, and Mr. Dowker. A collection of moths and entomological preparations from Captain Cox.

From the lateness of the season the committee thought best to defer the proposed visit to the neighbourhood of Dover till the next year.

A sub-committee of the society has been formed to investigate the remarkable specimen of coal or lignite found in the chalk at Lydden, near Dover.

Your committee have thought it desirable to alter the plan of book circulation, which it is confidently hoped will be of much service to the society, and solicit the aid of all interested in the pursuit, in forming a Natural History Library.

From the statement of accounts appended to the report, it appeared that the income for the year, including subscriptions due, amounted to £92 15s. 7d., and the expenses to £63 15s. 1d., leaving a balance in favour of the society of £29 0s. 6d. The balance of subscriptions due is put down at £30, so that the actual receipts barely cover the expenditure.

Matthew Bell, Esq., proposed the first resolution to the annual report just read be received and adopted, and that it be printed for circulation among the members. He very much regretted the absence of the President as he was afraid no other gentleman was prepared with a paper to read

to the society in place of the one they had expected from Sir Walter James. The contents of the report just read were of a nature to afford matter for congratulation, especially with regard to the attendance at the different meetings held during the past year. There were one or two of those meetings at which it would have afforded him (Mr. Bell) the greatest gratification to be present, particularly as the proceedings would have enabled him to increase his somewhat limited knowledge of different branches of the science of Natural History. Referring to the specimen of lignite, which was exhibited in the room, and which had been found in some of the railway works now in course of construction. The discovery of that piece of lignite had given rise to very different feelings among the inhabitants of the district. Some of the landowners had been induced to examine into the geological formation of the district, with the expectation of finding seams of coal under their estates, by means of which they should be able in a short time to realise large fortunes. Others, again, were afraid that the existence of coal should be demonstrated, lest they should in time see this pretty county covered with tall chimneys and enveloped in an atmosphere of smoke. But leaving those considerations out of the question, it was a very curious fact that an isolated piece of coal should be discovered imbedded in a stratum of chalk at a considerable depth from the surface. After referring to a theory that the piece of lignite may have been conveyed to where it was found, from some distant locality, by means of an iceberg, Mr. Bell briefly reverted to a number of specimens arranged in different parts of the room, and concluded by again proposing the resolution.

The Rev. B. S. Malden seconded the resolution, which, on being put to the vote, was unanimously agreed to.

Captain Cox rose to propose the next resolution. He very much regretted the absence of Sir Walter James, as it had in some measure thrown the society into a difficulty. However, though the meeting might not prove so interest-

ing as it would have done if they had had the pleasure of listening to the very excellent paper with which they should doubtless have been favoured by Sir Walter James, he should be sorry if they were unable to pass the time profitably on that account. He would suggest that they should turn the meeting into a *conversazione*, by which means they would all be able to contribute to the general edification of the company. Captain Cox then proceeded to direct the attention of the meeting to a piece of blackthorn, on the branches of which were a number of caterpillars, a Gastropacha Quercifolia, or oak lappet; and the nature and habits of which he described at considerable length, the information communicated being the result of his own observations extending over between three and four years. He remarked that to watch the wonderful changes through which the caterpillar passed would amply repay any one for the care and trouble required in breeding them. He concluded a very interesting address by proposing a vote of thanks to Sir Walter James for his services as president of the society during the past year.

Mr. G. Rigden seconded the motion, which was agreed to unanimously.

The Rev. J. Mitchinson briefly proposed a vote of thanks to the Vice Presidents for the past year, which, on being seconded by Mr. Andrews, was also agreed to.

J. Brent, Esq., said it was well known that no society could flourish except under good management. It had been shown during the past year that the Natural History Society was under good management; and he had the pleasing duty to propose a vote of thanks to the Secretary and Treasurer for the past year, and that they be re-elected. In bearing his humble testimony to the services rendered by the Secretary, he could state that they had been in the highest degree efficient. They were all aware that to properly carry on the objects of a society of that description involved a great deal of labour, and they were consequently very deeply indebted to those gentlemen who were willing

to give the necessary time and attention for that purpose. He was sure they would all concur in the proposal to award the best thanks of the meeting to Mr. Dowker, the secretary, and Mr. Reader, the treasurer of the Society. Mr. Brent then alluded briefly to the pleasure afforded by a study of the wonders of natural history. He had been much interested in a book which he had lately been reading bearing on the influence of insects on the yield of certain descriptions of crops. The book was by that well known and enthusiastic naturalist Mr. F. H. Newman. He was particularly struck by a theory that the growth of a certain description of clover was influenced by the visits of the humble bee. It was also stated that the field mice were very destructive to the humble bee from the depredations committed on their stores of honey. Hence it was an ascertained fact that the humble bees were found in larger numbers in the neighbourhood of dwelling houses than far away from the haunts of men. This was attributable to the number of cats kept for domestic purposes which would keep down the field mice. From this it was to be inferred that the flora of a neighbourhood might be very greatly influenced by the number of cats kept. Mr. Brent then alluded to a wonderful fact in natural history—the enormous increase of the aphis. It was admitted that the produce of a single aphis in one year would be equal in bulk to 500,000,000 of stout men. The earth would consequently be soon overrun with insect life if means were not provided to counteract such astonishing increase.

The Chairman remarked that Mr. Darwin, in his book on *The Origin of Species*, made almost precisely the same statements as had been given by Mr. Brent, who had found them in another author. It would be somewhat remarkable if it should be found that he had obtained the theory from the writings of a naturalist of a somewhat earlier date.

Mr. G. Rigden seconded Mr. Brent's resolution, which was agreed to unanimously.

Captain Cox again rose, and alluded to the practice of farmers strewing about grains of poisoned wheat on their land, for the purpose of destroying birds, to prevent them from injuring the crops. Last year he (Captain Cox) brought a magpie which had been destroyed in that way, in whose crop eight poisoned grains of wheat were found, but also several wire worms and a host of small beetles, and he expressed a hope that some means would be found to put a stop to this nefarious and abominable practice. On this occasion he had a complaint to make respecting almost the same locality. He alluded to the neighbourhood of Hoath; and the other day, when he was going to the residence of Sir Walter James, he discovered the bodies of several rooks which had been destroyed in that manner. He did not think the farmers knew their own interest, or they would not seek that wholesale destruction of birds, as they must be ignorant of their value in keeping down insect life. It had been mentioned that the farmers of this county sustained a loss of more than £30,000 a-year by the depredations of insects; and if the means provided by nature for the purpose of keeping down insect life were destroyed, then there would be such an increase of insect life as to seriously jeopardise the means of sustenance for the people of this country. But that was not the only argument to use against the destruction of birds by means of poisoned grains of wheat. The poison that was sown for the destruction of rooks and sparrows, &c., would be picked up by larks, and poisoned larks might find their way into the market, in which case a sacrifice of human life would probably result. On that ground, therefore, the practice ought to be put a stop to.

Mr. Dowker said he could not allow the flattering terms in which Mr. Brent had alluded to his services and the services of the Treasurer, to pass without acknowledgment, and particularly as they had been endorsed by the approval of the meeting. What little service he (Mr. Dowker) had rendered to the society had been rendered most willingly

and with the greatest pleasure. Whatever trouble he had experienced had been most amply repaid by the acquaintances he had made and the friendships established by being brought into the society of gentlemen with like tastes and congenial pursuits—acquaintances and friendships which he hoped to retain in future years. Societies of that description, in order to succeed, must be conducted on a combination of popular and scientific principles. It would be impossible to muster a sufficient number of scientific members to give the society a purely scientific basis; and hence they found it necessary to make it as nearly as they could scientific and popular. Mr. Dowker then proceeded to refer with gratification to the great progress lately made in the science of natural history, and concluded by directing attention to a number of cheap microscopes which had been forwarded to him from Birmingham for exhibition at the meeting.

The Chairman remarked that he was a guilty man, in some respects, with regard to the destruction of sparrows by means of poisoned grains. If a man had the pleasure to reside in a house which was incumbered with an immense quantity of ivy he was sure to be pestered with far more than a fair proportion of the sparrows in his neighbourhood. During the week it was all very well, for, when the gardener was at work, of course the sparrows had not much chance of doing any great amount of mischief. It was on the Sunday the greatest destruction was committed, when the gardener was not at work, and when the members of his family were at the Cathedral. They were sure to find on the following day that the sparrows had destroyed all the crocuses. The gardener gave them a quantity of poisoned grains, and numbers of them were soon strewed about the garden. If Captain Cox could suggest any other means of getting rid of the annoyance he (the Chairman) should be very glad to adopt it.

The Rev. F. T. Scott, in proposing a vote of thanks to

the committee, and that they should be re-elected, and their number increased by the names of the Rev. Mr. Hutchinson and the Rev. Mr. Mitchinson, offered some very interesting remarks upon the Ligurian honey bee. He stated that having read of the advantages this bee possessed for apiarian purposes over the common honey bee, he was desirous of possessing one. A neighbour of his likewise wishing for one, he ordered of the importer two Ligurian queens, these arrived packed in small boxes containing some other bees. He found that one queen was dead, and the other and her subjects appeared perfectly healthy. His object was now to unite this queen with one of his hives; and as it might interest some of them he would detail the plan he adopted. He first fumigated the hive to be operated upon with common puff ball, and whilst the bees remained stupified, which would be about twenty minutes, he looked them over and removed the queen, and replaced the others in the hive. Having then tapped the hive, which he did to apprise the bees of the loss of their queen (for the bees always cluster round the queen when any disturbance takes place), he placed the new queen with some of her species in an opening at the top of the hive. The bees gladly received their new queen, and he watched with great interest the result of the experiment. The next day he found the bees had killed all the Ligurians but the queen. As the spring was backward, he had not much opportunity of witnessing the appearance of the new bees, but lately he had been delighted at beholding some young Ligurians emerge from the hive, and therefore the experiment had completely succeeded. In answer to a question put by some gentleman at the meeting, he stated that the Ligurian bees differed from the common bee in being of smaller size and brighter coloured, the two last abdominal rings being of a bright orange colour; they were of more active habits than the common bees, and were said to be less addicted to using their sting. This experiment would likewise set at rest a disputed point in the history of the bee, viz., its age. He

paid one guinea a piece for his Ligurian queens, but they were now advertised in the "Cottage Gardener" at half that price.

Mr. Slater seconded the motion which was carried unanimously.

The Dean being obliged to leave the meeting, at this stage of the proceedings, vacated the chair, which was then taken by Matthew Bell, Esq. A vote of thanks was unanimously awarded to the Dean for his kindness in presiding.

On the motion of Mr. Martin, seconded by Mr. Linford, a vote of thanks was awarded to the Museum Committee for placing a room at the disposal of the Natural History Society for the storing of specimens.

Mr. Dowker then stated that, application having been been made to Sir Norton Knatchbull, Bart., to accept the office of President for the ensuing year, he had received the following reply :—

Mersham Hatch, April 8th, 1860.

Dear Sir—I am very sensible of the compliment you pay me in proposing to elect me President of the East Kent Natural History Society for the ensuing year. I shall be very proud to fill the office. I wish I could feel that I was at all competent to be of any use to you. If I fail in that respect it will be from want of power, and not from want of will.

I remain, dear Sir, yours truly,

Norton J. Knatchbull.

To George Dowker, Esq.

The Rev. M. Scott proposed that Sir Norton Knatchbull be appointed president for the ensuing year.

Mr. Dowker seconded the motion which was carried with expressions of approbation.

It was then stated that the meetings of the society for the coming season are fixed to be held near Dover, Ashford, Deal, and Margate, and that the dates of which will be notified in the usual manner. The proceedings then terminated.

EAST KENT
NATURAL HISTORY SOCIETY.

Excursion Meeting at Margate.

SECOND GENERAL MEETING, JULY, 1860.

The first general excursion meeting of this society, for the present season, was held, July 26th, at Margate, the local arrangements being under the able management of James Standring, Esq., Mayor, and a select but energetic committee. On the whole the weather was favourable, but rather cold. We are sorry to have to record that the meeting was not so successful as that held at Margate last year. This, however, may be attributed mainly to the circumstance that the anniversary festive gathering of the scholars connected with the Church of England Sunday Schools took place on the same day, and not to any decline in the interest taken by a number of the leading inhabitants of Margate in the interesting science of Natural History. According to pre-arrangement the members and friends of the society assembled about half-past twelve o'clock, at the Droit Office, where a dredging party and an exploring party were respectively organized, the members of which, if not

numerous, evinced the most enthusiastic ardour in their investigations into the wonders of nature, both on the shore and in the briny deep. The parties, however, returned from their expeditions without discovering any great wonder or rarity.

At three o'clock a cold collation was served up at the White Hart Hotel, both the style and quality of which redounded greatly to the credit of the obliging host and hostess Mr. and Mrs. Fagg. The only drawback here again was in the meagre attendance. When landlords evince such promptitude to accommodate societies on pursuits of science bent in so hospitable a manner, and at so reasonable a rate as Mr. Fagg's, it is much to be regretted on public grounds that the extent of patronage should fall so short as to give no encouragement for a continuance of such a meritorious policy.

At four o'clock a public meeting was held in the Town-hall, the use of which had been kindly granted for that purpose by the Mayor and Corporation. Among the company we observed James Standring, Esq., Mayor of Margate, Dr. Rowe, Dr. Pittock, F. H. Sankey, Esq., — Elgar, jun., Esq., Capt. and Mrs. Cox, Mr. and Mrs. Dowker, C. F. Gibson, Esq., J. Thornton, Esq., — Hatfield, Esq., and the Misses Hatfield, E. F. S. Reader, Esq., Lady Burton, Miss Bushell, Mr. E. Tucker, Mr. G. Barton, &c., &c.

Among the specimens exhibited on the occasion we observed a splendid collection of fossils from the chalk by G. Barton, Esq.; marine aquariums by Dr. Rowe, Dr. Pittock, and J. Standring, Esq.; a fossil tooth and bone from the South Eastern Railway cutting at Chartham; silicate of Potash from burnt straw; specimens of silk and silk worms, belonging to Mrs. Friend, exhibited by Captain Cox; herbarium of the Isle of Thanet by Mr. E. Tucker; the Anguis fragilis or blind worm, and varieties of flox by Mr. Dowker; a beautiful specimen of sponge as it grew, by Dr. Rowe; and a hornet's nest, from the end of a beam in an old cottage in Leicestershire, by Lady Burton. There

were also a number of microscopes exhibited by Dr. Pittock, Mr. Dowker, and Mr. Tucker.

James Standring, Esq., Mayor of Margate, having been elected to the chair, proeeeded to open the business. He said it would ill become him to occupy the time of the meeting when there were other gentlemen present to address them, much better able than himself to afford amusement and instruction. He could not, however, avoid expressing his regret on account of the thin attendance at the meeting. The smallness of the attendance was no proof that the people of Margate were indifferent to the claims of Natural History, but that they were great friends to the cause of education. It had happened unfortunately that a festival for the entertainment of the children connected with the Church Schools had been fixed for that afternoon, and a great many of those who would otherwise have been present on that oceasion were engaged in it, which would in some measure account for their not having a good meeting. He felt persuaded there was no science so well calculated as Natural History to improve the taste and elevate the mind. (Hear, hear.) In nature everything was beautiful—everything perfect and in order. There was no bad admixture of colours, and the more they studied the simple yet beautiful combinations of nature the more their tastes were likely to improve. They saw in nature the effects and manifestations of infinite wisdom and infinite love. The air, the earth, the sea were all teeming with life, and every plant and insect—every created thing sought sustenance from God and acknowledged its obligation to an Almighty Power for the food which it received. (Cheers.) After alluding briefly to indications of the power of reason evidenced in some of the lower orders of created beings, Mr. Standring proceeded to ask why the earth is teeming with life and beauty? Why do beautiful flowers cluster in the fields? Why are the skies studded with beautiful stars? Why was everything in nature calculated to afford pleasure and knowledge to man? Why—but because God wishes

for all to be happy, to increase in knowledge and prepare for a higher state of existence. It was impossible for a naturalist to be otherwise than a thoughtful man, because in his investigations he was constantly finding indications of and reasons for a future life. We are not to be here for ever—the present is only a state of probation for a brighter and a better world. Some of the changes observed in the insect world were emblematical of the future change which they would all have to undergo. He need not mention the transformation of the chrysallis which in a brief space, as it were at the touch of a enchanter's wand, became a thing of life and beauty, fit emblem of the freedom and happiness which the human spirit will enjoy when freed from its present state of existence and transferred to the unknown land where they were assured there is never ending spring and never failing pleasures. Mr. Standring concluded his address by explaining that, owing to unavoidable circumstances Mr. Hoffman was prevented from attending the meeting and that Mr. Tucker had been too much engaged to prepare the paper he had been expected to read. It only remained for him therefore to call upon Dr. Pittock to read his promised essay on the Corallines found on the Margate coast, after which Captain Cox would address the meeting on the silkworm and silk producing insects.

Dr. Pittock then rose and read an excellent paper, the more important portions of which we subjoin:—"At the annual meeting of this society, held at Ramsgate last year, a paper was read by my friend Mr. Hillier, on the "Sea Anemones of the Thanet coast," which will, doubtless, be fresh in the recollection of many here present to-day. As I think it will be universally admitted that the chief, or at least the most important, object of a society like this, is to investigate the flora and fauna of the district, in all their branches, so as to be able to compile a catalogue of the various species in each department, together with original observations on their history and habits, for the guidance of

the student of Natural History, and the general advancement of the science, I think I need not apologise for bringing forward before the meeting my humble quota to the work in the present paper, which may be considered a continuation of the subject treated of so ably by Mr. Hillier, and will embrace some account of the other marine zoophytes of this shore: the class, namely, of the *Corallines*, comprising the *Hydroid zoophytes* and the *Polyzoa*. As, no doubt, some specimens of this class have been obtained to-day in the dredging and shore-collecting expeditions, I trust it may be useful to those who are desirous of knowing something about what they have found to give an enumeration of the various species to be met with in this locality, together with a slight sketch of their Natural History. But as an account, however brief, of the whole of our marine species would occupy too much of the time and attention of my audience, I must limit myself for the present to a description of the shore species only: those, that is, which are to be found living and growing between tide-marks. And I can assure my hearers that although our coast is not peculilarly rich in zoophytes we have species enough to occupy the naturalist for many weeks, only to discover and discriminate them, and to afford him many weeks more of interesting research in the microscopic study of their structure, functions, and life-history. There are many here present who cannot be supposed to have any previous acquaintance with the subject of which I am about to treat; and I will therefore prefix a brief account of the general structure of these animals to the description of the particular species. What is a zoophyte? In its simplest form a zoophyte or polyp consists of a minute sac or bag of jelly-like substance, as shown here in the hydra or fresh water polyp, having a mouth at one end, surrounded by a circle of contractile threads or tentacles, for the purpose of seizing its prey; and provided with an adhesive disk at the other extremity, by which it is enabled to attach itself to any fixed object.

The interior of this sac is the simple digestive cavity or stomach, into which the food is received, and after undergoing the digestive process, the debris or insoluble portions are ejected. This gelatinous sac is endowed with a remarkable power of contractibility, by means of which it can change its shape, rapidly contracting into a globular form when irritated or alarmed, and again expanding into the long cylindrical shape here shown. The tentacles are equally endowed with this contractile property, by means of which they seize and close around their prey; and they are moreover gifted with a remarkable power of benumbing and killing their victim while struggling in their grasp; which faculty resides in certain minute poisonous darts, which they can project with great force, and which are called *nettling threads.* The marine species are for the most part more complex than this, being compound structures, consisting of an aggregation of such simple sacs as that I have described, united together by a common trunk, so as to give a branched and plant-like aspect to the animal, as shown in D 35 and others. These compound forms, called Hydroid zoophytes, from their being formed on the type of the hydra before described, are invested with a horny tube, which they have the power of secreting to serve for protection and support, highly requisite in the boisterous element they inhabit. This horny sheath called a polypidon invests the stem and branches, and provides cup-like cells, of various shapes, into which the polyp-heads can contract and conceal themselves when danger threatens. It varies in size, with the contained polyp, from a few line to a foot in height; is for the most part erect and shrub-like, attached by root-like fibres to stones and shells, or sometimes creeping like ivy over sea-weeds and rocks. The genera of the Hydroid zoophytes are founded upon the configuration and degree of branching of this investing sheath, or polypidon as it is termed, together with the form and arrangement of the cells: having premised which, I will proceed to enumerate the shore species." Dr. Pittock then

enumerated the different species of Hydroid zoophytes, his descriptions being illustrated by large sized diagrams. This portion of the paper we must necessarily omit, as without the illustrations the remarks would not be generally understood. The Dr. then proceeded as follows :—" I have now enumerated the various Hydroid zoophytes found on our rocks, and will now turn to the Polyzoa, of which class we have a greater variety here. The tribe of animals we are now about to consider, though practically ranked with the zoophytes, are in reality not zoophytes at all, as a very brief consideration of their organization will shew. They certainly resemble them in outward form, and mode of life, and the dried polypidones of the two can scarcely be distinguished by the unassisted eye; like the zoophytes we have been considering, they are composed of a series of horny or stony cells, which are inhabited by animals closely resembling polypes, each with its crown of tentacles, and all united into a compound life. But if we examine them more minutely we shall find they differ completely in all essential characters from the zoophytes proper. D 33 shews a living specimen of one of our shore forms, the transparency of whose envelope will allow us to observe the animal within, and the delicacy of its tissues will permit us to penetrate into the secrets of its internal anatomy. Instead of being a simple sac like the hydra, we see here a complete digestive system; a gullet, two stomachs, and an intestine; in fact, as highly organised a digestive apparatus as exists in any of the lower forms of mollusca. And again, the tentacles are not here contracted threads, as in the polypes, but stiff hollow bristles, communicating with the cavity of the body, and permeated by the nutrient fluid; and beset on both sides by vibratite cilia; in fact, they are breathing organs, like the gills of the oyster or muscle, not instruments of prehension, like the tentacles of the hydra. It is true they also serve to procure the food of the animal, but it is not by prehension, as the arms of the polypes do, but by ciliary currents, producing a vortex in the water, in

which the prey is engulphed, according to the ordinary mode of feeding in the bivalve mollusks. However, for practical purposes they are conveniently and generally classed with the zoophytes proper. There is the greatest variety in the form and arrangement of the cells in this group, and consequently in the resulting compound structure. Like the hydroid zoophytes, it is either erect and shrub-like, or creeping and parasitic; slender and delicate, or solid and stony; and in many cases furnished with curious appendages, in the shape of *birds' heads*, consisting of a kind of vulturis' head with a moveable jaw, which keeps snapping continually, and whose use is surmised to be connected with the prehension of food; and *whips*, or jointed bristles, also endowed with a power of independent movement, apparently for the removal of foreign substances from the polypidons. The *genera* of this class are founded upon the texture and arrangement of the cells, and on their shape and appendages."

Captain Cox, on rising, expressed the great pleasure he had experienced in listening to the very able paper contributed by Dr. Pittock. He also expressed his concurrence with the very appropriate remarks made by the worthy Mayor on opening the proceedings. He had not prepared a paper himself, but the subject which he was about to introduce to the notice of the meeting was one of great interest, not merely to naturalists, but also in a commercial point of view, and more particularly to the ladies. By the kindness of Mrs. Friend, of Northbourne, he was able to exhibit before them specimens of the silk worm, and he proposed to give a few particulars respecting that interesting little creature, and of the production of an article which entered largely into the composition of ladies' dresses. He might observe that the attempts to cultivate the silk worm profitably in this country had hitherto proved entire failures on account of the difficulty of procuring its food—mulberry leaves—in sufficient quantities and at a low cost. The silk worm was exceedingly ravenous, and the amount

of food required for its proper sustenance was something very enormous. In countries where the silk worm is cultivated the people care very little about the mulberry itself. Captain Cox explained that the quality of the silk produced depended on the food supplied to the worms, and that the mulberry leaf contained the essence of the very best that could be produced. Worms fed upon lettuce leaves produce a very poor quality of silk indeed. He then proceeded to describe the *modus operandi* by which the silk is produced, his remarks being illustrated by worms which were handed round the company, and which excited great interest. He then proceeded to observe that a question of very great commercial importance to this country was involved in the production of silk, and to the solution of that question he was directing his attention. He had already stated that the cultivation of the silk worm in England had hitherto failed in a commercial sense on account of the difficulty of procuring the food in sufficient quantity and at a sufficiently cheap rate. But while they must still be dependent upon other countries for the best qualities of silk, would it not be possible to produce in this country an inferior quality in sufficient quantity and at a cost that will enable it to be profitably cultivated, and thus make its production, commercially speaking, a question of national importance? Captain Cox then proceeded to state that Mrs. Friend had obtained from her worms almost as much silk as would make a dress; and concluded by explaining the process by which the "gut" used in fishing is made from the silk worm, when the little insect is in a certain state which is fully understood by those who have had experience in its cultivation.

Captain Cox's address excited a great deal of attention, especially among the ladies.

The Mayor explained that Lady Burton had presented the large hornet's nest then upon the table to the Margate Literary and Scientific Institution. He also took occasion to advert upon the great amount of sagacity displayed by

the hornets in the construction of their cells, and adverted to other articles exhibited on the table, the greater portion of which we have enumerated above.

The following new members were then formally proposed and elected:—The Rev. Sanderson Robins, incumbent of St. Peter's, and Mr. and Mrs. Gibson.

Mr. Dowker then read the following letter, which he had received from Sir Norton Knatchbull, president of the society:—

London, July 24th, 1860.

Dear Sir,—I am extremely sorry that engagements long since made, and not in any way dependent upon myself alone, prevent me from attending your meeting at Margate on the 26th instant. I had been led to suppose when I agreed to your kind proposal of acting as your President for this year that your annual meeting would have been held at Ashford, but even had that been the case I could not have been with you on the 26th. I regret this very much, because it may appear to some of your friends that I am making a very unkind return to the compliment your society was good enough to pay me. Had it been possible I would have met you anywhere: as it is, I can only express my regret, my thanks to the society for the attention shewn me, and my best wishes for the success and useful progress of the East Kent Natural History Society.—I have the honor to remain, dear sir, yours, very truly,

Norton Knatchbull.

Mr. Dowker reported that he was anticipating a great deal of pleasure this year from some nightingales building in his garden. All his expectations, however, were disappointed. A pair of "butcher birds" had taken up their abode in the garden, and the consequence was that all the other birds excepting sparrows had forsaken their neighbourhood. Whenever the butcher birds attacked the sparrows, the latter raised an instant alarm, and all the sparrows in the neighbourhood collected together, and proved too many for the foe. He was now left with only the sparrows; and certainly whenever he came again across any of the butcher birds he should make them as scarce as possible. He exhibited at that meeting a specimen of the *Anguis fragilis*, or blind worm, which was rather noticeable in

natural history. It was not a true snake, but a kind of intermediate species between the snake and the lizard.

Some general conversation followed on a variety of subjects connected with natural history, in which Captain Cox, Mr. Harman, Mr. Dowker, and others took part.

Captain Cox then proposed a vote of thanks to Lady Burton for her kindness in sending the hornet's nest and other specimens, for exhibition at the meeting, and also to other ladies and gentlemen who had conferred similar favours on the society.

E. F. S. Reader, Esq., seconded the motion, which was unanimously agreed to.

A communiction was received from Mr. Hillier, wishing to resign his office as Local Secretary, as his time was too much occupied to give the Society proper attention.

Votes of thanks were also awarded to the Mayor and Corporation for the use of the Town-hall; to the Local Committee for their services in getting up the meeting, and to the Mayor for presiding, after which the proceedings, which were throughout of the most pleasant and agreeable character, terminated.

EAST KENT
Natural History Society.

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MEETING AT ASHFORD.

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The Third General Meeting of this Society was held at Ashford, on Friday, the 31st August, 1860, and proved a most interesting and in every respect a satisfactory one. The arrangements for the meeting were principally under the control of Robert Furley, Esq., and a resident committee. The programme of the day's proceedings comprised a botanical ramble over the Eastwell Downs; an exhibition of specimens illustrative of different branches of Natural History; and a public meeting.

Fortunately the weather was very favourable, and, in accordance with the programme a large party of excursionists met at the principal entrance to Eastwell Park —(the Earl of Winchelsea having kindly permitted the society to have their excursion in the park)—under the

direction of Mr. J. Marten of Chilham, Wm. Harris of Charing, T. Thurston, and Mr. A. Russell of Ashford. After examining the entrance tower the party proceeded through the grounds to Eastwell Church. The botanical specimens met with were those generally found on the chalk at this season. In the pond were found *Potamogeton natans* and *lanceolatum*, *Polygonium amphibium*, *Veronica anagallis;* and in the woods adjoining were found *Epilobium hirsutum* and *pariflorum*, *Lythrum salicaria*, *Eupatorium cannabium*, *Scrophularia nodosa* and *aquatica*. The border of the large pond was edged with large blocks of sandstone rock, having a waterworn appearance, and similar to those composing the "Kits Coty house," a Druidical remains near Maidstone. These blocks occur scattered over the chalk down in this neighbourhood. After visiting the Church the party proceeded across the park visiting the highest grounds where magnificent views may be obtained of the surrounding county, the geological features of which were explained by W. Harris, who pointed out to the party the courses of the Stour through the green-sand at Ashford, and then through the valley in the chalk, between Wye and Eastwell—the high ground on which they were standing. This range of hills stretches out towards Maidstone and constitutes part of the north downs. From this vantage grounds the whole of the greensand towards the Weald was stretched out in the valley, Ashford being on the low ground through which the different branches of the Stour bend their winding course. Large specimens of the beautiful *gentiana campestris*, in great abundance, were found in the park. The excursionists next directed their steps towards Westwell Church, visiting on their way a small spring, one of the sources of the Stour. This small stream took its rise from a deep gorge in the chalk, and it was noticed that magnificent specimens of Scolopendrium Vulgare were growing in great abundance, covering large circles of chalk rock with their rich green fronds. Although so abundant no varieties were found. This fern seems to

take a preference to a chalky soil, and it would be well for fern growers to bear this in mind in forming their ferneries, this plant being a great ornament when grown well. After an examination of this curious Church the party returned to Ashford: It would be impossible and useless to innumerate all the plants found in this botanical expedition, but it is quite evident that this neighbourhood yields a large flora of chalk plants, and had the meeting been held here at an earlier period of the year we doubt not but that many of the Orchideæ would have been found, and this delightful spot might well be made the starting point for another botanical excursion in this neighbourhood. We learned from Mr. Russell that many a prize might here be obtained by the young entomologist, but the advanced period of the year was not favourable for botanical or entomological specimens, no rarities were found, but there was abundance of interest to the excursionists, who returned well pleased with their successful expedition.

After partaking of a lunch at the "Saracen's Head," the party adjourned to the Public Rooms, which were well filled, this being by far the largest meeting the society has held this year.

The "public room" in which the collection was displayed, presented at once an imposing and pleasing appearance, the taste displayed in the arrangement being in keeping with the great variety and interesting nature of the specimens generously placed at the disposal of the committee. It is a matter of regret that a complete list was not prepared of either the exhibitors or their contributions. Among the more prominent features of the exhibition was a collection of ferns, British and Foreign, lent by Miss M. H. Furley, of Ashford, and Mrs. Gardner, of Willesborough the latter lady being also a contributor of a number of rare and curious flowers and plants. There was a splendid collection of butterflies. The chief exhibitors of these were Mr. A Russell, of Ashford, who had 16 cases, each con-

taining a different variety, and Mr. H. Foster, of Ashford Messrs. G. Allen, of Alfred; E. Hayward, T. George, A. Harrisson, R. Down, Saffery, G. Godden, Master C. Viggers, W. Hayward, J. Allen, G. Wilks, W. Orr, and W. H. Taylor, of Ashford; Mr. T. Woodford, of Eastwell, and Mr. Palmer, of Beaver, were also exhibitors of innumerable varieties of butterflies and other insects; Mr. F. Sankey, of Wingham, exhibited specimens of the larvæ of the goat moth. Master J. Bird sent a case of eggs of British birds, Mr. T. E. Scott and Mr. T. Hayward, each a case of stuffed birds; Mr. Orr was also the exhibitor of several cases. Mr. Burgess, of Westbrook House, Lydd, and Mr. G. Gell also displayed a large and valuable collection of stuffed birds, among them being some very rare specimens, shot in this county. Among the other exhibitors were Captain Cox, of Fordwich House, several beautiful specimens of the shell of the nautilus; Mr. J. Bateman, a series of microscopic photographs; Dr. Carter, Kennington Hall, two specimens of Bohemian chatterers, shot at Kennington, and other foreign birds; R. N. Taylor, collection of fossils and minerals; Master A. Harrison, Ashford, cases of stuffed birds, and a great many of butterflies; Mr. G. Cheesman, Ashford several specimens of fossils from different parts of England collected by himself; Mr. G. Allen, of Alfred, several cases of stuffed birds and animals, a fox, and two owls; Mr. G. Attrill, of Alfred, specimens of seaweed and Indian curiosities; Mr. W. Payne, stuffed British birds and squirrels; Mr. Harris, of Charing, a large collection of chalk fossils, specimens of gault, green sand, &c., and a dressing-case, dug up from the Goodwin Sands; specimens of ichthyosaurus in chalk, found at Folkestone; Mr. H. Whitfield, an aqua-vivarium; Mr. J. Furley and Mr. N. Toke, some specimens of fossils, the latter gentleman also adding some agate specimens, and Indian shells and gums, &c., &c., &c.

The Rev. J. P. Alcock having taken the chair, on the motion of Robert Furley, Esq., proceeded to open the proceedings. Before entering upon the business for which they had assembled he wished to express his heartfelt thanks to Almighty God for the blessed change which had taken place in the weather, and the commencement of a season in which they might gather the fruits of the earth, so that in due time they might enjoy them. (Hear, hear.) He felt great interest in the study of natural history, and he was glad to see so large a company gathered together on that occasion. When people really enjoyed nature, and took an interest in butterflies and insects, he looked upon it as proof of cultivated taste and kindness of heart. He was greatly pleased to see the beautiful specimens arranged round the room, and he directed particular attention to the collections of moths and butterflies, and birds and insects exhibited by those who must have devoted a great deal of time and incurred no small expense in their collection and classification. The study of natural history exercised a great and improving influence, and in proportion as the love of nature increased there was a softening of heart, and they could perceive a change for the better. (Hear, hear.) To the lover of natural history every locality had its distinct charms and distinguishing beauties, which those who did not share the taste could not either feel or appreciate. A great change had taken place of late years, which he believed might be attributed to the spread of education and the circulation of cheap and excellent books. He held in his hand a volume on entomology, published twenty-five years ago, and the price of which at that time was £2 14s.; and he also held in his hand a volume by W. S. Coleman, recently published, the cost of which was only 1s. (Cheers.) He again remarked that he rejoiced to see so large a meeting, indicating as it did the extent to which the taste for Natural History had spread among the people of that locality. No one knew the inducements to enter heartily into the study more than he did himself, and he would earnestly entreat them all, but the young particu-

larly, who took up the pursuit of Natural History, not to indulge in it on the Lord's day. They should not forget that the God of Nature was the God of the Bible, and that he tells in the Bible what his will is; and, while they were indulging their love for Nature, they should take care to do so in a religious spirit and not commit a sin by breaking one of His positive commandments. He advised all who had not got a volume like the one in his hand, to purchase one immediately. The cost was only 1s., and while they would find in it a great deal of valuable and interesting reading, they would learn also to look from Nature up to Nature's God. (Hear, hear.) This season of the year was usually very rich in regard to insect life, the glow worm forming a most interesting object for the observation of those who were fortunate enough to discover it. He might observe, what was perhaps not known to all present, that the glow worm was only the female insect, the male being a winged beetle. The glow worm had formed a subject for the poet's muse, and one writer had said :—

Thine is an unobtrusive blaze,
Content in lowly shades to shine;
How much I wish, while yet I gaze,
To make thy modest merit mine!

After some further general observations the Chairman concluded, amid considerable applause, by quoting the following beautifully expressive and appropriate lines :—

Where sense can reach or fancy rove,
From hill to field, from field to grove,
Across the waves, or round the sky,
There's not a spot, nor deep, nor high,
Where the Creator hath not trod
And left the footsteps of a God.

Mr. William Harris, F.G.S., of Charing, read a paper entitled "Outlines of the Geological History of the Country between Kingsnorth and Eastwell Park." He said: As the section of this district selected for my lecture, and over which many of you have rambled this morning, embraces an assemblage of rocks of so many varieties, composed of clays, gravels, and limestones,

accumulated by the action of seas and rivers during a long period of time, under various conditions of climate, and with many changes in the relative position of the land, I hope to be able to explain the order of succession of these changes, to give a brief description of their results, with notices of the animals and plants that tenanted the lands and waters during that ancient period; and thus to illustrate the physical history of Ashford and its vicinity, without inflicting on you any great amount of fatigue. A few introductory remarks on the sequence of the rocks or strata to be noticed will be found useful, and I beg you to bear in mind that all these rocks were formed at the bottom of the then existing seas. It is supposed that the rocky materials which form the earth's crust are about ten miles in thickness, and that granite appears to be the lowest; but it will suffice for our purpose to notice that there are several kinds of rocks in the lower part, and that the wealden reposes on the oolitic rocks, which are about the middle set. Immediately above the wealden we find the lower greensand, on the top of which the gault appears; above the gault we have the upper greensand, and next the chalk-marl; and then the chalk of which our downs are made; above the chalk are the London clay and other clays and sands called the tertiaries.

THE WEALDEN.

We shall commence our journey at Kingsnorth, which is on the north-east boundary of the exposed portions of the geological formation called the weald or wold, being the low wooded country lying between the north downs and south downs of Kent and Sussex. The wealden group of strata is of fresh-water origin, and consists chiefly of clays and shales, with subordinate beds of sands, sandstones, and shelly limestones, the fossils in which indicate an estuary or brackish-water origin. The wealden is supposed to occupy the site of an ancient estuary, which received the clay and mud of some gigantic river whose waters occasionally bore down the spoils of land plants and land animals, to be entombed along with those of aquatic origin; and this formation

is of very great geological interest, since the embedded remains give us some insight into the nature of the terrestrial fauna and flora of the lower cretaceous epoch. Dr. Fitton first discovered that the whole group was of fluviatile origin, and in proof of this he pointed out the entire absence of marine fossils characteristic of the cretaceous rocks above and of the oolitic strata below, and to the presence in the weald of paludinæ and various fluviatile shells, as well as the bones of terrestrial reptiles, and the trunks and leaves of land plants, including conifers, cycads, palms, ferns, &c., which indicate a genial, if not a tropical, climate. Geology brings us acquainted with strange animals, as will be seen by the reptilian fauna, which was rich, and comprised the iguanodon, megalosaurus, hylæosaurus, ichthyosaurus, plesiosaurus, pterodactyl, and chelonians or turtles, of some of which my friend Mr. Jones has kindly brought down portraits. In the upper division, or weald clay, its highest beds are comformable to the inferior strata of the lower greensand, and of similar mineral composition. To explain this, Sir Charles Lyell says—we may suppose that, as the delta of a great river was tranquilly subsiding, so as to allow the sea to encroach upon the space previously occupied by fresh water, the river still continued to carry down the same sediment into the sea. In confirmation of this view it may be stated that the remains of the Iguanodon mantellii, a gigantic terrestrial reptile, very characteristic of the wealden, was discovered by Mr. Bensted, in the overlying Kentish rag, or marine lime stone of the lower greensand, near Maidstone. Hence we may infer that some of the saurians, which inhabited the country of the great river, continued to live when part of the country had become submerged beneath the sea. Thus in our own times we may suppose the bones of large alligators are frequently entombed in recent fresh water strata in the delta of the Ganges. But if part of that delta should sink down so as to be covered by the sea, marine formations might begin to accumulate in the same space where fresh-water beds had previously been formed; and yet the Ganges might

still pour down its turbid waters in the same direction, and carry seaward the same species of alligator, in which case their bones might be included in marine as well as in subjacent fresh-water strata. The iguanodon was first discovered by Dr. Mantell, who tells us it was an herbivorous reptile, and regarded by Cuvier as more extraordinary than any with which he was acquainted. The teeth, though bearing a great analogy in their general form and crenated edges to the modern iguanas which now frequent the tropical woods of America and the West Indies, exhibit many striking and important differences; for the teeth of the fossil iguanodon have often been worn by the process of mastication, whereas the existing herbivorous reptiles clip and gnaw off, but do not chew, the vegetables on which they feed. Fish have also been found in the wealden, but the only species I have met with is the lepidotus, of which two fragments are submitted for your inspection—one procured from Egerton by Mr. Chambers, of Pluckley, and the other from Headcorn by me. The lepidotus is allied to the lepidosteus, or gar-pike, of the American rivers. The whole body was covered with rhomboidal scales, very thick, and having the exposed parts coated with enamel. Most of the species of the genus are supposed to have been either river-fish or inhabitants of the sea at the mouths of estuaries. The shells of a species of paludina, closely resembling the P. vivipara of English rivers, abound in bands of limestone called Bethersden marble, among which, plentifully scattered through the wealden clays, are shells of the cypris, a genus of crustaceans abounding in lakes and ponds; and we often find shells of cyclas, unio, and other fresh-water and brackish-water shells. This deposit, after being overlaid by the greensand and gault, was arched over with chalk, extending from the north downs to the south downs; but the theory and the proofs of the denudation of the weald, although interesting to geologists, are not likely to prove interesting to a mixed assembly; and we will, therefore, step out of the wealden to the lower greensand, or Kentish rag, which is a marine deposit and at the bottom

of the cretaceous system.

THE LOWER GREENSAND.

This formation ought to be well known to us; but a few observations as to the origin, lithological composition, and fossil contents of this rock will, perhaps, be acceptable. This deposit is described by Dr. Fitton as a triple alternation of sands and sandstones, with beds of chert and fuller's earth in some localities, and it consists of ordinary beds of sand, clay, and impure limestone, the materials of which resulted from the wearing down of pre-existing rocks, and the nature of which rocks we learn from finding in the greensand pebbles of quartz, quartzose sandstones, and green grains of silicate of iron, chlorite, and mica. This deposit is formed partly of green and partly of ferruginous sand and sandstone, with some limestone; and these rocks are classified thus (in ascending order):—

Calcareous stone called Kentish rag..	60 to	80	feet thick.
Sand with green matter.....	70 to	100	,,
Sand—white, yellowish, or ferruginous, with concretions of limestone and chert..... about	70	70	,,
	200 or	250	,,

At the base of the lower greensand, we find, at Ashford, the Atherfield clay, a thin bed of dark clay, not very different in appearance from the weald clay, but its fossils are of marine origin. The only specimen I have from this deposit is a large oyster, *Gryphœa sinuata*, found by the late Mr. Mark Dorman in clay from a well at the bottom of Ashford town. I believe it was at Raglan-place, where these oysters were numerous. Mr. Dorman brought away five or six of them and gave me three, which were eagerly caught after by my geological friends in London, to whom I gave two of the specimens reserving the one I now submit for inspection. I do not know what other shells might have been found there if I had been on the spot, but the well was finished and covered in before Mr. Dorman called on me, and my object in mentioning these facts is to draw the attention of resident geologists to the

desirableness of watching the sinking of wells in that part of Ashford. Next to the Atherfield clay you have the Kentish rag. The Kentish rag, the portions used for building-purposes (including stone-lime, which the late Mr. Whichcord, the county surveyor, invariably stipulated in his contracts should be used for drains and foundations of buildings) was consolidated by small grains of quartz becoming cemented together by different mineral matters. These materials must have been formed as sand in water, and must have been deposited by water, and this would happen in rather shallow water running with a strong current; for the Kentish rag is rich in fossil shells, marine animals, and plants which lived in the shallow waters in which they were deposited. At the same time it is often difficult to find the fossils because the sand, when the sea retired from it, allowed the rain-water to filter through, and in that way the calcareous parts of the shells were washed away, and only casts or moulds are left, many of which are met with in the sandstone. All sandstones are cemented either with lime, iron, or silex; but the best sandstones for building-purposes are those which have a siliceous cement in their structure, because the silex does not give way again to the action of the atmosphere and water. On the surface of the Kentish rag we meet with sand with green matter unconsolidated, but occurring in a state of sandy loam. This is said to be 70 or 100 feet in thickness; but the most prominent, best known, and extensively used sand in this form, about Ashford, is the ferruginous sand, such as is found on the north of Ripton farm; and again, at and beyond Hothfield-heath, and at Calehill, and the south-west side of Charing. Some of the soft brown sands are used for moulds in casting metals. The white sand is best seen near Bearsted and Aylesford; and is, I believe, used in glass-making. This sand is said to be 70 feet thick. The fossils of the lower greensand are marine animals, and there is plenty of fossil wood in it. Specimens are placed on the table for your inspection.

The more common shells are gryphæa sinuata, gervillia

anceps, trigonia dædalea, T. carinata, rhynchonella gibbsiana, terebratula sella, and large species of cephalopods, belonging to the genera—nautilus, ammonites, ancyloceras, and also belemnites; the latter form is allied to the cuttle-fish of our present seas.

THE GAULT.

Proceeding along the Faversham road over Kennington Common, we arrive at Lencker Street, where we meet with the gault. Gault is a provincial name for any bluish tenacious clay; but it has been adopted by geologists to denote this peculiar clay, which contains indurated argillaceous concretions and layers of greensand· In the bottom bed phosphatic nodules are found at Westwell Leacon, at Folkestone, and near Farnham in Surrey they are so abundant that they are ground down and used as a manure on account of their containing a large percentage of phosphate of lime, of animal origin, partly coprolitic, propably derived from the excrements of fish. The gault is described as having an average of 100 feet, but I have not met with it beyond 45 feet in thickness. This bleuish clay presents no disttnctive mineral aspect, but is rich in peculiar fossils, in excellent preservation, often with their nacreous shells entire.

UPPER GREENSAND AND CHALK MARL.

The upper greensand seems in this district to have become so mixed up with the chalk-marl as to be lost as a separate stratum; but in the Isle of Wight and some other districts it is found to consist of green-sand with layers and concretions of chert, and with seams and nodules of coarse chalcedony. The chalk-marl is an argillaceous limestone, and is so intimately connected with the upper greensand, on which it reposes, as to be scarcely distinguishable by an unpractised observer; but it abounds in fossils and contains numerous species of Ammonites and other cephalopoda, which are either of excessive rarity in or altogether absent from the upper chalk strata. Ammonites varians, and A. Mantelli, are characteristic species of

the chalk-marl. Upon this deposit along the base of the north and south Downs, and elsewhere on the flanks of the chalk hills, and in the valleys at their foot, there frequently occurs a superficial layer of earthy or chalky material, which, on careful manipulation, yields quantities of the foraminifera of the chalk-marl in great plenty and variety. Such a storehouse of the remains of the cretaceous microzoa occurs at Charing, between Ashford and Maidstone, at the foot of the North Downs. It was first observed by me, and I have for many years collected its interesting contents, specimens of which are contained in the slides in the long boxes before you. A thin narrow band of this whiteish, sandy, tenacious, and calcareous clay is traceable for some miles east and west of Charing, widening out occasionally in the basins or little valleys of the district. This superficial clay, or "chalk-detritus," appears to have mainly resulted from the action of water on the decomposing surface of the chalk-marl, the outcrop of which, together with that of the upper greensand (here exceedingly thin), is more or less covered by it. At some places flints from the chalk, and even gravel-flints, are found in the detritus, mixed with it at a comparatively modern period; and, where streams or marshes have had much influence on this detrital bed, fresh-water and land shells of existing species, seed-vessels, and small bones are found in it. This debris is largely made up of the shells of numerous kinds of foraminifera, spines of sponges, valves of cytherinæ, fragments of bryozoa, and other minute animal remains.

THE CHALK.

The chalk rock and marl have been formed above the upper green sand, and must therefore be of later date. The pure white chalk is composed of lime and carbonic acid, and is a mere aggregation of fragments of shells and other creatures, so minute that upwards of a million are contained in a cubic inch of chalk; the other particles appear to be the detritus of similar structures. These organisms for the most part are the calcareous chambered shells of the animalcules termed foraminifera, all of which belonged

to the sea, and it is therefore a marine deposit. The chalk is in this neighbourhood from 300 to 400 feet thick. Now, where the sea was two miles or more in depth, it would be too far from land to receive these deposits from a shore; but geologists explain the great thickness of some of these beds by the supposition that the floor of that sea was continually sinking, and receiving deposits from the animals which infested it. In the chalk we frequently find the perfect remains of animals, such as fishes, &c.; but we meet with no bones of land animals, nor any plants except sea-weeds, and here and there a piece of drift wood; and we therefore conclude that the white chalk is the product of an open sea of considerable depth. The existence of turtles and saurians, the ichthyosaurus or fish-lizard, found by me in chalk at Folkestone and by Mr. Carter, at Cambridge, the coniosaurus in my collection from Charing, and the pterodctyl or winged lizard in the chalk near Maidstone, implies, no doubt, a neighbouring land, which some geologists believe to have been on the west and south. I have been asked to explain the origin of the layers of flint in chalk, whether in continuous sheets, or tabular veins, or in the form of nodules. This is more difficult to explain than is the origin of white chalk. Sir Charles Lyell tells us that "no such siliceous masses are as yet known to accompany the aggregation of chalky mud in modern coral-reefs." The flint abounds mostly in the uppermost chalk, and becomes more rare or is entirely wanting as we descend; but this rule does not hold universally throughout Europe. Some portion of the flint may have been derived from the decomposition of sponges and other zoophytes provided with siliceous skeletons; for it is a fact that siliceous spiculæ, or the minute bones of sponges, are often met with in flinty nodules, and may have served at least as points of attraction to some of the siliceous matter when it was in the act of separating from chalky mud during the process of solidification. But there are other copious sources, of which the decomposition of felspar is one, and the disintegration of

mica is another; but, as Sir Charles observes, we have still much to learn before the conversion of fossil bodies into stone is fully understood.

I have endeavoured to give you the outlines of the physical history of the district, and I hope I have made myself understood. At all events, I am sure that you would find ample interest in the subject if you would take it in hand yourselves, and not neglect the opportunities of collecting and investigating those objects of past creation now buried in the rocks, but once living, and so wisely adapted by creative intelligence to the then existing physical conditions—unfolding to us lessons of useful instruction; while at the same time we need not overlook those subsequent changes of land and water, to which the scenery, as well as the economic relations of this part of the county of Kent, are evidently due.

Thomas Thurston, Esq., of Ashford, next rose and, after some introductiory remarks, read the following paper on the River Stour:—I have been requested to improve the present occasion, by introducing some remarks on some subject, connecting this locality with the society which has this day honored our town with its presence; and I hope the subject your are aware I am about to introduce, viz., one connected with the river Stour, may not prove wholly devoid of interest. It is gratifying to many of us to find the fast growing desire in the young to make themselves conversant with the minutiæ of different species of animate and inanimate nature, and I know nothing so likely to lead us to a knowledge of our Creator and a just estimate of His almighty power and wisdom, as learning to appreciate the wonderful *order* which prevades the whole universe, and which I feel to be eminently displayed in that portion of the creation of which I have undertaken to attempt the illustration. I am old enough to look back with some surprise at the advance which science has made during the present century, indeed I may say within the last 20 or 30 years societies like this I am now

addressing have sprung up around us, and instead of each individual seeking "to hide his light under a bushel" we hope to emulate each other in diffusing that knowledge which circumstances may have enabled some of us to attain. A lengthened life of professional activity has given me many opportunities of becoming acquainted with the peculiar features of *this* county. I regret I have not made a better use of them than I have done; but my *duties* have drawn me from those studies in which I early took a delight, and therefore these remarks result more from the study of authors which might have given me a more scientific knowledge of my subject. I well recollect, when botanising with my schoolfellows in the north of England, I found a fine specimen of osmunda lunaria or botrychium (as it is now called). This gave me a standing with my fellow botanists and I felt an inclination to continue the study of this beautiful science; but removing into Kent I lost my instructor and have been unable to continue it. With societies like the present this would not have happened; and I beg to suggest to my young friends, who are now engaged in various studies of that nature which surrounds them on every side, in the air above and in the ground beneath, that as they grow older they will reap a rich harvest from their labours, with this great advantage that the store will be always increasing. While writing these notes I was led to expect that Mr. Wm. Harris would kindly endeavour to diffuse some of his extensive knowledge of the character of the soils, strata, and other geological peculiarities of this district. I know no one more able to do so, as he has diligently devoted his energies to these subjects and gained a lasting reputation therein; however, if not treading too closely in his footsteps, I may be allowed to allude to the rivers and streams of this district to which the strata he has described give rise. In 1743 Dr. Christopher Parker published a most interesting description of these rivers, and a very accurate map (when we consider the materials he had to make it from). I was not aware that a copy of his map was to be obtained until I had thrown these remarks

together. I had lost my copy of his book and only had it returned to me on Wednesday last. I can assure any person taking an interest in these matters that the book will repay a careful perusal. As a member of the Council of the Kent Archæological Society I have obtained the loan of their excellent map for a few days, and have therefore exhibited it on these walls. You will be aware that the two most important features in my subject are the rivers Medway and Stour, to the latter, viz. the Stour, you will most of you claim acquaintance, and to its sources I propose more particularly to allude, as it rises and discharges itself at the Eastern division of the county, to which you profess more particularly to confine yourselves. From this river the town in which we are met takes it name. Hasted says it was called formerly the Eshet until the junction of its two branches at Ashford, which in Doomsday is called Estefort and Essetisford, and in the will of Sir John Fagge, in 1395, it retains the name of Eshetysforde, or the ford of the Eshet, which ford was plainly seen at the site of the present bridge during some recent excavations, and several relics of antiquity were then discovered. Whether the two names of Eshet and Stour have a common derivation, I am unable to trace, but the town is still called Eshford by many the rural population, which I consider a traditional corruption of the ancient name. The sunken way by which you will recollect we approach the ford from Willesborough, shows how many generations have trod in the same path, and like indications near all the other entrances show that for centuries and probably for thousands of years Ashford has been the focus of intercommunication and the nucleus of the district. The river Stour reaches Ashford by two opposite streams or branches, both, together with their numberless arms, rising in what I call the Ashford Basin; one rises near Lenham Church, the other near Postling Church. I consider myself justified in giving the name of the Ashford Basin to this district, out of which the Stour takes its rise. You may perceive that Dr. Parke calls it the Ashford Vale, a term synonimous with "Basin."

It is formed by the watershed line, a line on the other side of which all the water running off the surface takes some other course—either first joining the Len which runs from Lenham to Maidstone, and there falls into the Medway; or, secondly, joining the Sluggish Beult, which, rising at Shadoxhurst, passes through Smarden and empties itself into the Medway at Yalding; or, thirdly, along the rock ridge from Kingsnorth and Orlestone to Aldington, falling towards Romney Marsh, and, taking the course of the Ancient Lemen, empties into the Harbour of Rye; or, fourthly, beyond Sandling, falling into the Hythe Valley; or, fifthly, over the high chalk range shedding towards the Nore, but which after filling the chalk strata discharges a large portion of its waters into the Ashford Basin by those pores which I shall presently describe as the sources of the River Stour. These sources, which first supply this river in ordinary seasons, and which come almost entirely from the chalk, are in many cases powerful enough to turn the wheels of water-mills near their first exit from the surface of the ground. The principal of them are Lenham, Westwell, Eastwell, Brooke, and Postling, that of Westwell being the most remarkable for quantity and regularity of supply. The chalk strata, in common with all the others in this part of the county, is known to dip at a considerable angle to the North; it is underlaid by the gault or blue clay, for the slight vein of upper green sand which intervenes is too thin to be of any importance in a popular point of view. This chalk strata presents a steep face to the south of about 300 feet perpendicular depth; it is very porous, full of chasms, and becomes the receptacle of all the rain which falls on the northern half of the county, lessened only by the small portion which runs off the surface, or the much larger portion which escapes by evaporation. The clay known by the name of gault, and which is so much used for the manufacture of tiles and pottery, underlays the chalk and is impervious. It is about 50 feet in thickness, and retains on its surface all the moisture which enters above. A species of marle

called the chalk marle, also takes the base of the chalk, and probably partakes of the retentive qualities of the gault. It is ascertained that the surface level of this bed of water dips also to the north, as well as somewhat to the east, naturally caused by the means of exit in these directions, the ridge of the chalk confining it on the south. The wells on the summit of the chalk ridge vary from 250 to 350 feet, or over 20 rods in depth. They decrease gradually in depth as they approach the northern shore, and at Whitstable a perpetual stream is obtained on the principle of the artesian wells at a few feet above the surface, by boring through the alluvial soil which overlays the chalk. Several small streams burst out at short distances from the northern coast, but the great body of the chalk district is totally unsupplied by streams along the the numerous valleys on that side of the county. As I before stated a number of strong springs find vent on the southern face of the chalk, all of them first taking a southerly direction down the natural slope of the valley to the bottom of the rock hills, by which they are directed towards the centre of the basin in two main channels, turning nearly 20 watermills before reaching Ashford, where all unite except the Eastwell stream which joins about two miles below; and it is a peculiar feature of this river, caused by the formation of the surface, that no other stream joins it until it approaches Canterbury, when the small stream from Harbledown joins it at Whitehall. After this it traverses the Canterbury Vale by Grove Ferry, near which the Lesser Stour joins the main river. It thence proceeds to the sea with that peculiar indentation forming the Stonar Island, the harbour of the old town of Sandwich preventing a more direct communication with the sea. There are numerous very strong springs along the channel of the river and in the adjacent meadows, which add largely to its volume and power. They commence after the closing in of the chalk hills below Wye, and continue to Westbere, where they assume a peculiar character, called nucker pits, said to be of almost fabulous depths; from thence the

springs take an eastward direction, breaking out along the edge of the marshes, and joining the river at Pluck's Gutter. There are two other remarable streams joining at Sandwich, called the north and south streams, the latter rising at Eastry and Northbourne and supplying the town of Sandwich with abundance of pure water. The most remarkable features in this supply are the streams called "nailbournes" or periodical streams, some of which break out every winter, running for a limited period and then stopping suddenly; others run only once in every five, six, or seven years. Some of these rise above Elham and Bishopsbourne, particularly that called the Pott, and another above Petham which runs to Shalmsford Bridge. The same process occurs on the southern face of the chalk hills at longer intervals, and I have frequently had occasion professionally to remedy the mischief they have caused, which has led me to investigate their origin and cause, for at times they cover a large space, giving the surface the character of a sponge. They appear to be solely caused by the "overcharge" of the chalk strata, viz., when the water line rises above the edge of the gault, the water finds vent through an upper line of pores, and having driven out all the air in its rise, it starts running like a syphon, or series of syphons, and continues to discharge the water in the chalk basin below the level of the orifice with one continuous stream until this basin is discharged low enough to admit the air pressing from above, when it ceases as suddenly as it commenced, and stops until a series of years or an extraordinary quantity of moisture again supply the basin to overflowing. The constant springs, which so evenly supply this river with their waters, rise from a lower level and break through and over the gault, and the fissures through which they are supplied are probably of considerable length and depth; whether in some cases these fissures penetrate through the entire bed of galut into the lower green sand is uncertain though not impossible; but as their level is too near that of the summit of the rock range I should much doubt if it be the case. However there are many springs in the gravel and

other subsoils composing this bed, but they are individually so small as not to be worthy of note, nearly all the waters coming from the north side of the channel of the river. Many of these springs also break out along the east coast and never come into the Stour valley, and the celebrated Lydden spout, between Folkestone and Dover, is probably known to many of you, as also those of Newington and Folkestone. The purity and clearness of the waters in this river are strongly contrasted to those of the river Medway, which is principally supplied from the wealden clays until it approaches Maidstone, where it receives some tributaries from the chalk. The impurities which are discharged into the river from Ashford and Canterbury do not seem materially to affect the pureness of its water; but I trust the time is not far distant when these impurities will be turned to better account. There are times when the Stour assumes a character totally unconnected with the sources I have described. I allude now to the floods which occasionally cause it it overflow its banks, doing much injury to the pastures along its margin. The Ashford Basin, which contains an area of nearly 80 square miles or 50 thousand acres, is almost the only feeder for these overflowing waters; for the arable lands along the sides of the Stour valley absorb nearly all the moisture which falls upon them, and therefore I consider that by far the larger portion of the flood water which enters Canterbury flows through the Ashford Bridges. A careless observer might wonder from whence this constant supply of water is derived, and fancy that at some period or other it might cease to flow. The more thoughtful mind can trace these waters from their discharge into the sea back to the recesses in the hills, from which they are to emerge again and again for the fructification of the earth and the benefit of mankind. The exact process by which they rise in vapour from sea and land, then float in the air as clouds, the small particles being separated from each other by electric influences, until by some other atmospheric change they become united, and by the excess of gravity descend in showers of rain, hail, or

now on to the earth's surface, has been differently described by scientific men. Meteorology is become a science of itself, and knowledge of its intricacies becomes more extended every day. For how many cycles of years this process of nature has been continued or when it first commenced, the mind of man has not the power to conceive. When we examine the chalk strata, and see its courses laid in regular intervals with lines of flint, indicating the numerous chaotic waves of semi-fluid matter which must have rolled at intervals over the earth's surface, leaving its heavier deposits at the base; when we consider that this mass is full of evidences of pre-existence of life, that beneath this lies the gault full of the shells of aqueous life; below that again other series of rocks also containing evidences of previous vitality; thence we descend to the wealden clay, also serrated with solid masses or layers of stone called marble, which owes its beauty to its organic remains; that these are each succeeded by other strata, which, after the proofs of animal life are gone, give other proofs of previous vegetation, now forming seams of coal and other products replete with wonders; I repeat the imagination cannot fathom and language hardly describe the period which omniscience has chosen for thus far developing the laws by which the universe is governed. We are told by the first historian, in the Scriptures of truth, when man first appeared upon the earth; but when chaos first arose at the Almighty command has not been revealed. The discoveries of Buckland, of Miller, and of Murchieson, with other eminent geologists, have done much to enlighten us; but far more remains, and ever will remain, unknown. Before I conclude, allow me to add that I think it would be beneficial to this society if its members would unite in making observations on the quantities of rain which fall in different altitudes and localities in this division of the county, and also upon the variations of temperature. It has been ascertained that on higher levels less rain falls than on those lower down. In one year the result of numerous observations gave the following depths of rain falling at the

different altitudes:—On the tower of Westminster Abbey it was 12 inches; on the top of a neighbouring house it was 18 inches; but on the level of the ground adjacent it was 22 inches, or nearly double that on the tower. We have a difference of nearly 700 feet between the hills and the lowlands of this district, and it would be useful as well as curious to ascertain if similar effects would result here. Again, at the approach of winter, we see the snow capping the hills in this vicinity, while our fields continue as green as usual, and when we are covered with snow we often find the Weald or the Marsh almost entirely free. These effects must result from difference in the temperature, which it might be useful to analyze. I throw out these hints for consideration at a future time. I could have enlarged further on the subject of this paper, but I should have tried your patience too much at this period of the day, and in conclusion, let me apologise for my inability to do justice to the subject I have chosen; but man has yet much to learn of the wonderful harmony of the universe. The seasons revolve at the *fiat* of the Almighty, the laws of nature are his laws, and it is our duty to study them. If I have succeeded in inducing any of you to investigate these subjects further, I shall feel satisfied with myself. I may have drawn some wrong conclusions, but they are the result of continued observation, and I shall be pleased in being informed where your judgment may have had better opportunities of arriving at more just conclusions. I am obliged by your indulgence and thank you for your attention.

Captain Cox, who exhibited some beautiful specimens, next responded to the invitation of the chairman, and offered a few interesting remarks on the nautilus. The shells by which his observations were illustrated had been carefully cut into sections, and showed how the little creature was formed to exist without injury when exposed to the most furious storms, together with the difference between the nautilus as it existed formerly and as found at the present time. He said he could not possibly foresee, when he left home, that they would have so large and in-

fluential a meeting, and he was, therefore, rather taken aback when called upon by the chairman to address them. He was, however, glad to see the progress the society was evidently making, and more especially the interest which the people of Ashford evidently took in the science of Natural History. The specimens collected together in the room were sufficiently numerous to constitute a museum, which would be a credit to the district. It was the general impression among the inhabitants of other parts of the county that Ashford was an exceedingly slow place, and greatly behind neighbouring towns. ("Oh! oh!" and laughter.) Certainly that had been the feeling, but their gathering of that day, and the evidence before him of the extent to which the science of Natural History had been cultivated by the inhabitants, must go far to correct the impression. He concluded by observing that an immense boon would be conferred upon the inhabitants of Ashford if the exhibitors of the specimens then in the room could be induced to give them for the purpose of forming the nucleus of a public museum. (Hear.)

Mr. J. Marten addressed the meeting on the results of the botanical excursion to Eastwell. It was not, he said, his intention to give a complete list of the plants found, but simply to mention the natural families whose reign is principally centred in the present season, taking them in their order as to importance and number, and noticing specially any rarities or plants of peculiar interest. The principal families were—1, the grass; 2, the composite; and 3, the umbellate. The families of secondary importance were—4, the rush; 5, the sedge; 6, the polygonum; 7, the goosefoot; 8, the gentian; 9, the *œnothera*; and 10, the campanula. Of the grasses, sedges and rushes, it was not necessary for him to speak at any length, as, although of great interest to botanists, they were not popularly considered as flowering plants. The composites were very numerous. Among them he might first notice the daisy, growing among the grasses, in the corn fields and hedges; the *chrysanthemums* and camomiles, some species of the

latter being often used for medicinal purposes; the cud-weeds, growing in the woods and copses; the groundsels and thistles, prominent pests of the cultivated lands as well as the woods; the *chicory* or *succory*, with its blue flowers, standing upright by the waysides; and the *lettuces*, from which our edible forms of that plant originate. The composites were found in the dryest and most exposed situations, and those enumerated were but a few representatives of a very large family. The umbellates were also a large family, but not of much general interest, save the deadly hemlock known to nearly all, and as representing our vegetable carrots and parsnips and the condimentary seeds used in household economy. The polygonums were represented by the docks and the pretty pink plants which crowned the mud banks by the lake; the persicaria, with its black-spotted leaves, the black spots being fabled to represent the blood of some unfortunate deity of ancient times, who died whilst hunting near the plant which was represented to have retained the mark ever since. The goosefoots were dull, heavy, and uninteresting plants, frequenting corn-fields, but the favourite localities of which were the muddy shores of our island. The gentians, famed for their tonic properties, were mostly very pretty plants. The *œnotheras* furnished the willow herbs, used by the Kamtschadales to brew intoxicating drinks, and also eaten when young like asparagus. To this family belongs also the enchanter's nightshade. The campanulas were represented by the "Canterbury bells" and the pretty little "hare bells" so fond of such downs as those of Eastwell and Wye. The plants gathered during the excursion comprised about 90 species.

Mr. Masters, also made a few remarks descriptive of some of the plants gathered during the day.

Mr. Furley, in complimentary terms, proposed a vote of thanks to W. Harris, Esq., and Thos. Thurston, Esq., for the able and interesting papers to which the company had just listened.

Mr. Willis seconded the motion, which on being put to the meeting was carried unanimously.

Captain Cox proposed a vote of thanks to Mr. Furley and the local committee consisting of the Rev. J. P. Alcock, Mr. J. Marten, Mr. Manuell, Mr. Thurston, Mr. John Furley, Mr. Taylor, and Mr. Russell.

Dr. Grayling seconded the motion which was also agreed to.

A vote of thanks was also awarded to the contributors of the specimens, on the motion of Mr. Whitfield seconded by the Rev. Mr. Dix; to the Secretary of the Society, Mr. Dowker, on the motion of Mr. Thurston, seconded by Mr. Harris; and to the Earl of Winchilsea for permitting the excursionists to have the use of his Park, on the motion of the Rev. Mr. Malden, seconded by Mr. Reid.

Mr. Dowker, in responding, explained the objects of the East Kent Natural History Society, and that a library of reference was in course of formation at Canterbury for the use of the members.

The meeting terminated by a vote of thanks to the Chairman, but the company afterwards spent some time in examining the collection of specimens.

Errata.

Page 42, line 17, for pterodctyl read pterodactyl.

Page 47, line 6, for chalk read gault.

REPORT

OF

THE EAST KENT Natural History Society,

WITH A LIST OF

BOOKS BELONGING TO THE LIBRARY,

&c., &c.

SESSION, 1865.

CANTERBURY:

PRINTED AT THE "KENTISH GAZETTE" OFFICE, HIGH-STREET.

EAST KENT
NATURAL HISTORY SOCIETY.

REPORT.

In presenting their Eighth Annual Report the Committee are glad to be able again to congratulate the members on the condition of the Society, as although the increase in numbers is not so great as last year from circumstances easily explained, they have still a net balance in hand of more than six pounds, exclusive of a few subscriptions since paid and a few still unpaid.

Since the last Annual Meeting the Society has lost five members from various causes, and eleven new members have been elected, leaving a net gain of six to the Society.

The first meeting in the past year was held in the Lecture-room of the Museum, at Canterbury, Major Cox in the chair, on which occasion the Committee proposed the alteration of the day of general meetings and excursions from the last Tuesday to the last Thursday in the respective months of February, May, August, and November, which was adopted by the meeting. After the business the Rev. J, B Reade, of Bishopsbourne, read a highly interesting paper

on The Ashes of Plants and the Arrangement of their Solid Constituents. The rev. gentleman drew the attention of the members to the forms taken by the silica and other incombustible constituents of the ashes and their relation to the form of the spiral and other vessels of the plant, arguing therefrom that they were essential parts of those organs, skeletons as it were on which the carbonaceous matter was arranged and not mere earthy particles taken up for the sake of the ammonia, &c., in combination with them and dropped without arrangement as effete among the fibres. The paper raised some discussion, but the majority of speakers supported the rev. lecturer's view.

Mr. Harvey also read a short paper on the so-called "Circulation in the Valisneria," which also led to a brisk discussion as to the said movement being an evidence of active life or of decay.

Major Cox then exhibited some wood from a dog kennel bored by insects, and swarming with a species of Tick—the Ixodes Plumbeus—but whether they had bored the wood seemed doubtful, as they are suctorial insects. A number of microscopes were on the table, and a very successful meeting was brought to a close with the exhibition of specimens illustrative of the papers read.

An extra meeting for the reading and discussion of papers was held in the same room, on the 29th of April, John Brent, Esq., in the chair, when Mr. Geo. Dowker read an interesting paper on The Sleep of Plants, drawing particular attention to the functions performed by the various organs during the winter repose of the plants; the accretion and alteration of the amylaceous parts of the rhizomes or roots, and the functions of the altered cells in relation to the spring shoots being especially pointed out. The remarks were illustrated by diagrams and specimens, and gave rise to an ani-

mated discussion, in which many of the members present took part.

The first excursion for the year of the Society on June 1st was from Cockering Bottom to Kenfield. The line taken for this excursion is through Iffen Wood and over Swarling Downs, and about 60 members met at the end of the journey having approached it by different routes. The country was found rich in botanical and entomological specimens, a goodly variety of each being collected. The members met for luncheon in Kenfield Park, and afterwards went, by the kind invitation of T. Thompson, Esq., to see his pinetum in the grounds of Kenfield House. The collection of conifers is one of the most complete in the county, and contains many very choice specimens, and the inspection of them greatly enhanced the pleasure of the excursion. Mrs. Thompson added to the kindness of the invite by hospitably entertaining the whole of the party to tea, &c.

The next meeting of the Society was an extra excursion planned by the members residing at Dover, on the 3rd of August. It was ushered in by a severe thunderstorm, which broke over Canterbury at half-past seven a.m.; at 9.44 the weather had somewhat cleared up, but only a very few members met. On their arrival at Dover, the Local Committee had the steam tug Lord Palmerston in readiness. About sixty members and their friends went on board to dredge along the coast, and met the remainder of the Society at St. Margaret's Bay. The weather was very threatening, and shortly after leaving the pier the rain began to descend. A very fine water spout broke about half-a-mile from the vessel. At the hour of twelve a heavy thunderstorm was raging over St. Margaret's Bay; those in carriages could not alight; some few came on shore from the steamer, and both parties then returned to Dover. About sixty sat down to dinner at the "Harp." No less than three

distinct thunderstorms passed over the excursionists during the day.

While seeking shelter in the little inn at St. Margaret's Bay, the landlord, who was a collector, showed some very good entomological specimens, which Major Cox described to the assembled members.

The third meeting of the Society took place at Folkestone. The point of rendezvous was at the Folkestone junction station. Again the weather was so threatening and the rain coming heavily down soon after only between 20 and 30 members met. Under such circumstances, those who attempted the investigation of the cuttings and the rich Flora of the district, soon had to return to Folkestone wet through. Nothing, therefore, was done. About thirty sat down to dinner, after which Mr. Whitaker made some interesting observations on the gault, and the appearance it now presented. On his last visit it was in fine weather. He then informed the excursionists that should much rain fall, he had not the least doubt but that a great deal of the mound on which they were then standing would slip down. Since then the heavy rains had deeply perforated the soil, and the great landslip to the east of the town of Folkestone had resulted.

The last general meeting of the year was held in St. George's Hall, on the 7th December, under the presidency of Sir W. James, when F. Buckland, Esq., gave a lecture on Fish Culture, or the Life of a Salmon from the Egg to the Net. The lecture was illustrated by a large number of preserved specimens and models, and was listened to with great attention by a numerous audience, as on this occasion your Committee, thinking the subject of much practical as well as scientific interest, issued a number of cards of invitation to gentlemen in the neighbourhood who were supposed to be interested in the subject, and your Committee are proud to

think that the result of their introduction of the scientific aspect of the question to the county has been the starting an Association to carry into practice the views so ably enunciated by Mr. Buckland on that evening, and though the Association formed for that purpose, has no direct connection with this Society, your Committee feel that the first step is at least due to this Society.

With reference to the exhibition of roses proposed to be held in Canterbury under the auspices of the Society in June last, your Committee have to report that it was reluctantly given up, as they were unable to obtain sufficient help to carry it to a successful issue.

Your Committee have considered it advisable to subscribe a guinea a year in the name of the Society to the Ray Society in London, and the first volume for 1865 has been received and placed in the library.

Annexed is the Treasurer's statement of account for the past year, showing a balance in hand of £6 11s. 4d., and a list of books and periodicals in the library.

In conclusion your Committee must again congratulate the Society on the results of the past year. There have been two extra meetings beyond those provided for by the rules, and all have been well attended, except the excursion to Folkestone, when the weather was quite sufficient to account for the small number of members present; and although at the Dover excursion the same cause prevented the collection of many specimens or the introduction of many new members, your Committee hope that the interest in the science of Natural History has been well kept up by the excellent papers read at the three evening meetings.

Your Committee still have to regret that no decided step

has yet been taken towards forming a complete record of the Flora and Fauna of the district in which our work lies. With our present distribution of members they feel it requires but little energy on the part of individual members, to get up a complete record of the Fauna and Flora, of that part of Kent east of a line drawn from Sittingbourne through Ashford to the coast by Hythe. At least they hope members will make a beginning this year, and that by the time of the second evening meeting in November, many members will be ready to hand in lists of the Flora or Fauna of some districts however small, a part of the whole. It is proposed to hang the ordnance map of the County in the Society's room, on which the districts can be marked off as completed, nor need members be debarred from the attempt by the apparent magnitude of the work, for it is one of which they will find the pleasure will grow with the performance, while the delight of the country walk or sea side ramble will be greatly enhanced by the habit of observation that even this attempt will so greatly encourage. To carry this out your Committee invite members to send in their names stating at the the same time the district and the branch of the science they propose to work in.

Your Committee cannot separate without expressing a hope that as the Society has now arrived at a position of stability its transactions should be printed and a copy delivered to each member, for your Committee feel it not only due to your Society, but to science at large, that such valuable papers as those read by the Rev. J. B. Reade and others should be made generally known, and it is hoped that some members will illustrate their papers for the benefit of the Society.

FINANCIAL STATEMENT.

RECEIPTS.	£	s.	d.
Balance in hand, Dec. 31st, 1864	6	18	4
Subscriptions of 1863	0	10	0
Ditto of 1864	2	5	0
Ditto of 1865	33	0	6
	42	13	10

EXPENSES.	£	s.	d.
Frank Buckland, Esq., Lecturer	3	3	0
Mrs. Ward, for printing	4	0	0
Contributions to the Library	10	0	0
Mr. Chivers, printing Annual Report, &c.	2	0	0
Ditto, printing sundries	0	6	6
Rent, one year	10	0	0
Fire and candles	1	0	0
Mr. Craig, attendance at Museum	0	10	0
Mr. Ginder, hire of room	1	1	0
Messrs. Jenks and Hobday, hire of furniture	0	2	0
Subscription to the Ray Society	1	1	3
Secretary for sundries	2	13	9
Treasurer for stamps and paper	0	5	0
	36	2	6
In Treasurer's hands (£ 6 1 6)			
In Secretary's hands (£ 0 9 10)	6	11	4
	42	13	10

Audited—Frederick Rouch.

GEORGE RIGDEN, Hon. Treasurer.

LIST OF BOOKS AND PERIODICALS.

Belonging to the East Kent Natural History Society

1. British Land and Fresh Water Mollusks, 1 vol., (Reeve)
2. Bryologia Britannica, 1 vol., (Wilson)
3. Synopsis of British Sea Weeds, 1 vol., (Harvey)
4. Flora of Surrey, 1 vol., (J. A. Brewer)
5. Manual of Geology, 1 vol., (Professor Phillips)
6. Flora of East Kent.
7. Morris's British Butterflies, 1 vol.
8. Ramsays Physical Geography of Great Britain, 1 vol.
9. Dallas' Animal Kingdom, 1 vol.
10. Johnstone's British Zoophytes, 2 vols.
11. A Catalogue of rare Phœnogamous Plants collected in South Kent in 1829.
12. Memoirs of the Geological Survey of Great Britain, 2 Nos. referring to Sheets 4 and 7.
13. British Hemiptera Heteroptera, 1 vol., 1865, (Douglas and Scott)
14. Hand Book of British Flora, 2 vols., (Bentley)

PERIODICALS.

Natural History Review, vol 3, 1863, and 4, 1864. (Half bound Calf)
The Zoologist, from 1843 to 1852. (In Cloth)
" 1853 to 1855. (Half bound Calf)
" 1856 to 1857. (In Cloth)
" 1858 to 1861, and for 1863 and 1864. (Half bound Calf)
N.B.—The Zoologist for 1862 is incomplete at present.
The Quarterly Journal of Microscopical Science, vols. 7 and 8, old Series. Vols. 1, 1861, 3, 1863, and 4, 1864, new ditto. (Half bound Calf)
Magazine of Natural History, vols. 3, to 8, and 11 to 14, 3rd Series. (Half bound Calf)
The Geologist, vols. 2, 3, 4, 6, and 7. (Half bound Calf)
The Phytologist, vol. 3, 1859. (Half bound Calf)
British Moths, Nocturni.
" Geometræ.
Proceedings of the Geologist's Association, 1863-4.
Geological Magazine, vol. 1, 1864.
Journal of Science, vol. 1, 1864.

N.B.—As it is most important to increase the number of Books in the Library for the use of Members, a special subscription for the purchase of Books, or donation of works on Natural History will be thankfully received by the Committee.

THE FOLLOWING PERIODICALS

ARE TAKEN IN BY THE SOCIETY, VIZ:

1. Natural History Review
2. The Annals and Magazine of Natural History
3. Quarterly Journal of Microscopical Science
4. The Zoologist
5. The Geological Magazine
6. Quarterly Journal of the Geological Society
7. „ „ of Science
8. The Geological and Natural History Repertory.

LIST OF BOOKS, &c.

LENT TO THE EAST KENT NATURAL HISTORY'S SOCIETY'S LIBRARY.

1. Clark's British Marine Testaceous Mollusca, 1855, 1 vol. By G. Dowker, Esq.
2. Work on Butterflies, 1 vol. By Rev. F. Rouch.
3. Letters of Rusticus on the Natural History of Godalming. By Miss Kenrick.
4. Work on the Microscope. By Rev. F. Rouch.
5. Hooker's British Flora, 1835, 1 vol. By Dr. Boycott.

LIST OF OFFICERS AND MEMBERS.

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Marshall, Dr.	Ditto.
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Neame, E., Esq.	Selling.
Neame, Mrs.	Ditto.
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Sankey, F. H., Esq.	Wingham.
Sankey, Mrs.	Ditto.
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Scudamore, Dr.	Harbledown.
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Stock, Henry, Esq.	Folkestone.
Sankey, Herb. T., Esq.	Margate.
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Smith, Miss J.	Dane John, Canterbury.
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Thompson, T., Esq.	Kenfield House.
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Ward, Miss	High Street, Canterbury.
Whitaker, W., Esq.	Geological Museum, Jermyn Street, London.
Wilson, J. L., Esq.	Bridge Street, Canterbury.
Worsfold, Christopher, Esq.	Dover.
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Way, E. T., Esq.	Dover.
Weston, L., Esq.	Waterloo Crescent, Dover.
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ASSOCIATES.

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Prebble, Mr. J. G.	Ramsgate.
Young, Mr.	Sittingbourne.

EAST KENT
NATURAL HISTORY SOCIETY.

TITLE AND OBJECTS OF THE SOCIETY.

The objects of the East Kent Natural History Society shall be, the Collection and Diffusion of Practical and Theoretical Knowledge respecting Natural History, in all its Branches, both in relation to the particular District, and the General Science.

RULES AND REGULATIONS.

MEMBERSHIP.

1. The Society shall consist of Ordinary, Honorary, and Corresponding Members, and of Associates.

2. Every candidate for admission into the Society as an Ordinary Member, must be proposed in writing by two Members, and the election shall be by ballot, taken at any Meeting of the Committee, or at a General Meeting—one black ball in five to exclude.

3. The Annual Subscriptions, to be paid by Ordinary Members, shall be Ten Shillings; the Subscription shall become due on the 1st of January in each year, and shall be paid in advance for the current year.

Any Member neglecting to pay his Subscription for three months after it is due, shall be applied to by the Secretary, and if the Subscription remains unpaid for three months after such application, he shall cease to be a Member of the Society.

4. The Committee shall have power to admit, without ballot, on the nomination of two Members, any Lady who shall be desirous of becoming an Ordinary Member, and her Subscription shall be Five Shillings.

5. Any persons distinguished for their researches in Natural History, for their liberality to the Society, or for their connection with similar Societies may, on the recommendation of the Committee, be elected Honorary or Corresponding Members of this Society, provided they do not reside within the district: such Honorary and Corresponding Members shall not be subjected to any of the expenses of the Society, and shall have no vote in its affairs.

6. In order to encourage the study of Natural History among individuals of the class of mechanics, &c., residing in the district, the Committee shall have power to admit individuals of that class as associates, provided they shall first communicate some information or observation on Natural History, exhibit such specimens or present them to the Local Museums, as shall by their merits satisfy the Committee. Such Associates shall enjoy the privileges of Honorary Members.

MANAGEMENT, AND BUSINESS MEETINGS.

7. The affairs of the Society shall be conducted by a Committee of Management, which shall consist of a President, Vice-Presidents, a Treasurer, and an Honorary Secretary, and not less than six Members, who shall all be chosen at the Annual Meeting. Three Members of such Committee shall form a quorum. The Meetings shall be held on the same day as the February and November General Meetings, and at such other times as the Secretary may deem necessary.

8. An Annual Meeting shall be held on the last Tuesday in January in each year, at Canterbury, for the purpose of electing the Officers for

the current year, receiving the Annual Statement of Accounts, and Report of the Committee, and conducting the general affairs of the Society.

9. Special General Meetings may be summoned by the Committee, or by the Secretary, on the requisition (in writing) of any six Members of the Society, the specific purposes of the Meeting being stated in the notice, which shall be sent to each member not less than one week before the time of such Meeting.

10. All questions discussed at the Meetings shall be decided by a majority of votes; and if upon any question the votes shall be equal, the Chairman of the Meeting shall have the second or casting vote.

11. In the event of any vacancy occurring in the Officers or Committee, between the Annual Meetings, the same shall be filled up by the Committee.

12. In order to facilitate the objects of the Society, the Committee shall be empowered to appoint any Member Local Secretary for the town or district he may reside in. Such Local Secretary shall be *ex-officio* a Member of the Committee.

SCIENTIFIC MEETINGS AND EXCURSIONS.

13. Two Meetings shall be held in Canterbury yearly, on the last Thursdays in February and November, for the purpose of reading Papers, exhibiting Specimens, Lectures, &c. Each Member to have the right of introducing a Visitor at these Meetings.

14. Two Excursions are appointed to take place yearly, on the last Thursdays in May and August, for the purpose of investigating the natural objects of interest in some district in East Kent; the arrangements for these Excursions to be made at the Annual Meeting.

15. A Minute of the Proceedings of all Meetings shall be entered by the Secretary in a Book kept for that purpose.

16. The Secretary to give seven days' notice of such Meetings and Excursions to every Member, stating the time and place of Meeting, &c.

LOCAL MEETINGS.

17. To promote still further the objects and interests of the Society, Local Secretaries and Members are invited to organize Meetings or Excursions in their districts; and to give notice of the same to the General, and all the Local Secretaries, stating the time and place of meeting, and what particular subjects are to be brought forward.

COLLECTIONS OF SPECIMENS.

18. The Society shall endeavour to make a Collection of Objects of Natural History, both with a view of forming a Museum and distribution of Duplicate Specimens, according to Regulations to be adopted by the Committee.

LIBRARY.

19. Only Books and Periodicals connected with Natural History are to be purchased by the funds of the Society, and the number to be purchased shall be determined by the Committee.

20. All the Books and Periodicals shall be kept in some convenient place, so that Members may be able to refer to them, or take them out, under such regulations as the Committee from time to time may think proper to make.

21. Members are also invited to lend Books for the use of the Library, reserving to themselves the full right of ownership; such Books to be under the care of the Committee, and not allowed to be taken out of the Library.

East Kent Natural History Society

Contents – Papers read

EAST KENT

NATURAL HISTORY SOCIETY.

SESSION, 1861-2.

REPORT

OF

MEETINGS HELD & PAPERS READ,

AND JOURNAL OF

GENERAL TRANSACTIONS.

GEORGE DOWKER, Stourmouth, Secretary.

Canterbury:
PRINTED BY HENRY CHIVERS, PALACE STREET.
1862.

EAST KENT

NATURAL HISTORY SOCIETY.

ANNUAL MEETING,

MAY 15th, 1862.

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At the Annual Meeting of this Society, the following Report was read and adopted.

REPORT.

In presenting this the Fourth Annual Report of the Society, your Committee, would take the opportunity of expressing their regret, that the past Session had not been so successful as the previous, and would urge upon the Members the necessity (if they would have the Society prosper) of a continuance of their exertions in aid of the General Meeting of the Society. During the past year two Excursions have been carried out; the first at Hythe on the 5th of July—when a Geological Expedition (under the guidance of H. B. Mackeson, Esq.) was successfully carried out. The Excursionists afterwards assembling in the Town Hall, under the Presidency of the Dean of Canterbury.

The next Excursion took place on the 29th of August, when an Expedition to Shottenden Mill and Perry Wood was organized. Mr. Dowker explaining the Geology of the District, the party assembling at Canterbury, under the Presidency of the Dean.

The Committee would next direct attention to the Book Circulation. The same Periodicals have been taken regularly as those of the previous years, but for want of a better plan of circulation, the Members have not generally availed themselves of them. The Committee have also been without the aid of a paid Secretary during part of the last year.

Lastly; your Committee would direct your attention to the state of the Finances. Owing tot he accumulation of arrears, the Funds of the Society have been declining and it has been found necessary to issue a circular, calling on Members to pay up arrears; this circular has been partially successful.

Society, Cr.

1861. RECEIPTS.	£	s.	d.
Subscriptions up to 1861	49	5	6
To balance due to Treasurer	7	6	8
	£56	12	2

Society, Dr.

PAYMENTS.	£	s.	d.
Balance due to Treasurer ..	16	2	7
Paid Secretary's Salary and expenses account	21	15	7
Printing account ..	6	6	0
Book account	5	15	0
Hire of Rooms	3	0	0
Secretary & Treasurer; Postage, &c.	0	11	0
Sundry expenses of Excursions	2	2	0
Book Binding	1	0	0
	£56	12	2

A vote of thanks having been passed for the President, Vice-President, and Committee. The following were elected for the ensuing year.

President:

THE VERY REV. THE DEAN OF CANTERBURY.

Vice-Presidents:

MATTHEW BELL, ESQ.
W. OXENDEN HAMMOND, ESQ.
SIR BROOK W. BRIDGES, BART., M.P.
REV. J. F. SCOTT.
J. F. CROOKES, ESQ.
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ALDERMAN J. BRENT.
SIR WALTER JAMES.

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G. RIGDEN, ESQ., CANTERBURY.

Gen. Secretary:

G. DOWKER, ESQ., STOURMOUTH HOUSE, STOURMOUTH.

Local Secretaries:

ISLE OF THANET..... DR. G. M. PITTOCK.
SITTINGBOURNE ..... DR. J. GRAYLING.
CANTERBURY..... A. B. ANDREWS, ESQ.
DEAL AND SANDWICH.... E. F. S. READER, ESQ.
ASHFORD ..... R. FURLEY, ESQ.

Committee:

REV. H. L. JENNER, Preston.
REV. J. MITCHINSON, Canterbury.
F. H. SANKEY, ESQ., Wingham.
J. REID, ESQ., Canterbury.
REV. B. S. MALDEN, Canterbury.
REV. H. J. HUTCHESSON, Canterbury.
MR. J. LINFORD, Canterbury.
H. B. MACKESON, ESQ., Hythe.

PROCEEDINGS OF GENERAL MEETINGS.

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The first General Meeting of the Society held at Hythe, July 5th, 1861.

According to the programme of the proceedings, the Excursionists assembled at the Westenhanger Station. The following were among those present.—The Very Reverend the Dean of Canterbury, Miss Alford, Rev. F. J. Scott, Rev. B. Kingsford, H. B. Mackeson, Esq., W. P. Hoare, Esq., Mrs. Hoare, F. H. Sankey, Esq., T. Hatfield, Esq. and family, Miss Thurston, Mr. Horsley, A. B. Andrews, Esq., W. Bridges, G. Dowker, Esq., &c., &c.,

Near the Station was found Dianthus Caryophyllus, apparently wild.

The Excursionists under the guidance of H. B. Mackeson, Esq., crossed the field at the left of the Station; Mr. Mackeson pointing out to the party, the valley running in an Easterly direction, formed in the Lower Green-sand and caused by the denudation of the Atherfield Clay, the lowest division of the Greensand; and which from its yielding nature, was seldom seen in sections, being at the base of the valley. He explained that by Geologists the Lower Green-sand formation was divided into three, consisting of, firstly, White and Yellow or Ferruginous Sand, with concretions of Limestone and Chert; secondly of green coloured Calcareous Stone, called Kentish Rag; and lastly of Clay Marl, the Atherfield Beds, named from Atherfield in the Isle of Wight, where this stratum is very extensive). The upper of the series, viz. the sand

was seen in one or two quarries by the roadside and was pointed out by Mr. Mackeson. The Excursionists next passed through Sandling Park, where from the lower beds of the Green-sand, were many Springs much impregnated with Iron. Specimens of *Asplenium Filix Fœmina* or Lady Fern were here abundant. The Oak and Ash flourished in this soil. Mr. Mackeson pointed out a mass of Drift upon the green-sand and accounted for this by the Glacial Hypothesis. Passing on through the Wood, the Excursionists arrived at a deep valley with ponds, and around magnificent specimens of the Ash ; this valley is in the Atherfield Clay, it was shewn by the presence of Rushes in the soil, these being on this formation a sign of the presence of these Atherfield beds. From this point the party passed on to the Wealden Clay, which appears a little beyond the Park. It was explained that this, although inferior or anterior to the latter formation, (which was of Marine origin and deposited in the bed of an Ocean through vast cycles of time), was a fresh-water deposit, as had been shewn by Dr. Mantel, and more recently by Dr. Tritton. The Wealden beds were most probably formed by the deposits of a large fresh-water estuary, and the Shells found were mostly all of fresh water, the characteristic, in this formation, being the Paludinæ and Cyprides, the former constituting the Sussex Marble, so extensively used in our ancient ecclesiastical edifices—as in Canterbury Cathedral. It was noticed by Dr. Tritton that some of the lower Wealden beds contained deposits of Oyster Shells, and he, (Mr. Mackeson), had discovered the same to occur in the upper series here represented, and had pointed out their appearance in this locality to Dr. Tritton. The explanation given of these Marine Shells, associated with those of a fresh-water character, was, that the sea had at different times encroached upon these fresh-water deposits, and that sand banks or other causes had driven it back, so that we had at one time Marine and at another Fresh-water deposits ; the Oyster found in these beds was of diminutive growth and often distorted. Leaving the green fields the party soon crossed the hill above Hythe, where

the Kentish Rag is extensively quarried. The summit of this hill commands a most beautiful and extensive prospect, embracing at one view the entire series of formations from the Chalk to the Hasting's Sand. This point was well chosen by Mr. Mackeson to give a short Field Lecture on the Denudation of the Weald, which he illustrated by a series of Diagrams.

Field Lecture by Mr. Mackeson *on the Denudation of the Weald.*

Mr. Mackeson began by observing that it was very difficult to explain himself clearly to those who had not a previous acquaintance with Geology. They must remember, that all the geological series which were extended before them—the Chalk Hills to the right and the Hasting's beds to the left seen in the distance, embracing as they did vast periods in the history of the globe—were all deposited at the bottom of the ocean or in fresh-water estuaries :—that they must get rid of the notion of the stability of the Land and the unstableness of the Ocean : the reverse was the case. The Ocean which was expanded before them had most probably always retained its level ; the land had and was constantly undergoing alterations in its level, at one time being gradually elevated, (as was the case now with the coast of Norway), and at other times sinking below the bed of the Ocean. He exhibited a section shewing the relative position of the Geological series, shewing the igneous rocks forming the lowest, then the aqueous rocks or the deposits of seas formed in the basins of these primitive rocks ; these igneous rocks were constantly elevating or depressing the deposits upon them, and thus it is seen that the beds of the Ocean on its surface have been constantly changing, and by the volcanic action underneath upheaved above the Ocean in which they had been deposited. Mr. Mackeson next exhibited a Diagram of the Denudation of the Weald, and explained the denuding action of the Ocean on those beds which were raised had caused the gradual wearing away of all the deposits resting upon the Weald.—We must suppose that,

before the Green-sand or Chalk was formed, the delta of some large river had left its deposits in the area of the Weald. Even the area of this vast deposit does not exceed in magnitude that of many modern rivers. (Thus the delta of the Niger, in Africa, stretches into the interior 170 miles, and occupies, it is supposed, a space of more than 300 miles along the coast, this forming a surface equal to about one-half of England.) If asked where the continent was placed, from the ruins of which the Wealden strata were derived, we are tempted to speculate on the existence of the Atlastis of Plato. The story of the submergence of an ancient continent, however fabulous in history, *must* have been true again and again as a geological event. This Wealden deposit gradually subsided beneath the Ocean, and upon it were deposited the Green-sand and the Chalk ; these, from an upheaving force towards the centre of the Wealden, were elevated, and the action of the Ocean denuded first the Chalk, then the Gault, and then the Green-sand. In the centre of the Diagram is seen the Hasting's sand, forming an anticlinal axis, on each side of which the other formations are arranged with an opposite Cliff. Stretching from Folkestone towards Wye the Chalk is seen forming part of the North Downs. These hills are bounded by a valley, where the Gault and upper Green-sand, from their yielding nature, were more easily denuded. Again we have another range of Hills formed of the lower Green-sand, which resisted the action of the denuding force more ; and next we have the Valley of the Weald represented by Romney Marsh Vale. Mr. Mackeson next drew the attention of the visitors to the action of the Ocean at the present time, which was receding and throwing up banks of shingle ; and he pointed out the sand which had drifted over to the Hills beyond.

The party, after examining the Stone Quay, adjourned to the Town, where a substantial Cold Collation was provided, and met at the Town Hall, where an interesting Collection of Fossils and Entomological Specimens was exhibited.

The second General Meeting of the Members of this Society was held at Canterbury, on Thursday, the 29th August. The programme of proceedings for the day comprised an excursion to Shottenden Mill and Perry Wood, near Selling Station, on the London Chatham and Dover Railway. The Excursionists, about 25 in number, were under the guidance of the Very Rev. the Dean of Canterbury, President for the year, George Dowker, Esq., and the Rev. B. S. Malden. Among those present where F. H. Sankey, Esq., of Wingham, Mr. E. Sankey, and Miss Sankey; F. Slater, Esq., Kenfield, and Mrs. and Miss Slater; John Brent, Esq., and Mr. F. Brent; the Rev. H. L. Jenner, of Preston-next Wingham; Mrs. Horsley, Master Horsley, and the Misses Horsley; Master — Rigden; Edw. Neame, Esq., and Mrs. Neame; Mr. R. Slater, and Miss Slater; J. F. Crookes, Esq.; Miss Hoare; the Rev. — Beardsworth, of Selling; Captain and Mrs. Kemp; — Hatfield, Esq., and family; the Rev. — White, of Boughton, and Mrs. White; the Rev. J. Mitchinson; Miss Alford; — Corbett, Esq.; J. Marten, Esq., &c. The Excursionists found one or two rare plants, and among other places of interest visited was the supposed site of a Saxon camp, and Mrs. Neame explained the historical associations connected therewith, pointing out the three large beech trees under which our Saxon forefathers held their Court. The geological features and peculiarities of the districts where ably pointed out and explained by Mr. Dowker.

On the return of the Excursionists to Canterbury a number of them partook of Luncheon which had been provided by Mr. Moore of the Freemason's Tavern, and a public meeting was subsequently held in the Music Hall. Among the specimens of natural history exhibited we may notice an almost complete collection of British Ferns from Mr. Alderman Master's Exotic Nursery, also a number of specimens of sea weeds; a quantity of dried Australian plants, exhibited by Mr. Slater of Kenfield; and a quantity of chalk fossils also by Mr. Slater.

The Dean of Canterbury presided, and having briefly

opened the meeting Mr. Dowker delivered an address on "the Geology of the district visited by the Excursionists," illustrated by Diagrams.

Mr. Dowker commenced by observing that those members who had taken part in the excursion had had an opportunity of noticing some of the principal Geological features of this part of Kent.—He might remind them that the hill they ascended at Shottenden, was one of the lowest of the *Eocene beds*, popularly termed the London clay. He explained that the tertiary deposits overlying the chalk, of which the Woolwich bed was a member, followed in the following succession;—Firstly, over the chalk, the Thanet sands; next the Woolwich sands; then the basement bed of the London clay, over which they found the London clay proper. The out crop of these lower beds extended from Reculver in a south-westerly direction to Canterbury, and thence to Faversham and Sittingbourne, the chalk hills bounding this region towards the South, and forming the range of hills termed the North Downs. From the top of Shottenden hill they might see the chalk extending from the Isle of Thanet (Pegwell Bay Cliffs) to the North Downs in the direction of Maidstone; the London clay, to the North, in the Isle of Sheppy; and the intermediate Woolwich sands extending from Herne Bay to the point from which they were observing the scene. The Woolwich sands were characterised by large beds of pebbles, and a good section of them was pointed out to the Excursionists in a sand pit near Shottenden hill. They were also interspersed with beds of a ferruginous sandstone, impervious to water; and it was owing to the presence of this sand in the woods at Perry-street that there were found so many springs of water issuing from the surface. The Thanet sands lying immediately below these series were not seen in sections, being for the most part denuded by fluviatile action; but they could be traced in the neighbourhood from the number of green flints strewn over the chalk; these green flints being indicative of the presence of the Thanet sand. Towards the north, by Bough-

ton, the basement bed of the London clay was met with, and the iron sandstone contained in it was extensively quarried for smelting purposes. The Woolwich sands were not, at least in this portion of them, fossiliferous, and the fossils found were mostly in the form of casts, the ferruginous sandstone helping to preserve the form. They were partly fluviatile and partly marine, the fresh water deposits prevailing to a greater extent as they approach London. In reference to the physical features exhibited, it might have been remarked by the Excursionists that a deep gorge appeared opposite Chilham and Wye, through which the Stour winds its way, and it was probable that the area of the Wealden, which had been denuded at various times had, at a late date, geologically speaking, been a large lake or sea, the gorge being formed by the breaking through of the waters at a point near Wye. The deposits of gravel and sand would thus be left in parallel ridges on either side of the valley, and the more yielding portion, as the Thanet sands, have been washed away or denuded. This appeared one explanation of the peculiar physical features that were exhibited. Mr. Dowker concluded by apologising for the unconnected character of his remarks, being quite unprepared to illustrate the subject.

The Rev. B. S. Malden gave a summary of a paper, on the importance of small birds to agriculturists, which has been recently published in *The Times* as a translation from the French. He observed that the subject treated upon was one to which the members of the Society might advantageously direct their attention,

The proceedings terminated with a vote of thanks to the Dean for presiding.

LIST OF MEMBERS.

Andrews, Alfred B., Esq.	Westgate, Canterbury.
Alcock, Rev. J. P.	Ashford.
Admans, Mr. John	Knott's Lane, Canterbury.
Bell, Matthew, Esq.	Bourne Park, near Canterbury.
Bayden, Thomas, Esq.	Hythe.
Brent, Alderman J.	Canterbury.
Bridges, Sir Brook W., M.P.	Goodnestone Park.
Bottle, Mr. A.	Town Wall Street, Dover.
Burton, Carr, Esq.	Chapel Hill Lodge, Thanet.
Bateman, Mr. J.	St. George's Street, Canterbury.
Canterbury, The Very Rev. the Dean of,	Deanery, Canterbury.
Cotton, Henry, Esq.	Dent de Lion, near Margate.
Cox, Captain C. J.	Fordwich House, near Canterbury.
Cox, Mrs.	Ditto.
Crookes, J. F., Esq.	Harewell, near Faversham.
Chaffey, Mrs.	Doddington, near Faversham.
Craig, Mrs.	Butchery Lane, Canterbury.
Dean, Mrs. H. M.	St. Peter's Street, Canterbury.
Dentry, John, Esq.	Union Crescent, Margate.
Dowker, G., Esq.	Stourmouth House.
Forrest, Mrs.	Orchard Place, Canterbury.
Furley, R., Esq.	Ashford.
Friend, W., Esq.	Updown House, Thanet.
Grayling, J., Esq., M.D.	Sittingbourne.
Gibson, F., Esq.	Hawley Square, Margate.
Gibson, Mrs.	Ditto.
Green, Mrs. J.	Canterbury.

Hallowes, Mrs.	Canterbury.
Hammond, W. O., Esq.	St. Alban's, Nonington.
Hannam, C., Esq.	Northbourne Court, near Deal.
Hannam, G., Esq.	Bromston House, Thanet.
Hillier, J. T., Esq.	High Street, Ramsgate.
Hillier, D. D.	High Street, Sandwich.
Hoare, W. P., Esq.	Faversham.
Hutchesson, Rev. H. J.	Palace Street, Canterbury.
Horsley, Mrs.	Wincheap Street, Canterbury.
Harris, W., Esq.	Charing, near Ashford.
Hatfield, — Esq.	Word, near Sandwich; and Northdown, Thanet.
Hatfield, Mrs.	Ditto.
Hatfield, Miss	Ditto.
James, Sir Walter	Betshanger.
Jenner, Rev. H. L.	Preston Vicarage.
Kenrick, Miss	Stone House, near Canterbury.
Knocker, E., Esq.	Castle Hill, Dover.
Lake, Robert, Esq.	Milton Chapel, near Canterbury.
Linford, Mr. James, Jun.	Burgate, Canterbury.
Leith, R. M., Esq.	Folkestone.
Mackeson, H. B., Esq.	High Street, Hythe.
Malden, Rev. B. S.	St. George's Rectory, Canterbury.
Mead, Chas., Esq.	Sturry.
Mitchinson, Rev. J.	King's School, Canterbury.
Neame, Mrs. A.	King's Bridge, Canterbury.
Newton, W., Esq.	Clarence House, Herne Bay.
Percival, John, Esq.	High Street, Herne Bay.
Pidduck, Mr. J.	Westbere.
Philpott, W., Esq.	New Road, Canterbury.
Pittock, Dr. G. M.	Crescent Place, Margate.
Rammell, Thomas, Esq.	Sturry Court, near Canterbury.
Reader, E. F. S., Esq.	Sandwich.
Russel, Mr.	Ashford.
Reid, James, Esq.	Bridge Street, Canterbury.
Rigden, G., Esq.	Burgate, Canterbury.
Sankey, Robert, Esq.	Castle Street, Canterbury.
Sankey, F. H., Esq.	Wingham.

Sankey, Mrs.	Ditto.
Sankey, Miss	Ditto.
Slater, F., Esq.	Kenfield, Petham.
Scott, Rev. J. F.	Sibertswould, near Dover.
Tainch, E. C., Esq.	4, Spencer Square, Ramsgate.
Tucker, Mr. E.	The Grove, Margate.
Thurston, Thomas, Esq.	Ashford.
Tassell, R., Esq.	St. Margaret's Street, Canterbury.
Tylden, Rev. M.	Stamford Rectory, near Hythe.
Thornton, Mr.	Hawley Street, Margate.
Whitfield, H., Esq.	Ashford.
Wish, Rev. J. F.	Birchington, Thanet.
Willis, Mr.	Shepherdswell, near Dover.
Walker, Mrs.	Hawke's Lane, Canterbury.

ASSOCIATES.

Baker, Mr,	Cattle Market Place, Sandwich.
Coppin, Mr. E.	Sibbertswould.
Else, Mr. R.	Burgate Lane, Canterbury.
Kennett, Mr. W.	Fordwich.
Gordon, Mr.	Museum, Dover.
Young, Mr.	Sittingbourne.
Gutteridge, Mr.	Faversham.
Prebble, Mr.	Ramsgate.

CHIVERS, PRINTER, CANTERBURY.

REPORT

OF

THE EAST KENT

NATURAL HISTORY SOCIETY,

WITH A LIST OF

BOOKS BELONGING TO THE LIBRARY,

&c. &c.

SESSION, 1863.

Canterbury:

PRINTED BY H. CHIVERS, PALACE STREET.

EAST KENT

NATURAL HISTORY SOCIETY.

REPORT.

In presenting their report for the year 1863, the Committee are able to congratulate the Society on the prosperous condition of the financies, as after all expenses are paid, the Treasurer has a balance of £14 10s. 4d. in hand. The Library has also been increased by several highly useful books of reference, and many valuable donations.

The Committee regret that they cannot add the increased number of Members to their subjects of congratulation, but various circumstances have caused the resignation of many Members living at a distance, which are not quite counterbalanced by new elections.

The Society commenced their campaign last year, by a Meeting for Scientific purposes, in the King's School Room, on the 24th of February, which was fully attended. There were three papers read,—one by the Rev. J. Mitchinson on British Inland Mollusca; one by Dr. Boycott on the Welwitschia Mirabilis; and one by Mr. Dowker on the Desmidiæ. The Rev. J. F. Scott exhibited and explained a new American Hive; and Captain Cox some beautiful specimens of the wings of the Tineidæ. Several Microscopes,

with specimens of the wings and of the Desmids were exhibited, and the papers were fully illustrated by specimens, or diagrams.

The first Excursion of the Society was on the 21st of May, to Eastwell Park which was generously placed at the disposal of the Society for the day by the Earl of Winchelsea. About 60 Members and their friends assembled at the place of Meeting, (Boughton Aluph Church), and taking various directions, each in search of his own speciality, met again at 2 o'clock at Challock Church; where, after luncheon, a goodly collection of Botanical and Entomological specimens were exhibited. The party then proceeded by the Star Walk and Mount Parnassus, from both of which points beautiful and extensive views of the surrounding country and the distant channel were obtained, and thence on to Eastwell Church and House; the Gardens of the latter having been kindly thrown open to them by command of the Earl—whose kindness was ably and heartily seconded by his Steward, Mr, Peach, who accompanied the party and pointed out the objects of interest and beauty on their route. A brilliant spring sun lit the landscape, and conduced considerably to the success of one of the pleasantest excursions the Society has had.

The next Excursion of the Society was on August 25th, to Sandwich and along the road past Stonar to Cliff End. Owing to a rainy morning the attendance of Members was small, and the rain coming on again shortly after leaving Stonar, prevented the collection of the specimens of the Marsh Plants, &c., which was one of the chief objects of the Excursion. At Stonar, however, the Members examined the ancient Sea Beach, still in many parts quite bare of vegetation, though gradually becoming covered in others, and collected a few specimens of the peculiar Botany of the district. Mr. Reader exhibited a plan of the ancient town of Stonar, and of some cuttings that had been made on the site of the

Church; and they then proceeded to Cliff End, where Mr. Dowker explained the Geological features, especially of the Thanet Sands there visible—which the frequent showers prevented many from seeing.

In October it was arranged to hold a Monthly Evening Meeting at the Society's Rooms, for Scientific purposes, on the third Tuesday, which has been carried out since, it is hoped, with some benefit to those attending, more particularly in Microscopic researches. The Committee hope to continue these Meetings, and to see a larger attendance of working Members at them, when they become more generally known.

The last Meeting of the Society was at the King's School Room, on the 24th of November, at which Mr. Whittaker gave an excellent and practical description of the Tertiary Deposits of Kent, particularly of the immediate district round the City, which was admirably illustrated by several large diagrams; and Mr. Saunders exhibited some beautiful specimens of a genus of Butterflies, Ornithoptera primus, as illustrating the passage of varieties into species, and the great difficulty of deciding between them: The specimens were from the Indian Archipelago, and were remarkable for their beauty and large size; and both Lecturers furnished much pleasure and instruction, by the clearness and excellence of their remarks, to a large audience.

In the next winter the Committee hope (should the state of the finances permit it) to have a series of elementary Lectures here on the various branches of the Science of Natural History, so as to make a short course each on Botany, Geology, Entomology, &c.

Annexed is the account for the year already referred to, and a list of Books now in the Library.

In conclusion, the Committee beg to congratulate the

Members on the success of the Meetings of the year, and at the same time to urge on them the necessity of each Member using such means as are at his command for advancing, as far as possible, the knowledge of Natural History, by such observations as fall in his way, especially of the Natural History of his own neighbourhood, by bringing specimens to the Society's Room, at the Monthly or General Meetings. No observations—carefully taken—of any uncommon occurrences are too trivial, no Member too unlearned to be of service in noting them to the science; while, by a generous co-operation, we may at once advance our own knowledge, increase the usefulness of the Society, and add, we hope, to the happiness of all.

The President, Captain Cox, has this year offered as a prize for the best collection of the Flora of East Kent, a Standard Botanical work: The collections to be exhibited at the General Meeting of the Society in November. Three competitors to exhibit or no prize will be given. The award to be made by the Committee.

FINANCIAL STATEMENT.

RECEIPTS.	£	s.	d.
In Treasurer's hands, Dec. 31st, 1862 ..	7	13	4
Subscriptions for 1862	7	12	6
Ditto for 1863	29	13	6
Donation to the Library fund	1	5	0
	£46	4	4

EXPENSES.	£	s.	d.
Mr. Hayward for book binding, 1862	0	6	0
Mr. Chivers for printing .. „	1	17	0
Mrs. Ward ditto .. .. .. „	1	0	0
Secretary's expenses .. . „	0	10	0
Local Secretary's ditto .. .. „	0	7	6
Cheque book 1863	0	2	6
Librarian for books.. .. .. „	10	0	0
Mr. Chivers for printing.. .. „	2	17	6
Mr. W. Sharp for book case .. „	2	0	0
Rent, 11 months .. .. .. „	9	3	4
Fire and candles . .. .. „	1	0	0
Secretary, for stationery and stamps, &c. ..	2	5	0
Treasurer, for stamps, ... „	0	5	0
	31	14	0
Balance Dec. 31st, 1863:			
In Treasurer's hands £14 0 6			
In Secretary's hands 0 9 10	14	10	4
	£46	4	4

February, 1864.

GEORGE RIGDEN, Hon: Treasurer.

LIST OF BOOKS AND PERIODICALS

Belonging to the East Kent Natural History Society.

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1. British Land and Fresh Water Mollusks, 1 vol., (Reeve)
2. Bryologia Britanica, 1 vol., (Wilson)
3. Synopsis of British Sea Weeds, 1 vol., (Harvey)
4. Flora of Surrey, 1 vol., (J. A. Brewer)
5. Manual of Geology, 1 vol., (Professor Phillips)
6. Flora of East Kent

PERIODICALS.

Natural History Review, vol. 3, 1863. (Half bound Calf)
The Zoologist, from 1843 to 1852. (In Cloth)
" 1853 to 1855. (Half bound Calf)
" 1856 to 1857. (In Cloth)
" 1858 to 1859, and for 1861-63. (Half bound Calf)

N.B. The Zoologist for 1860 and 1862 are imcomplete at present.

The Quarterly Journal of Microscopical Science, vols. 7 and 8, old Series. Vols. 1, 1861, & 3, 1863, new ditto. (Half bound Calf)
Magazine of Natural History, vols. 3, 4, 5, 6, 7, 8, 11, and 12, 3rd Series. (Half bound Calf)
The Geologist, vols. 2, 4 and 6. (Half bound Calf)
The Phytologist, vol. 3, 1859. (Half bound Calf)
Hand Book of British Flora, parts 1 to 14
British Moths, Nocturni. Presented by Capt. Cox
" Geometræ. Presented by Capt. Cox

THE FOLLOWING PERIODICALS ARE TAKEN IN BY THE SOCIETY, VIZ:

1. Natural History Review
2. The Annals and Magazine of Natural History
3. Quarterly Journal of Microscopical Science
4. The Zoologist
5. The Geologist
6. Hand Book of the British Flora

LIST OF BOOKS, &c.,

Lent to the East Kent Natural History Society's Library.

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1. The Ray Society's Publications from 1845 to 1854, 12 vols. By James Reid, Esq.
2. Balfour's Class Book of Botany, 1855 and 1859, 2 vols. By James Reid, Esq.
3. Geology of South East of England, 1833, 1 vol. By James Reid, Esq.
4. Clark's British Marine Testaceous Mollusca, 1855, 1 vol. By G. Dowker, Esq.
5. Johnstone's British Zoophytes, 1847, 2 vols. By G. Dowker, Esq.
6. Martin's Geological Memoir of Part of Western Sussex, 1828, 1 vol. By James Reid, Esq.
7. Mantell's Geology of Surrey, 1840, 1 vol. By James Reid, Esq.
8. Buckland's Reliquiæ Diluvianæ, 1823, 1 vol. By James Reid, Esq.
9. Work on Butterflies, 1 vol. By Rev. F. Rouch.
10. Hints on the formation of Local Museums. By James Reid, Esq.

LIST OF OFFICERS AND MEMBERS.

President:

CAPTAIN C. J. COX, Fordwich House.

Vice-Presidents:

THE VERY REV. THE DEAN OF CANTERBURY.
SIR BROOK BRIDGES, BART., M.P., Goodnestone Park.
SIR WALTER JAMES, BART, Betshanger.
MATTHEW BELL, Esq., Bourne Park.
WM. OXENDEN HAMMOND, Esq., St. Albans.
REV. J. F. SCOTT, Sibertswould.
J. F. CROOKES, Esq., Harewell.
REV. J. MITCHINSON, King's School.
J. BOYCOTT, Esq., M.D., Watling Street.

Treasurer:

G. RIGDEN, Esq., Burgate Street.

Secretary:

MR. JOHN S. LINFORD, Burgate Street.

Committee:

A. B. ANDREWS, Esq.
G. DOWKER, Esq.
G. FURLEY, Esq.
COLONEL HORSLEY.
CAPTAIN KEMP.
H. R. MACKESON, Esq.
J. REID, Esq.
F. H. SANKEY. Esq.
REV. F. ROUCH.
Dr. TASSELL.

MEMBERS.

Andrews, A. B. Esq.	Westgate, Canterbury.
Andrews, Thos., Esq.	Dane John Terrace.
Alcock, Rev. J. P.	Ashford.
Bottle, Mr. A.	Dover.
Bateman, Mr. J.	St. George's Street, Canterbury.
Bland, W., Esq.	Hartlip, Sittingbourne.
Cotton, H., Esq.	Dent de Lion, Margate.
Cox, Mrs. C. J.	Fordwich House.
Chivers, Mr.	Palace Street.
Chaffey, Mrs.	Doddington near Faversham.
Dowker, G. Esq.	Stourmouth House.
Dowker, Mrs.	Ditto.
Drew, C. T. Esq.	Chartham.
Farren, Col., C. B.	Colchester.
Furley, R., Esq.	Ashford.
Furley, George, Esq.	Barton Villas, Canterbury.
Forrest, Mrs.	Orchard Place Canterbury.
Grayling, J., Esq., M.D.	Sittingbourne.
Gibson, F., Esq.	Hawley Square, Margate.
Gibson, Mrs.	Ditto.
Green, Mrs. J.	Canterbury.
Greaves, Mr. Cyril.	Ditto.
Hallowes, Mrs. P. B.	Stour Street, Canterbury.
Hoare, W. P., Esq.	Faversham.
Hatfield, G. T., Esq.	Word near Sandwich.
Hatfield, Mrs.	Ditto.
Hatfield, Miss.	Ditto.
Harvey, Mr. S.	High Street, Canterbury.
Horsley, Col.	St. Stephen's Lodge.
Inthurn, Miss.	Wincheap.
Jenner, Rev. H. L.	Preston Vicarage.
Kersey, Dr.	Littlebourne.
Kenrick, Miss.	Stone House, Canterbury.
Kemp, Capt.	Cavalry Barracks.
Lake, Robt., Esq.	Milton Chapel.
Leith, R. M., Esq.	Folkestone.
Mackeson, H. B., Esq.	High Street, Hythe.

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Rammell, Thos., Esq.	Sturry Court.
Reid, Jas., Esq.	Bridge Street, Canterbury.
Rouch, Rev. F.	Precincts, Canterbury.
Rouch, Mrs.	Ditto.
Rouch, Miss.	Ditto.
Swathem, Mrs.	
Sankey, Robt., Esq.	Castle Street, Canterbury.
Sankey, F. H., Esq.	Wingham.
Sankey, Mrs.	Ditto.
Saunders, Sibert, Esq.	Whitstable.
Slater, F., Esq.	Chislett.
Scudamore, Dr.	Harbledown.
Tainch, E. C., Esq.	4, Spencer Square, Ramsgate.
Tucker, Mr. E.	The Grove, Margate.
Thurston, Thos., Esq.	Ashford.
Tassell, Dr.	St. Margaret's Street, Canterbury.
Tylden, Rev. M.	Stamford, Rectory, Hythe.
Taylor, Mrs. A.	North Street, Herne Bay.
West, Rev. J. F.	Birchington, Thanet.
Walker, Mrs.	St. George's Place, Canterbury.
Wildash, Dr.	Hythe.

CHIVERS, PRINTER, PALACE STREET, CANTERBURY.

REPORT

OF

THE EAST KENT

NATURAL HISTORY SOCIETY,

WITH A LIST OF

BOOKS BELONGING TO THE LIBRARY,

&c., &c.

SESSION, 1864.

Canterbury:

PRINTED BY H. CHIVERS, PALACE STREET.

EAST KENT

NATURAL HISTORY SOCIETY.

REPORT.

The Committee in presenting their 7th Annual Report, have again to congratulate the Members on the improved position of the Society, as although their cash balance is not so large as last year, there has been a great increase in the number of members, and several valuable additions to the Library. The Treasurer has a net balance in hand of £6 18s. 4d., after paying all accounts to the end of the past year.

We have since the last annual meeting received an accession of forty-six new members, and during the same time we have lost by death and resignation 8, leaving a net gain to the Society of thirty-eight, among whom your Committee are proud to recognize several earnest workers in the different branches of Natural History.

The first meeting of the Society was held on the 23rd of February in Saint George's Hall, where a Lecture was delivered by H. W. Bates, Esq., on the River Amazons and the Natural History of the Central District of South America. The Lecture was illustrated with a large map of the course

of the river and its principal tributaries; and Mr. Bates gave a graphic description of the luxurious forest growth that clothes the valley on each side, with a sketch of the chief animals and insects. On this occasion your Committee issued a number of free admission tickets, and the large room was well filled, more than three hundred being present; and the lecture was listened to with marked attention and pleasure throughout. The experiment of issuing a general invitation did not however produce results to induce your Committee to repeat it.

The first excursion of the year took place on the 31st of May, to Chilham and thence to Shottenden Wood. In spite of a threatening morning about 45 members and friends assembled at the Beeches at Shottenden at luncheon, and a goodly collection of Flowers and Ferns were exhibited. The President then gave a short Lecture on the formation and changes in Insects, which was interrupted by a heavy fall of rain, compelling the party to hasten their return home.

On the 28th of June the President invited the members to an extra general meeting at Fordwich House, where fifty-six members and about thirty visitors availed themselves of his kind invitation and assembled in a marquee on the lawn.

The President opened the proceedings by a short lecture on the rose—its cultivation, history, and uses, which was illustrated by some beautiful specimens of the finer or rarer varieties both cut and growing in the garden. Budding and grafting were performed by Mr. Kennett, for the instruction of the members; and the President concluded a very interesting address by briefly sketching the history of the rose farms of the east and the manufacture of otto of roses.

Mr. Dowker then explained, with the help of some clearly drawn diagrams, the principles and construction of the microscope, both simple and compound; after which, the company

adjourned to the dining-room, where were several first class instruments belonging to different members, and under which many objects of deep interest were exhibited; especially an undescribed species of Ophiura by Mr. H. Lee, Volvox Globator (alive) by Mr. G. Dowker, and the dental plates of a Starfish by the Rev. J. B. Reade.

The next meeting of the Society was the autumn excursion to the neighbourhood of Folkestone on the 30th of August, on which occasion a Committee was formed at Folkestone to receive and welcome the Society. About 50 members assembled at Copt Point at 2 p.m. on that day, and after exploring the Flora of the immediate neighbourhood, descended to the beach, where W. Whittaker, Esq., B.A., F.G.S., gave a short lecture on the secondary strata, which are well shown at that spot. By the help of a large diagram he pointed out in the surrounding cliffs almost the entire cretaceous group, from upper chalk through lower chalk, upper greensand (not visible in consequence of the fall of the cliff) and gault to lower greensand. Several fossils from the gault were collected, and many actiniæ and marine Polyzoa from the rocks on the shore, and the party returned over the cliff to the Pavilion Hotel, where they dined together—the President taking the chair, and supported by two of the Vice-Presidents, Capt. Crookes and Dr. Boycott. After dinner 13 new members were proposed and elected at the next committee meeting.

The President having received an invitation for the Society, from a Committee of gentlemen at Dover, to attend a Microscopic Meeting in the Maison Dieu at that place, and your Committee having accepted the same on behalf of the members, a meeting was accordingly held there on the 3rd of November, which was very numerously attended, both by the members of the Society and by the citizens of Dover. The members assembled in the Museum at Dover, where they were addressed by Dr. Astley the Curator, after which they adjourned to the

Maison Dieu, where the President delivered an address on the objects and uses of the Society, which he has since published and circulated among the members. Thirty-two microscopes of various sizes and descriptions were exhibited on a long and wide table in the centre of the Hall, among which were some first class Binoculars by T. Ross, some cheaper Binoculars by C. Baker, single tube instruments by both those makers and by Smith and Beck, Pillisher, Highley, Powell and Leland, &c. The objects of interest shewn by these were too numerous to particularize; consisting of rive and mounted Zoophytes, Diatomaceæ, Xanthidiæ, Insects and parts of Insects, Sections, Algæ, &c., &c. The meeting was admirably organized by the Dover Committee, and was a decided success; and with the Folkestone meeting has contributed greatly to increase the number of members of the Society.

The last meeting of the year was held in St. George's Hall, when a Lecture was delivered by B. F. Lowne, Esq., on the Natural History of Palestine and the Bible. Mr. Lowne had travelled in Palestine with the expedition organized by the Rev. Mr. Tristram as Surgeon and Naturalist, and gave a graphic description of the Geological Features of the Jordan Valley, the Lebanon Range and the Dead Sea; showing the effect of the formation of the Country on its natural products, and the relation of its Flora and Fauna to those of Europe on the west, and Africa and Asia on the south and east.

On this occasion, your Committee thinking the citizens of Canterbury might be interested in the subject of the lecture, resolved to admit non-members on a small payment, but the invitation was not responded to, and the lecture (which gave great satisfaction to those who heard it) was listened to by an audience more select than numerous.

The Monthly Evening Meetings, which were commenced

in 1863, have been continued regularly through the past year, and with one or two exceptions have been well attended, and many objects of interest exhibited and discussed, (especially some very interesting specimens of Marine Polyzoa and Annelilida, by Mr. Saunders); and your Committee believing much benefit has accrued from these meetings, and much information been gained and disseminated at them, recommend their continuance in the present year.

The Prize offered by the President at the last Annual Meeting has not been awarded, as there was but one competitor; and our want of room has assisted in preventing the institution of the courses of elementary lectures hoped for in our last report.

Annexed is the Treasurer's statement of account for the past year, and a list of the books in the Library, those added during the year being marked with an asterisk.

Your Committee have to regret the loss of the services of Dr. Boycott one of your Vice-Presidents.

It having been suggested to the Committee that an exhibition of Roses would be very popular in Canterbury, your Committee, having carefully considered the matter, and ascertained that they are likely to be well supported by the nobility and gentry of the county, beg to recommend that an exhibition of the native and cultivated varieties of the Rose be held at Canterbury, under the auspices of the Society, about Thursday June the 22nd; and in order to induce exhibitors to send specimens, prizes be offered for competition, under such regulations as a Committee specially appointed shall determine on, and a subscription be started to defray the cost thereof.

In concluding their report the Committee can but congratulate the members on the success that has attended the

meetings during the year, and the improved position of the Society generally; and again urging on members the utility and necessity of each member noting carefully the observations that fall in his way of the Natural History of his own immediate neighbourhood, or of any part of the county where he may be sojourning, as it is by a number of separate observations, apparently trivial in themselves, that many of the great truths of the science have been established. With our increased number of members, spread over a space comprehending Dover, Deal, Sandwich, Ramsgate, Margate, Herne Bay, Whitstable, Faversham, Sittingbourne, Tenterden, Ashford, Hythe, and Folkestone, we should be in a position to make out a complete Fauna and Flora for East Kent, particularly of the neighbourhood of the coast line—a task the Committee hope for the cordial co-operation of the members in attempting.

FINANCIAL STATEMENT.

RECEIPTS.	£	s.	d.
Balance in hand Dec. 31st, 1863	14	10	4
Subscriptions for 1863	0	10	0
Ditto for 1864	29	6	0
	£44	6	4

EXPENSES.	£	s.	d.
W. W. Bates, Esq., Lecturer	3	3	0
Mr. Ginder for hire of room	1	11	6
Contribution to the Library	10	0	0
Donation to the Library fund	1	5	0
B. J. Lowne, Esq., Lecturer	3	0	0
Mr. Ginder for hire of room	1	1	0
Rent, 1 year, due January 6th	10	0	0
Fire and candles	1	0	0
Secretary for sundry expenses	2	7	0
Treasurer for stamps and paper	0	5	0
Mr. Chivers for printing	3	15	6
	37	8	0
Balance in Treasurer's hands £6 0 6			
Ditto in Secretary's hands .. 0 17 10			
	6	18	4
	£44	6	4

GEORGE RIGDEN, Hon: Treasurer.

January, 1865.

LIST OF BOOKS AND PERIODICALS.

BELONGING TO THE EAST KENT NATURAL HISTORY SOCIETY.

1. British Land and Fresh Water Mollusks, 1 vol., (Reeve)
2. Bryologia Britannica, 1 vol., (Wilson)
3. Synopsis of British Sea Weeds, 1 vol., (Harvey)
4. Flora of Surrey, 1 vol., (J. A. Brewer)
5. Manual of Geology, 1 vol., (Professor Phillips)
6. Flora of East Kent

*7. Morris's British Butterflies, 1 vol.
*8. Ramsays Physical Geography of Great Britain, 1 vol.
*9. Dallas' Animal Kingdom, 1 vol.
*10. Johnstone's British Zoophytes, 2 vols.
*11. A Catalogue of rare Phœnogamous Plants collected in South Kent in 1829.
*12. Memoirs of the Geological Survey of Great Britain.

PERIODICALS.

Natural History Review, vol 3, 1863. (Half bound Calf)
The Zoologist, from 1843 to 1852. (In Cloth)
" 1853 to 1855. (Half bound Calf)
" 1856 to 1857. (In Cloth)
" 1858 to 1861, and for 1863. (Half bound Calf)
N.B.—The Zoologist for 1862 is incomplete at present.
The Quarterly Journal of Microscopical Science, vols. 7 and 8, old Series. Vols. 1, 1861, and 3, 1863, new ditto. Half bound Calf)
Magazine of Natural History, vols. 3, 4, 5, 6, 7, 8, 11, and 12, 3rd Series. (Half bound Calf)
The Geologist, vols. 2, 3, 4, and 6. (Half bound Calf)
The Phytologist, vol. 3, 1859. (Half bound Calf)
Hand Book of British Flora, parts 1, to 24.
British Moths, Nocturni.
" Geometræ.
Proceedings of the Geologist's Association, 1863-4.

N.B.—As it is most important to increase the number of Books in the Library for the use of Members, a special subscription for the purchase of Books, or donation of works on Natural History will be thankfully received by the Committee.

THE FOLLOWING PERIODICALS

ARE TAKEN IN BY THE SOCIETY, VIZ:

1. Natural History Review
2. The Annals and Magazine of Natural History
3. Quarterly Journal of Microscopical Science
4. The Zoologist
5. The Geological Magazine
6. Hand Book of British Flora
7. Quarterly Journal of the Geological Society
8. „ „ Science.

LIST OF BOOKS, &c.

LENT TO THE EAST KENT NATURAL HISTORY SOCIETY'S LIBRARY.

1. The Ray Society's Publications from 1845 to 1854, 12 vols. By James Reid, Esq.
2. Balfour's Class Book of Botany, 1855 and 1859, 2 vols. By James Reid, Esq.
3. Geology of South East of England, 1833, 1 vol. By James Reid, Esq.
4. Clark's British Marine Testaceous Mollusca, 1855, 1 vol. By G. Dowker, Esq.
5. Martin's Geological Memoir of Part of Western Sussex, 1828, 1 vol. By James Reid, Esq.
6. Mantell's Geology of Surrey, 1840, 1 vol. By James Reid, Esq.
7. Buckland's Reliquiæ Diluvianæ, 1823, 1 vol. By James Reid, Esq.
8. Work on Butterflies, 1 vol. By Rev. F. Rouch.
9. Hints on the formation of Local Museums. By James Reid, Esq.
10. Letters of Rusticus on the Natural History of Godalming. By Miss Kenrick.

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Greaves, Mr. Cyril	Ditto.
Gillett, Mr.	Ditto.
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Hoare, W. P., Esq.	Faversham.
Hatfield, G. T., Esq.	Word near Sandwich.
Hatfield, Mrs.	Ditto.
Hatfield, Miss	Ditto.
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Horsley, Col.	St. Stephen's Lodge.
Hart, R. Esq.	Folkestone.
Imthurn, Miss	Wincheap.
James, Sir W., Bart.	Betshanger.
Jenner, Rev. H. L.	Preston Vicarage.
Kersey, Dr.	Littlebourne.
Kersey, Mrs.	Ditto.
Kenrick, Miss	Stone House, Canterbury.
Kemp, Capt.	Cavalry Barracks.
Kingsford, Miss	Seaton.
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Lee, R., Esq.	The Waldrens, Croydon.
Levy, Adolphus, Esq.	Folkestone.
Linford, Mr. J. S.	Canterbury.
Linford, Mrs.	Ditto.
Makeson, H. B., Esq.	High Street, Hythe.
Mitchinson, Rev. Dr.	King's School.
Mount, Mr. W.	Canterbury.
Neame, Mrs. A.	King's Bridge, Canterbury.
Neame, Miss C.	Orchard Place, Canterbury.
Neame, E., Esq.	Selling.
Neame, Mrs.	Ditto.
Pittock, G. M., Esq., M.D.,	Margate.
Parker, R. D., Esq.	Barham.
Pool, Mr.	High Street, Canterbury.
Powell, Rev. W.	Folkestone.
Powell, Mrs.	Canterbury.
Reid, Jas., Esq.	Bridge Street, Canterbury.
Rigden, G. Esq.	Burgate Street.
Rouch, Rev. F.	Precincts, Canterbury.
Reade, Rev. J. B.	Bishopsbourne.
Reade, Geo., Esq.	Ditto.
Scott, Rev. L. F.	Sibertswould.
Sankey, Robt., Esq.	Castle Street, Canterbury.
Sankey, F. H., Esq.	Wingham.

Sankey, Mrs.	Wingham.
Saunders, Mr. Sibert,	Whitstable.
Slater, F., Esq.	Chislett.
Scudamore, Dr.	Harbledown.
Smith, Capt. Carleton	Dover.
Stock, Henry, Esq.	Folkestone.
Sankey, Herbt. T., Esq.	Burgate Street, Canterbury.
Tainch, E. C., Esq.	4, Spencer Square, Ramsgate.
Tucker, Mr. E.	The Grove, Margate.
Thurston, Thos., Esq.	Ashford.
Tassell, Dr.	St. Margaret's Street, Canterbury.
Tylden, Rev. M.	Stamford Rectory, Hythe.
Taylor, Mrs. A.	North Street, Herne Bay.
Thornton, W. H., Esq.	Hawley Square, Margate
Tyson, W. T., Esq.	Folkestone.
West, Rev. J. F.	Birchington, Thanet.
Walker, Mrs.	St. George's Place, Canterbury.
Ward, Miss	High Street, Canterbury.
Whittaker, W., Esq.	St. Margaret's, Canterbury.
Wilson, J. L., Esq.	Bridge Street.
Worsfold, Christopher, Esq.	Dover.

The following were elected at the Annual Meeting:—

Green, Mrs. A.	9, Clarence Lawn, Dover.
Hambrook, Mr. J. B.	Strond Street, ditto.
Kingsford, — Esq.	Lundy House, ditto.
Lewis, F., Esq.	Castle Street, ditto.
Lindsay, J. B., Esq.	Maison Dieu Road, ditto.
Mummery, Mr. W. P.	Strond Street, ditto.
Pryer, E. J., Esq.	ditto. ditto.
Spice, C., Esq.	ditto. ditto.
Weston, L., Esq.	Waterloo Crescent, ditto.
Wightwick, W., Esq.	Folkestone.

CHIVERS, PRINTER, PALACE STREET, CANTERBURY.

REPORT

OF

THE EAST KENT

Natural History Society,

WITH A LIST OF

BOOKS BELONGING TO THE LIBRARY,

&c., &c.

Session, 1866.

CANTERBURY:

PRINTED AT THE "KENTISH GAZETTE" OFFICE, HIGH-STREET.

REPORT.

The Committee have the pleasure of laying their ninth annual report before the members, and again find their chief source of congratulation in the financial position of the Society, as the present balance in hand is more than £9, which would be greatly increased were all the outstanding subscriptions paid up. Since the publication of the last report the Society has lost eleven members from various causes, and twenty-eight new members have been elected, being a net gain of seventeen to the Society.

In consequence of an arrangement entered into with the proprietor of the "Kentish Gazette," the Committee are enabled to present to the members a more detailed account of the proceedings of the Society than they have hitherto given.

The Committee regret the compulsory omission of the November meeting in the past year, but as none of the members were at the time prepared with a paper, and they were unable to procure a professional lecturer from London, it would have been useless to call the meeting. One of the chief uses of fixing the days of these evening meetings was to allow such members as had anything to communicate to the Society to give notice of their intention to the Secretary before the time of meeting; but the Committee fear that this convenience has hardly been appreciated by the members, as a reference to the report will show only three original papers during the year, viz., one by G. Dowker, Esq., on the work

of the East Kent Natural History Society; one by J. Brent, jun., Esq., on the Stork; and one by Mr. Gordon on the Birds frequenting the Kentish Coast,—this last being an epitome of personal observations extending over a period of more than a quarter of a century.

It will be seen by the Librarian's statement appended that 6 new books and 5 vols. of periodicals have been added to the library, and that several volumes which had been kindly lent for reference, have been reclaimed by their owner, James Reid, Esq., to whom the Committee tender their best thanks for some years' use of a number of valuable works. The Librarian has yet a sum of £5 2s. 1d. in hand awaiting an opportunity of obtaining one or more expensive books of reference, for which he is at present in treaty, at a reduced rate.

The Treasurer's account, duly audited, is also annexed, showing a balance of £9 7s. 1d. in favour of the Society.

In conclusion, the Committee beg to urge on the members the necessity of increased activity, if not of observation, at least in the communication of their results to the Society at large. The excursions have been pretty well attended this year, and the Microscopic Meeting was a decided success, while the interest in the papers read, at the second and third meetings especially, render it still more to be regretted that there were none to keep it up at the meeting which should have been held in November.

Annexed is the detailed report of the proceedings before alluded to.

LIST OF BOOKS AND PERIODICALS

Belonging to the East Kent Natural History Society.

1. British Land and Fresh Water Mollusks, 1 vol., (Reeve)
2. Bryologia Britannica, 1 vol. (Wilson)
3. Synopsis of British Sea Weeds, 1 vol., (Harvey)
4. Flora of Surrey, 1 vol., (J. A. Brewer)
5. Manual of Geology, 1 vol., (Professor Phillips)
6. Flora of East Kent.
7. Morris's British Butterflies, 1 vol.
8. Ramsay's Physical Geography of Great Britian, 1 vol.
9. Dallas' Animal Kingdom, 1 vol.
10. Johnstone's British Zoophytes, 2 vol.
11. A Catalogue of rare Phœnogamous Plants collected in South Kent in 1829.
12. Memoirs of the Geological Survey of Great Britain, 2 Nos. referring to Sheets 4 and 7.
13. British Hemiptera Heteroptera, 1 vol., 1865, (Douglas and Scott)
14. Hand Book of British Flora, 2 vols., (Bentley)
15. Miscellaneous Botanical Works of Robert Brown, 1 vol.
16. Recent Memoirs on the Cetaceæ, 1 vol.
17. Monograph of British Spongidiæ by Dr. Bowerbank.
18. Conybeare and Phillips' Geology, 1 vol.
19. Bell's British Quadrupeds, 1 vol.
20. Atlas of British Sea Weeds, drawn by Mrs. Gatie from Professor Harvey's Phycologia Britannica.

PERIODICALS.

Natural History Review, vol. 3, 1863, and 4, 1864. (Half bound Calf)
The Zoologist, from 1843 to 1852. (In Cloth)
" 1853 to 1855. (Half bound Calf)
" 1856 to 1857. (In Cloth)
" 1858 to 1861, and for 1863 to 1865. (Half bound Calf)
N.B.—The Zoologist for 1862 is incomplete at present.
The Quarterly Journal of Microscopical Science, vols. 7 and 8, old Series. Vols. 1, 1861, 3 to 5, 1863 to 1865, new ditto. (Half bound Calf)
Magazine of Natural History, vols. 3 to 8, and 11 to 16, 3rd Series. (Half bound Calf)
The Geologist, vols. 2, 3, 4, 6, and 7. (Half bound Calf)
The Phytologist, vol 3, 1859 (Half bound Calf)

British Moths, Nocturni.
„ Geometræ.
Proceedings of the Geologist's Association, 1863-4.
Geological Magazine, vol. 1, 1864, and 2, 1865.
Journal of Science, vol. 1, 1864.

The Librarian regrets to state that in consequence of the undermentioned Periodicals not having been returned to the Library, nor any entry of them made in the book kept for the purpose in the Society's reading room, he has been unable to have the volumes for 1865 bound, viz:—Journal of Science, No. VI. Natural History Review, No. X.

THE FOLLOWING PERIODICALS

ARE TAKEN IN BY THE SOCIETY, VIZ:

1. Natural History Review
2. The Annals and Magazine of Natural History
3. Quarterly Journal of Microscopical Science
4. The Zoologist
5. The Geological Magazine
6. Quarterly Journal of the Geological Society
7. „ „ of Science

LIST OF BOOKS, &c.

LENT TO THE EAST KENT NATURAL HISTORY'S SOCIETY'S LIBRARY.

1. Clark's British Marine Testaceous Mollusca, 1855, 1 vol. By G. Dowker, Esq.
2. Work on Butterflies, 1 vol. By Rev. F. Rouch.
3. Letters of Rusticus on the Natural History of Godalming. By Miss Kenrick
4. Work on the Microscope. By Rev. F. Rouch
5. Hooker's British Flora, 1835, 1 vol. By Dr. Boycott

FINANCIAL STATEMENT.

RECEIPTS.	£	s.	d.
Balance in hand, Dec. 31st, 1865	6	11	4
Subscriptions for 1865	0	10	0
Ditto for 1866	44	0	0
Donations in aid of the expenses at Microscopical Meeting	3	0	0
	54	1	4

EXPENSES.	£	s.	d.
Mrs. Ward, for printing	6	12	0
Contributions to the Library	10	0	0
Rent of room	10	0	0
Fire and candles	1	0	0
Subscription to Ray Society	1	1	0
Mr. James, for refreshments, &c., at the Microscopical Meeting	8	0	0
Mr. Bottle, expenses at Dover	2	10	9
Mr. Pierce, for use of lamps	0	12	0
Secretary, for sundries	4	11	0
Treasurer, for stamps and paper	0	5	0
Cheque book	0	2	6
	44	14	3
In Treasurer's hands (£ 7 14 3)			
In Secretary's hands (£ 1 12 10)			
	9	7	1
	54	1	4

Audited by me—John Kemp, Captain Cavalry Staff,
29th January, 1867.

GEORGE RIGDEN, Hon. Treasurer.

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Haddon, Miss C.,	ditto ditto
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Neame, Mrs. A.	King's Bridge, Canterbury.
Neame, Miss C.	Orchard Place, Canterbury.
Neame, E., Esq.	Selling.
Neame, Mrs.	Ditto.
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Rigden, G., Esq.	Burgate Street, Canterbury.
Rigden, G. W., Esq.	Taunton, Somerset.
Rouch, Rev. F.	Precincts, Canterbury.
Reade, Rev. J. B.	Bishopsbourne.
Reade, Geo., Esq.	Ditto.
Scott, Rev. F.	Sibertswould.
Sankey, F. H., Esq.	Wingham.
Sankey, Mrs.	Ditto.
Saunders, Mr. Sibert.	Whitstable.
Slater, F., Esq.	Chislett.
Smith, Capt. Carleton.	Dover.
Stock, Henry, Esq.	Folkestone.
Sutton, Dr.	Liverpool Street, Dover.
Spice, C., Esq.	Strond Street, ditto.
Solomon, — Esq.	Little Kenfield.
Smith, Miss J.	Dane John, Canterbury.
Smith, J. G., Esq.	Dover.

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Sicard, A., Esq.	Bridge.
Tucker, Mr. E.	The Grove, Margate.
Thurston, Thos., Esq.	Ashford.
Tuckey, C., Esq., M.D.	St. Dunstan's, Canterbury.
Tylden, Rev. M.	Stanford Rectory, Hythe.
Taylor, Mrs., A.	North Street, Herne Bay.
Thornton, W. H., Esq.	Hawley Square, Margate.
Tyson, W. T., Esq.	Folkestone.
Thorpe, J. C., Esq.	Dover.
Thomson, R. E., Esq.	Kenfield House.
Walker, Mrs.	St. George's Place, Canterbury.
Ward, Miss	High Street, Canterbury.
Wilson, J. L., Esq.	Bridge Street, Canterbury.
Worsfold, Christopher, Esq.	Dover.
Winter, Capt.	Bridge.
Weston, L., Esq.	Waterloo Crescent, Dover.
Wightwick, W., Esq.	Folkestone.
Wray, Miss	Barton Fields, Canterbury.
Warman, Mr. W.	St. Peter's Street, Canterbury.
Warman, Mrs.	Ditto ditto
Winch, —, Esq.	Dover.

Honorary and Corresponding Members.

Sandilands, —, Esq.	Cannings Down, Queensland, Australia.
Saunders, J., Esq.	Reigate.
Whitaker, W. Esq.	Geological Museum, Jermyn Street, London.

Associates.

Baker, Mr.	Cattle Market, Sandwich.
Coppen, Mr. E.	Sibertswould.
Else, Mr. R.	Burgate Lane, Canterbury.
Gutteridge, Mr.	Faversham.
Kennett, Mr. W.	Fordwich.
Parren, Mr. W.	Canterbury.
Prebble, Mr. J. G.	Ramsgate.
Young, Mr.	Sittingbourne.

EAST KENT
NATURAL HISTORY SOCIETY.

Title and Objects of the Society.

The objects of the East Kent Natural History Society shall be, the Collection and Diffusion of Practical and Theoretical Knowledge respecting Natural History, in all its Branches, both in relation to the particular District, and the General Science.

RULES AND REGULATIONS.

MEMBERSHIP.

1. The Society shall consist of Ordinary, Honorary, and Corresponding Members, and of Associates.

2. Every candidate for admission into the Society as an Ordinary Member, must be proposed in writing by two Members, and the election shall be by ballot, taken at any Meeting of the Committee, or at a General Meeting—one black ball in five to exclude.

3. The Annual Subscriptions, to be paid by Ordinary Members, shall be Ten Shillings; the Subscription shall become due on the 1st of January in each year, and shall be paid in advance for the current year.

Any Member neglecting to pay his Subscription for three months after it is due, shall be applied to by the Secretary, and if the Subscription remains unpaid for three months after such application, he shall cease to be a Member of the Society.

4. The Committee shall have power to admit, without ballot, on the nomination of two Members, any Lady who shall be desirous of becoming an Ordinary Member, and her subscription shall be Five Shillings.

5. Any persons distinguished for their researches in Natural History, for their liberality to the Society, or for their connection with similar Societies may, on the recommendation of the Committee, be elected Honorary or Corresponding Members of this Society, provided they do not reside within the district: such Honorary and Corresponding Members shall not be subjected to any of the expenses of the Society, and shall have no vote in its affairs.

6. In order to encourage the study of Natural History among individuals of the class of mechanics, &c., residing in the district, the Committee shall have power to admit individuals of that class as associates, provided they shall first communicate some information or observation on Natural History, exhibit such specimens or present them to the Local Museums, as shall by their merits satisfy the Committee. Such Associates shall enjoy the privileges of Honorary Members.

MANAGEMENT, AND BUSINESS MEETINGS.

7. The affairs of the Society shall be conducted by a Committee of Management, which shall consist of a President, Vice-Presidents, a Treasurer, and an Honorary Secretary, and not less than six Members, who shall all be chosen at the Annual Meeting. Three Members of such Committee shall form a quorum. The Meetings shall be held on the same day as the February and November General Meetings, and at such other times as the Secretary may deem necessary.

8. An Annual Meeting shall be held on the last Tuesday in January

in each year, at Canterbury, for the purpose of electing the Officers for the current year, receiving the Annual Statement of Accounts, and Report of the Committee, and conducting the general affairs of the Society.

9. Special General Meetings may be summoned by the Committee, or by the Secretary, on the requisition (in writing) of any six Members of the Society, the specific purposes of the Meeting being stated in the notice, which shall be sent to each member not less than one week before the time of such Meeting.

10. All questions discussed at the Meetings shall be decided by a majority of votes; and if upon any question the votes shall be equal, the Chairman of the Meeting shall have the second or casting vote.

11. In the event of any vacancy occurring in the Officers or Committee, between the annual Meetings, the same shall be filled up by the Committee.

12. In order to facilitate the objects of the Society, the Committee shall be empowered to appoint any Member Local Secretary for the town or district he may reside in. Such Local Secretary shall be *ex-officio* a Member of the Committee.

SCIENTIFIC MEETINGS AND EXCURSIONS.

13. Two Meetings shall be held in Canterbury yearly, during the first and last quarters, for the purpose of reading Papers, exhibiting Specimens, Lectures, &c. Each member to have the right of introducing a Visitor at these Meetings.

14. Two Excursions are appointed to take place yearly, during the Summer, for the purpose of investigating the natural objects of interest in some district in East Kent; the arrangements for these Excursions to be made at a Committee Meeting to be held in the first week of each of the Summer Quarters.

15. A Minute of the Proceedings of all Meetings shall be entered by the Secretary in a Book kept for that purpose.

16. The Secretary to give seven days' notice of such Meetings and Excursions to every Member, stating the time and place of Meeting, &c.

LOCAL MEETINGS.

17. To promote still further the objects and interests of the Society, Local Secretaries and Members are invited to organize Meetings or Excursions in their districts; and to give notice of the same to the General, and all the Local Secretaries, stating the time and place of Meeting, and what particular subjects are to be brought forward.

COLLECTIONS OF SPECIMENS.

18. The Society shall endeavour to make a Collection of Objects of Natural History, both with a view of forming a Museum and distribution of Duplicate Specimens, according to Regulations to be adopted by the Committee.

LIBRARY.

19. Only Books and Periodicals connected with Natural History are to be purchased by the funds of the Society, and the number to be purchased shall be determined by the Committee.

20. All the Books and Periodicals shall be kept in some convenient place, so that Members may be able to refer to them, or take them out, under such regulations as the Committee from time to time may think proper to make.

21. Members are also invited to lend Books for the use of the Library, reserving to themselves the full right of ownership; such Books to be under the care of the Committee, and not allowed to be taken out of the Library.

FIRST ANNUAL MEETING.

Canterbury, March 1st, 1866.

Reprinted from "Kentish Gazette," of March 6th, 1866.

On Thursday afternoon last an interesting meeting in connection with this Society was held in the Corn Exchange, Canterbury. Major Cox, the President of the Society, was called to the chair, and there was a large attendance of members and their friends. Among those present we noticed G. Dowker, Esq., Vice-President, Peter Marten, Esq., (Mayor), and party, W. R. Mummery, Esq., A. Bottle, Esq., Captain Kemp, C. T. Drew, Esq., T. Davidson, Esq., Colonel Horsley, Dr. Tuckey, Dr. Grayling, J. Reid, Esq., Mrs. Reid, and family, W. Delmar, Esq., G. Rigden, Esq., F. Slater, Esq., J. Brent, jun., Esq., Mrs. and Miss Brent, W. D. Furley, Esq., and party, J. F. Crookes, Esq., E. Plummer, Esq., M. G. Lloyd, Royal Dragoon Guards, Revs. E. Gilder, T. S. Huxley, J. M. Ward, P. W. De Quetteville, A. P. Moore, and E. R. Orger, F. Rutley, Esq., Mrs. Cox and party, Mr. E. Collard, Mrs. and Miss Robertson, Rev. J. White, Miss White, P. B. Claris, Esq., Mr. J. Linford and Mrs. Linford, Mr. S. Harvey, &c., &c.

The President in addressing the meeting, said that he

was extremely pleased to see so many visitors present at this the first meeting for the year, and he could assure them that they were most kindly received by the Committee and members of the Society generally. He was especially gratified to see so large an attendance of the fair sex, and the Society would ever strive to enlist their best feelings by explaining to them the wonderful works of the Almighty, by the powers of the microscope. (Hear, hear.) He would now call upon Mr. Dowker to read a paper which he had kindly consented to draw up, explaining to those who were not acquainted with the Society, some of the objects it has in view.

G. Dowker, Esq., F.G.S., after making a few prefatory remarks, read a paper entitled "The work of the East Kent Natural History Society; what should be accomplished, and how to set about it; with a short summary of what has been done towards a knowledge of the fauna and flora of the district." He said:—

I hope in bringing this subject to your notice at this first meeting of the Society for the year, I may be pardoned if I sketch out a programme which might be adopted, with some modifications, by this Society, and which would, I think, be some step towards working out what should be the primary object of such a Society as this, viz., to describe and collect the Fauna, Flora, and Geology of the district.

The Society has been in existence since the year 1859, and therefore we have had seven years to consider our work, for it may be truly said that the *primary object* for which the Society was established was for the *collection* and *diffusion* of practical knowledge respecting Natural History, and especially in regard to *this particular district.*

No doubt this was not entirely the object for which this Society was formed. The diffusion of theoretical knowledge on various points of Natural History generally; the association of members of congenial pursuits and tastes, to examine

and admire the wonderful works of the Creator scattered around us in such munificence, and to teach others to look for the hidden beauties in flower and field, this was one object of the Society; and this, in every sense of the word, is the popular part of its proceedings. To this latter object the Society has hitherto directed too exclusively its attention. But surely with seven years of experience, during which we have formed so many I may say happy acquaintances with those residing in the county who have a practical knowledge of Botany, Zoology, Entomology, and Geology, and who would be most likely to aid us in this undertaking, surely now some practical work is expected of us; and although we may regret that seven years have passed over our heads leaving so little practical work behind as the result, yet we may, on the other hand, be glad that we have not begun our work with scanty knowledge and few workmen. We have the experience of the past to guide us, and I hope we shall for the future resolve that our energies shall be directed into some practical channel.

East Kent, from its varied surface, its sea-bound coast, and, above all, its varied geological features, possesses an exceedingly rich flora, and consequently fauna. It is not unexplored, for many botanists and zoologists have written about its wealth, but yet much remains to be done; and I may observe that what has been done has been accomplished by single individuals, aided, it may be, by others. As we have a society devoted to Natural History, containing many members qualified to record accurate observations, the task should fall proportionately lighter on our shoulders.

In suggesting to you the following plan, I would observe that although many men constitute an army, they cannot work without their separate generals; so they again require a field marshal, a general-in-chief, to direct their operations. With our Republican Natural History Society it will be necessary for us to place confidence in those indi-

viduals whom we place over their respective departments, allowing them to chose their *aides-de-camp*; but it should be understood that they are responsible only for their individual observations, and give credit in acknowledgment of all assistance rendered.

All the different departments of Natural History are mutually dependent on one another. Firstly, the geology and physical features of a district affect the flora. To the chalk districts, for instance, a certain flora is confined; to the London clay another, and so on, Then again the flora of a district affects the fauna; certain plants are the food of certain insects, and therefore to know where to find the plant will help us to find the insect.

1st. The geology and physical features will therefore constitute the key to the products to be found.

2nd. The flora will constitute the next.

3rd. The fauna the third.

4th. Besides these we must place a division embracing the marine fauna and flora, which are a distinct branch of study, and are influenced by other considerations.

In carrying out the work of determining the flora, fauna, geology, &c., of this county, we must first make ourselves acquainted with what has been accomplished by other observers; and in doing this we shall make out, also, the bibliography; but nevertheless it would be a task which might be left to one direction.

I do not think it advisable to map out the district into square miles and assign to individuals the task of determining the botany or zoology of such district, because to do so it would be necessary to have a staff of officials always ready, and with the time at their command, to examine every such district every month of the year, which, with the few workers we have, would be a manifest impossibility; on the other hand, I would avoid a desultorious way of proceeding by requiring those ladies or gentlemen who would undertake the task to communicate

monthly with the head of their respective departments, giving account of all finds, whether in botany, zoology, or geology, and all plants, &c., found by them should be chronicled by the head of that department at his discretion, with the name of the observer and time and place of observation. Thus, for instance, suppose certain gentlemen at Canterbury proceed to Wye and there find certain plants in bloom, they should communicate this fact to the head of the botanical department, whose duty it should be to acknowledge the receipt of the communication, and ask for such information as he might require; and at the same time any zoological or entomological finds, should be noted in like manner to the heads of their respective departments. By this means we should render available all the aid we might expect from different scattered members of this Society. With respect of a collection of plants for our museum, it would be desirable to form such a collection, and it should be impressed on all collectors the necessity of making *accurate* observations, keeping all doubtful specimens for careful observation and comparison, and keeping dried specimens with this *important caution*—not by any means to exterminate a species by securing the only specimen if *rare*; and not publish the habitat of any rare plant except to the head of the botanical department. I may here observe that I do not think the Society would do well to publish habitats of rare plants except in some general way, as plants have often been exterminated by the injudicious zeal of amateurs and the cupidity of regular collectors, when the exact spot is indicated; and I would rather see the attempt made to introduce scarce plants into fresh localities—a task which would repay those who are interested in botany.

By extending these observations over a few years, with occasional notices to the members of our general progress and hints for their aid, we should collect a mass of valuable information, which at some future time might be published by the Society.

In order to carry out such a scheme, it would be advisable to form a sub-committee of gentlemen in the Society noted for their scientific pursuits; to arrange and adopt shortly a plan to carry such object out.

Before leaving this subject allow me to add that we need not be alarmed at the work before us, and may take courage from what has been accomplished by others. In geology we have the observations of Philips, Prestwich, Morris, Fitton, Trimmer, and a host of minor observations by other geologists; and lastly, the valuable aid of the Geological Survey, under Mr. Whitaker. Nor must I omit the chart published by Christopher Packe, a native of Canterbury. On botany we have the observations of Ray, Boys, Bateman, Jacob, Smith, Turner, Hunter, Curtis Dillwyn, and lastly Cowell, in his Faversham and East Kent floral guide.

On zoology we have the observations of Ellis, and the contributors to the Dover and other musuems, Dr. Plomley's birds, &c.

I would not wish this Society to forego its pleasant instructive excursions and popular exhibitions, and am perfectly aware that such a Society must be supported by members who have not the time or inclination to enter into scientific pursuits; at the same time I think the Society would still add to its usefulness, and not diminish its income, by adopting a more business way of proceeding than has yet characterised its transactions.

By setting to work studiously to increase its *practical scientific usefulness*, we shall I have no doubt, revive the energy, and receive again in our ranks those real workers in Natural History who have not had the inclination to continue in a Society whose pleasant excursions they cannot find time to attend, and whose meetings generally lack that scientific interest which would attract them; and by finding local work for them, may keep up a greater bond of fellowship among *distant county members.*

The company then proceeded to inspect the microscopes, which were arranged on three large tables, in the centre of the Exchange. The following is a list of the microscopes, and the persons by whom they were exhibited.

A. Bottle, Esq., Dover, microscope by Smith and Beck, showing the circulation of blood in the frog; tongue of spider, &c.

Major Cox, Fordwich House, binocular microscope by Ross, showing wild flowers, and hairs of deutzia and other plants.

Captain Crookes, Dover, microscope by Baker, showing a variety of objects.

Dr. Davidson, Littlebourne, binocular microscope by Ross, showing the tongue of wasp, diamond beetle, and other insects.

G. Dowker, Esq., Stourmouth, microscope by Smith and Beck, showing polysiphonia, fibulosa, delessaria, hypoglossum, calithamnion, gracilimum.

C. Drew, Esq., Chartham, microscope by Pillischer, showing the xanthidiæ in flint, spicules of gorgonia, arachnoidiscus from Cape, and microscopic photographs.

Mr. S. Harvey, Canterbury, three microscopes by Ross and Baker, showing the vegetable circulation in valisneria; scales of sole, by polarized light; section of echinus spine, and various diatomaceæ.

Mr. J. S. Linford, Canterbury, two large binocular microscopes by T. Ross, showing cysticercus, trichina spiralis, leaf of oncidium, leaf of sage, pollen of mallow, frond of fern, palate of trochus, peristome of moss, and foot of dytiscus.

W. P. Mummery, Esq., Dover, binocular microscope by Stewart, showing bowerbankia and other polyzoa.

F. Rutley, Esq., Dover, microscope by Baker, showing a section of toe of mouse and section of human skin; foraminifera; crystals of chlorides, growing.

S. Saunders, Esq., binocular microscope by Ross, showing embryo oysters and various polyzoa.

F. Slater, Esq., microscope, showing the fronds of ferns, foot of spider, &c.

Refreshments were provided by Mr. James, of the Cathedral Yard, and the company, who were much interested by the objects exhibited, dispersed at about seven o'clock.

SECOND MEETING.

Canterbury, May 4th, 1866.

Reprinted from "Kentish Gazette" of May 8th, 1866.

On Friday evening a meeting of the members of this Society was held at the Museum, Guildhall Street, Canterbury, for the purpose of hearing a paper read by J. Brent, jun., Esq., on the "Stork," and an address by G. Dowker, Esq., on the "Drift." Among those present were Major Cox (the President of the Society), Mrs. and Miss Cox, Mrs. and Miss Brent, Misses Brock, Mrs. Powell, Mrs. Foreman, and Miss Rigden; Col. Horsley, Ald. J. Brent, jun., G. Dowker, Esq., G. Rigden, Esq., T. G. Peckham, Esq., Captain Kemp, Dr. Grayland, A. B. Andrews, Esq., and Messrs. Harvey and Linford, hon. secs. A collection of flint arrow heads, &c., was placed upon the table by Mr. Brent, and examined with much interest by the company.

The CHAIRMAN having briefly introduced Mr. Alderman Brent to the meeting,

Mr. BRENT said that before he proceeded to read the paper which had been set down opposite his name, he would give a short description of the flint implements which were lying before him. They were very interesting in a scientific

point of view, but he should not on this occasion enter into any discussion as to their age or the date of their formation, because on this point there was a great deal of mystery. Excavations on a large scale had recently taken place at Abbeville, and a great many of these flints had been found. They were called by the workmen cats' tongues, on account of the similarity they exhibited to those objects. An examination of them would prove that they were artificial, but the deposit was so ancient that their existence excited the attention of learned men in various parts of Europe. The subject had been carefully studied, and in the course of the investigation attention was drawn to a specimen in the British Museum, which had been found in digging a well in Gray's Inn Lane. They were also found in what is called the drift above the Thanet sands, and in other parts of England similar objects had been found. It was ascertained that at a place called Noxnè, in Suffolk, the workmen had discovered similarly shaped stones, and the attention of Messrs. Evans, Falconer, and Prestwich, having been called to the French excavations, they went over, and endeavoured to discover if there was any probability of these objects having been manufactured. After spending much time and research in the matter, these gentlemen came to the conclusion that these flints were authentic—in fact, some of these objects were taken out of the Abbeville excavations by themselves. Certain flint implements had been associated with our Celtic ancestors, and had been classed as being identical with the stone period. [Mr. Brent then showed the specimens, some of which were very fine, and described each of their peculiar characteristics in a very pleasant manner.] Some specimens lent him he said were Mexican, others came from the South Sea Islands, and others again from Sweden. It was believed that from these implements our ancestors designed the weapons called "celts," which had been discovered almost in every

tumulus scattered over the county. Nearly the whole of the implements on the table Mr. Brent said had been found under his inspection, or by his means. He then went on to describe a visit he had paid to Reculver and Bishopsbourne with a friend, where he found two beautiful specimens. The deposit above the shore was gravelly, and it was supposed that these implements had been left on the beach and were exposed by the flow of the waves. As an indication of their very great age, the bones of the elephant, rhinoceros, bears, and hyenas had been found along with similar specimens. In Torquay flints had been found with the bones of extinct animals, which was another proof of their great antiquity. After some other remarks Mr. Brent said he would not occupy the time of the meeting farther, but would at once proceed with the subject which stood first on the list of business – the reading of his paper on "The Stork." He was glad to say that a gentleman would follow him who would tell them more about these flints and their interesting history than he could. (Applause.) Mr. Brent then read the following paper: –

THE STORK.

The increase of population, the progress of the arts of civilization, the building up of large towns, combined with certain physical changes in the face of a country, produce those mutations in the habits of animated nature which are constantly occurring.

The wolf no longer prowls amid the fastnesses of Wales, nor the Grampians of Scotland, and – to say nothing of a remote and prehistoric period when the rhinoceros, the elephant, the hyena, the cave lion, and the cave bear, with that gigantic elk whose antlers are frequently found embedded in the bogs of Ireland, thereby indicating that he was comparatively a modern inhabitant of our isles – we are constantly reminded as naturalists, that several species of birds and animals of our temperate zone, have become wholly or partly extinct.

There is little doubt, that together with the wild dog and the wolf, and perhaps beaver, a species of bear probably similar to the individual of old German forests, inhabited our woods. We find frequent allusions in the grants and notitiæ to "bear dogs," dogs employed in hunting the bear. Even the woods around Canterbury, the Blean or "Blen" as it was called anciently, were the abode of the bear as well as wolves and foxes.

Taking a wider range, we find that of birds, the Dodo, moa, or dinormis,* and perhaps the great Awk may be considered extinct. Considerable interest has of late years been attached to the histories of two of these examples by the discovery of an almost entire skeleton of the Dodo at the Mauritius, in the mud and deposit of a pond or morass, by Mr. George Clark, of Mahebourg, and the interesting circumstance brought to light that an egg of the Moa, resting in the bony hand of a human skeleton, has been exhumed from a grave in New Zealand. This egg was probably a trophy to the fame of some chief or native, who had slain or captured one of these gigantic birds – or buried with him as a charm or as one of the most valuable of his possessions. The discovery of the bones of the Dodo ineptus, almost complete I believe, are still more important – as the remains of this bird have hitherto been confined to a very small portion of its frame – nevertheless, the Dodo has been drawn at full length. Buffon has a portrait of it, and all manner of hypothetical sketches have been given. Now however the remains of this bird have been handed over to Professor Owen, we shall have most probably an opportunity of testing how far the ideal creature has conformed to the shape and appearance which its osseous structure suggests. The Dutch, indeed, who boast of having seen numerous indivi-

* Note.—Dinormis, said by Professor Owen to be three times the size of the ostrich, but the head only eight inches long.—*Times*, 22nd Febrbary, 1866.

duals of the species when the Mauritius and Isle of Bourbon were first discovered, named it "Dodaers," and also "Walch Vogel," "Disgusting Bird," a suggestive, perhaps, but not very hopeful title. But to return to the Stork. This somewhat celebrated bird may be said not only to possess an European, but a classical fame, to say nothing of the singular reputation it has had for its piety and morals. The Stork, family "Grallœ," and genus "Liconia" of Cuvier, is the "Ardea" of Linnæus, and is described by Buffon as consisting of two species—the white and the black stork. The latter is the rarer bird; its habits are comparatively unsocial; it resorts to secluded places and to the depths of woods. It is smaller than the Ciconia Alba. There is a tolerable specimen of it in the Canterbury Museum. It is for the most part black, reflecting shades of orange, green, and dark blue. The feet of both species are semi-webbed.

The Ciconia Alba, whose beak and legs are a crimson red, is of a snowy whiteness, with the exception of its wings and some part of its head and thighs, which are of a glossy black. In the young birds these parts are tinged with brown. It sits for thirty days, and lays from two to four eggs. The wings when flying exhibit a rather singular arrangement, the large quill feathers folding into a sort of double scalloping. The Storks of Europe migrate about the middle of August and return in the spring.

As a bird the Stork has generally gained respect in all the countries it has inhabited. In Egypt it is held in veneration, second only to the sacred ibis. In ancient Thessaly, it was death to kill a Stork. The white Stork seems to invite the confidence of man; she builds in the midst of populous cities, she chooses the most noted and celebrated buildings, she has as much veneration for an old minster as an antiquary, and for a battlemented castle, as a feudal baron. She is a sort of swallow on a gigantic scale, and sheds a glamour around her of respect and for-

bearance that ensures her protection. In Strasbourg, Storks' nests may be seen amongst the chimneys of the most populous parts of the city, – nay the Storks are purposely invited, as in France at one time carriage wheels were placed on the house tops for these birds to build in. A similar practice held in Alsace in Germany.

The attachment of Storks to their young has been noted, as well as the audible joy and gratulations often expressed together with a flapping of the wings, when after their long migrations these birds return to the old nests and habitations. The young Storks are said to cherish and feed their aged parents. To Egypt, when by the subsidence of its waters the Nile leaves ample supply in the soft mud, of worms, fish and reptiles, the stork loves to migrate; and to Asia in the mountains around Antioch, quitting for a time the fens and marshes of the northern latitudes. In these climes, however, the native born Stork is not always migratory. They often pass from Egypt to Asia, and immense flights of Storks, which have occupied hours in passing, have been observed by travellers. The Stork has a high reputation—scriptural, classical, and mediæval authorities are full of allusions to this bird. "The Stork, worker of adventure," says Chaucer; Bruin observed carved in a stone amidst the ruins of Persepolis a nest of Storks; Juvenal in an obscure and almost untranslatable line, Sat. 1, verse 115 observes, "Quæque salutato crepitat Concordia nido," in which he is supposed to allude to the Stork, or rather to its nest, as containing the only worshippers in the deserted temple of Concord during the reign of Tragan. Juvenal was a man of peace, and hated the warlike propensities of the Emperor. The Stork is represented on one of the coins of Hadrian. I may here give a bit of antiquarian gossip, a stray waif from the myths of the North; it is a pretty little tradition about the Stork.

Hans Christian Anderson has made a tale from it. When

a little stranger is born in a house, to the great joy and wonderment of the younger children in the nursery, "Where does baby come from?" is a natural query. "The Stork has brought it," said the old nurses to the little Danes and Saxons. The Stork was truly a familiar and household bird to our Northern forefathers at the date of these sayings, and almost as cherished as the little inhabitants of our roofs and eaves, the gentle swallows.

I might mention also, in allusion to the above, that "Christening Tongs" were once formed with handles, representing Storks; each bird sometimes carrying a little child.

I must now refer to that part of the subject which first induced me to prepare this paper—a subject which has from time to time excited attention, and engaged the consideration of many writers in that useful publication, "Notes and Queries," and other periodicals. "Did the Stork ever inhabit and breed in England?" and if so, when was the fact last observed? and why did it leave us? "It will only live in Republics," says one authority, and "it was common in England in the time of Oliver Cromwell." Sir Thomas Brown, in his Treatise on "Vulgar Errors," vol. 3, page 142, ed. 1626, seriously endeavours to refute an hypothesis which implied such a nicety of political scruples in a bird; and he instances several countries wherein the Stork is found abiding under despotic governments. It is not worth while, however, for us to linger over an hypothesis so absurd as this.

We revert to our question, did the Stork ever breed in England? The poets have answered in the affirmative—Phillips in his poem on "Cyder," p. 22, ed. 1727, alludes to the migration of the Stork to this country as a known fact—

> 'Twill profit when the Stork, sworn foe to snakes,
> Returns to show compassion to thy plaints.

The poets are not the most correct teachers in Natural His-

tory. Milton, and I approach his name with reverence, who sang so delightfully in his minor poems of rural scenery, was not always a correct describer. In "Penseroso," he says —

The Bee, "with honied thigh."

Milton took much of his rural scenery from books, and wrote in his back parlour in London of the country he loved, all the more delightfully, for the smoke, and noise and gloom around him. In the "Allegro" he says —

"Though the sweet briar and the vine,
Or the twisted Eglantine."

By "twisted Eglantine" he meant doubtless to describe the honeysuckle—but the Eglantine is the wild rose. In the same poem he describes the lark as coming to his window, there to bid good morrow—a habit more applicable to the robin than the lark.

Ben Jonson, who made a journey on foot to Scotland to visit Drummond of Hawthornden, thus wrote sweetly of the bee, and other matters suggestive, and described that insect correctly too —

"Have you seen but a bright lily grow,
Before rude hands have touched it?
Have you marked the fall of the snow,
Before the soil hath smutched it?
Have you felt the wool of the bever, or swan's down ever,
Or smelt of the bud of the briar, or Nard in the fire,
Or have tasted the bag of the bee—
Oh so white, so soft, so sweet, is she?"

Again with the poets, the nightingale has from all time "leaned her breast up 'till a thorn," and sang to the rose, and the rose has blushed back in reply, and as for the phœnix, his existence is not only taken for granted as a proved fact, but like the poet himself he is always ready to be consumed in his own fires. Taking therefore Phillips' evidence with caution, I am nevertheless inclined to the opinion that he related a fact, and that when in this country there existed a large area of fens, forests,

and undrained land, as in Lincolnshire not long since, affording harbour for snakes, reptiles, and the small amphibiæ, the Stork frequented England, and built there, as at present in Holland and in Germany. Wallace, in his History of Northumberland, dated 1766, mentions a Stork as having been killed at Collerford Bridge. Albin records an account of two specimens having been seen at Edgware in Middlesex. Sir William Jardine somewhat vaguely says, in allusion to the presence of the Stork, "In England it has occurred lately at various seasons in many of the Southern countries," he may merely have in view the authorities given as above, "once or twice in Scotland, and as far North as Shetland, on the authority of Yarrell, who states this species (the white Stork, we presume) has been killed in Ireland." This is not unlikely, as the bird frequents Sweden and the countries adjacent.

The best proof which I have to offer of Storks building in England is from a notice I accidentally met with the other day, recorded in a little book entitled, "The Accounts of the Corpus Christi Fraternity at Maidstone." In these accounts, dated 1477 A.D., amongst the payments for a feast is an entry,

For a Stork's nest £0 3 4

These birds, for it is not likely the nest was edible, were probably considered a delicacy, as young rooks are by some people; and that they were esteemed is in some measure proved by the sum they cost, which, taking into consideration the value of money in our own times compared with those of Edward the Fourth, would equal thirty-five or forty shillings of our coin. Amongst the payments for the same feast we find recorded, "For a hogshead of red wine," twenty shillings; "two legs of mutton," fivepence; "three rounds of beef," sixteenpence; "a calf," two and sixpence; and a "barrel of beer" (very small no doubt?) twentypence. We may wonder at this period how the nest of Storks tasted, as we

have it on record that Storks were not considered a dainty amongst the Romans. We may wonder at many things at which our ancestors adorned their repasts. Thus in a great feast given within a year or two of our Corpus Christi feast at the enthronization of George Nevill, Archbishop of York and Chancellor of England, we find as recorded by Battely, in his History of Canterbury (Appendix, p. 29), amongst other edibles there were provided 400 swans, 104 peacocks, 1000 egrits, 204 cranes (very like Storks these?) 4000 heronshaws, and 12 porpoises or seals. By way of digesting the latter, there were supplied also 4000 cold tarts baked, 3000 plain dishes of jelly, 500 stags and roes, to say nothing of pigeons, woodcocks, conies, oxen, quails, wild bulls, spices, "sugared delicates," and wafers.

A Lord Mayor's bill of fare is nothing to this. The feast stood open doubtless to all comers. Amongst the grosser supplies were 300 quarters of wheat, 300 tuns of ale, and 100 tuns of wine. There were 1000 officers and servants, and 62 cooks in the kitchen, the latter a moderate contingent, and not too many to spoil the broth.*

I shall conclude with a description of the black Stork — Ciconia Nigra. It is smaller than the white species, but not less elegant. It is said to be easily tamed by one authority, although Buffon describes it as unsocial. Its colour for the most part is black, that is its upper plumage, a black going off in the living specimen to a violet and golden green and azure. These shades contrast beautifully with the under portion of its body. The beak and naked skin around the eyes is red, the bill and legs a crimson red. On the authority of Sir William Jardine, well authenticated accounts exist of its being taken in the

* Note.—A.D. 1601.—The Sheriff of Devon provided the judges with an excellent supper during the whole time they were at Exeter. The Tuesdays' evening was as follow:—"A quarter of mutton, a breast of veale, one joynt, a capon, two chickens, two ducks, two rabbits, 1 qr lamb, one tarte, one gull.—Foss's Judges, Vol. 6, p. 191.

British Islands. Thus in 1814 a specimen was taken in Somersetshire, another was taken in 1831 on the Thames, another near Ipswich, and a fourth in November, 1839, in the Isle of Purbeck, on the south side of Poole Harbour. Its native countries are said to be Switzerland, Hungary, and Turkey. It has also been found at the Cape and at Madeira.

The President (Major Cox) said he was sure all the members present would agree with him that the Society was very much indebted to Mr. Brent for the remarks he had made and the able paper he had read on the Stork. One reason, he (Major Cox) believed, why this bird did not now breed in England was because it had been so constantly and relentlessly persecuted. In the time of Henry VIII. a fine was imposed on any one who took a stork's or a crane's nest, and at Leeds Castle the tower is seen where the Storks used to build. The Storks migrated in cold weather to those latitudes where its particular food was provided. In Holland this bird was entirely domesticated, and any individual thinks himself honoured by their building beside him. They were seen walking about in the market places, and in many places in Germany a heavy fine was imposed on any one who injured this bird. From Holland the Stork took its way to the Nile, where, from the large number of amphibiæ, of snakes, and lizards, it found abundance of food. But it this country they had been persecuted, along with, in fact, almost any class of birds, and this was the reason why they were now extinct. So also in the case of hawking — that was once a favourite amusement, and a gentleman in this neighbourhood used not long ago to keep them; but no sooner had they flown away to any distance, than a number of guns were pointed at them. (Hear, hear.) On behalf of the Society, he had much pleasure in conveying their thanks to Mr. Brent for his kindness in coming among them, and for his instructing papers. (Applause.)

Mr. Dowker, vice-president of the Society, said that al-

though he had been announced to give some information with regard to the flint-implements exhibited by Mr. Brent, he would rather Mr. Brent should have addressed them on the matter, as it was really more of an archæological than a geological matter. As, however, Mr. Brent had asked him to supplement his remarks, he would endeavour to do so, although what he had to say would relate more to the drift than the implements themselves. As the flint-implements had been found in the drift, it was not out of place to speak of them in connection with it. He would first point out to them why they dated these implements back so far anterior to the time it was supposed that man had been an inhabitant of the earth. What was termed the drift, geologically speaking, was that mass of gravel and sand generally spread over the sides of valleys, and more especially in the neighbourhood of rivers. It consisted of the *debris* caused by the destruction of older strata, by means of river and pluvial action. It was supposed at one time, that all drift owed its origin to causes, such as the action of the sea; and an idea was once entertained by geologists that the whole earth had been washed over by the sea, and that a complete wreck of the entire formation had taken place by a sort of diluvial wave and left this drift behind. That notion, however, was now quite exploded, and the researches of modern geologists had shown them that the drift was the result of river action. If they went along the banks of the Thames, or the banks of their own river Stour, and examined the sides of the hills, they would discover they were covered with gravel deposits, which extended more or less to a considerable height above the present level of the river. That was the case with nearly all the rivers in England, and more especially so with the Stour, the Thames, and the Severn, in which some of the implements had been found.

In order to form any adequate conception of the length

of time required to form these deposits at so great an elevation above the present river courses, we must consider that —taking the River Stour, near Canterbury, for instance— the water confined to the narrow limits of the present stream had once flowed at a much higher level, and filled the valley from Wincheap on the one side to Harbledown on the other, wearing away the strata on either side and depositing the gravel and sand along its banks, and that the present river is flowing through deposit made by the silt and sediment formed during many thousand years.

If they examined the drifts of sand and gravel in various parts of England they would find, generally speaking, that they presented nothing to show that they were associated with anything existing at the present day; nor would they find any Roman or Saxon remains, except those placed there artificially. Roman pottery was found at various depths of strata, and in various positions, but it was never found so associated that they could clearly say that the pottery was deposited with the sand or gravel in which it was found, except by some artificial means. That, however, was not the case with the bones of extinct animals, such as the Elephas Primigenius, the extinct ox, hippopotamus, and the elk, whose bones they did find associated with these gravel beds. It was also an interesting geological fact that there were to be found in these beds of drift fresh water shells, which were entirely wanting at the present day in this country, and were only to be found in the delta of the Nile, and some Asiatic rivers. Such was the deposit at Reculver, in which some of the flint implements had been found.

A few years since the attention of geologists, throughout Europe, was excited by the discovery of a large number of flint implements, in a bed of gravel resting on chalk, in the valley of the river Somme, in France, this gravel being overlaid by 20 or 30 feet of peat. M. Boucher de Perthes had collected and described some flint hatchets which had been

found at Abbeville. Dr. Falconer having seen this collection urged Mr. Prestwich to explore the geology of the valley of the Somme. He did so in company with Mr. J. Evans. They established the authenticity of these flint implements, and the geological age of the deposit in which they were found. The only conclusion they could arrive at was, that they were of the same age as the gravel with which they were associated, as the fractured surfaces were discoloured by the gravel; that they could not have been formed by natural means; that they were of the same age as the bones of extinct Mammalia found in the same deposit, and that the river Somme had not much altered its level since the Roman period. That the peat extended to the coast and there passes under the sand-dunes below the sea level.

It so happened that among the collection of things found in the peat, there was the remains of a piece of Roman pottery, which Mr. Brent would tell them could be identified as having been made at a definite period, anterior to a certain date. This Roman pottery rested near the surface of the peat, and was so constructed that it could not very easily sink into the peat, and as the piece to which he had alluded was discovered at some depth, they had data on which to estimate the rate of growth of this peat. That the flint implements found in the bed of the river must have been of extreme antiquity would thus appear. The character of the extinct mammals would show that the climate was not so warm as at present, as some of the extinct animals now only exist in Northern regions. It had been known that flints formed after a similar pattern had been found in caves with bones of extinct animals, but it had hitherto been supposed that they had been introduced at a later period. Human bones had likewise frequently been found, with these flint implements. Mr. Dowker then directed the attention of the audience to what he called a clipped "weathered-flint," which he said

must have been in existence a vast number of years indeed to have become so much "weathered" as that was. The flints in Richborough Castle, built during the Roman period, were so little weathered that the chipped surfaces presented quite a fresh appearance. The peculiarity of the flints produced was that they were all chipped in such a manner as to form a particular arrow-head, showing that they were formed with some design. The idea was entertained by some people that the flints were chipped by being rolled about by the action of the water; but some of the ablest geologists, who had handled the hammer all their lives—men who had picked up flints in all parts of the world, told them that when flints were fractured by accident they never assumed the particular form of those produced. It was quite evident that the collection before them had been chipped in a particular manner. The supposition that flints were cut in this way was strengthened by the fact that when Capt. Cook discovered New Zealand he found the natives used arrow-heads cut out of stone in the same manner as the flints before them. Looking at all these facts he thought they could come to no other conclusion than that these flint arrow-heads were manufactured by men who existed at a very remote age, and some of whose remains had been found in the same drifts from which the flints were taken. Mr. Dowker observed that at different depths and associated with different deposits had been found weapons, first of flint, secondly of bronze, and thirdly of iron, and some antiquaries maintained, man in advancing towards civilization had made use first of one and lastly of the other materials; and from the fact of a skull having been found with the earliest the flint of a very low type, had maintained that the earliest races of mankind were possessed of little cerebral development. But there was a great difference of opinion amongst authorities on this subject. In conclusion Mr. Dowker, said he could not, without having made any preparation to address

them on this subject carry his remarks any further, but he hoped that he had sufficiently explained himself to show that the flints exhibited by Mr. Brent, did possess very great interest. Similar flints to those shown by Mr. Brent had been found at Reculver, first by Mr. J. Leach afterwards by Messrs. Evans, Prestwich, Hughes Ramsay and Whitaker.

Mr. Brent said they must all have been much pleased with the very lucid manner in which Mr. Dowker had explained the geological as well as the archæological character of the flints he had exhibited. He was sorry that his friend had been so unsuccessful in his efforts to find these flints; but he himself had made five journeys along the cold bleak sands between Reculver and Bishopsbourne, and on two occasions only was he successful in finding flints. He had also spent several days in searching for flints in the gravel pits in this neighbourhood, but had, however, been unsuccessful. The flints produced were found in the neighbourhood of Ash, Sittingbourne, and Reculver.

Mr. Dowker said he believed that it was pretty well known that at the period at which the extinct animals of which he had spoken existed in this country, it was under very different conditions to what it is now. The climate was then very cold—more like that of the arctic regions of the present day.

Colonel Horsley asked how it was that no human remains had been found among the flints and arrow heads discovered in France?

Mr. Dowker said that human remains quickly decomposed in soil through which water percolates freely. In the course of the excavation of Saxon remains at Sarre a short time since, where hundreds of graves were opened, in many of them nothing was found with the exception of some trinkets and teeth. Even the bones of the elephant, which contained a large quantity of ivory, and resisted decomposition much longer than the bones of man.

The Chairman said they must all have been very much pleased by the exceedingly interesting remarks made by Alderman Brent and Mr. Dowker, and now that they had entered on a course of lectures he hoped they would be persevered with, and that others equally interesting would be given by other members of the Society. They did not come together merely to look at pretty things, but to investigate the wonders of nature which the Almighty had spread so abundantly in this division of the county.

Mr. Dowker remarked that at a former meeting of the Society he suggested that something should be done towards collecting fauna and flora of the county, and his idea was that it could best be done by forming a committee of those gentlemen who took a special interest in the matter. He believed that if such a system were adopted they would eventually get a mass of information which it would be worth while to publish, and which would also be a credit to the East Kent Natural History Society.

Mr. Linford said they had been endeavouring to carry out Mr. Dowker's idea for the last two months, but unfortunately they could not find a gentleman to undertake the botanical department.

Some further discussion took place on the subject, but the Chairman thought it was a matter which ought to be settled in committee.

The President then tendered the thanks of the meeting to Messrs. Dowker and Brent, and said he was pleased to find that the members of the Society at Dover were doing so well. It was proposed to take some of the birds' nests on the rocks in the course of a short time, and an excursion in connection with the Society would take place during the present month.

The proceedings then terminated.

THIRD MEETING.

Dover, June 5, 1866.

Reprinted from "Kentish Gazette," June 12, 1866.

The first excursion of the East Kent Natural History Society for the season took place on Tuesday, June 5th; and as the weather was beautiful, a day of unalloyed enjoyment was passed by all who formed the party. The Canterbury section of the members of the Society assembled at the station of the London, Chatham, and Dover Railway Company, where special carriages had been set apart for their use. These were attached to the down train for Dover, and the party were landed at the pier after a very pleasant run. At the Admiralty Pier a large number of ladies and gentlemen from Dover joined the party—which now numbered upwards of fifty. Among those present were:—Lieut-Col. Cox (President of the Society), Mrs. and Misses H. and J. Cox, Col. Farren, C.B., Col. Pilbrow, F.G.S., and Miss Pilbrow, H. Lee, Esq. (of Croydon), the Rev. M. Scott (of Shepherdswell), Dr. and Miss Grayling, Dr. G. M. Pittock, the Rev. T. B. W. Briggs, Councillor Thorpe, Capt. Kemp,

Lieut. and Miss Hatfield, Miss Munn, Miss Beer, W. H. Payn, Esq., Mrs. and Miss Astley, Miss Walker, Mr. Warman, Miss Haddon and party, Miss Eastwood, Mr. Bateman, Miss Simmons, Mr. G. Rigden (treasurer of the Society), Mr. S. Harvey (secretary), Mr. Alexander Bottle (local secretary), Mr. Lambert Weston and Miss Weston, Mr. E. N. Clement, Mr. C. Gordon, &c.

The steam tug "Palmerston" was most kindly placed at the disposal of the members of the Society by the authorities, and the obliging and highly respected harbour master commanded in person. One portion of the excursionists took the boat, and those who did not relish the water took carriages which were also in waiting; and both conveyances started shortly after eleven o'clock for St. Margaret's Bay. On the steamer reaching the bay, a number of ladies and gentlemen were put off in small boats and joined the party who had come by land. An examination of the flora of the bay was made by the members, and several beautiful specimens were obtained in the course of the day. A great deal of interest was excited by the descent from the cliff by ropes by men engaged to collect eggs of wild fowl, on account of the perilousness of the adventure. The men were lowered full 180 feet from the top of the cliff, and amongst the eggs they succeeded in collecting was one of the guillemot, commonly known as the willock. It is a very singuiar-looking egg, of a pear shape, quite as large and as heavy as the egg of a goose, of a greenish colour with black spots. The guillemot is now comparatively a rare bird along the coast, St. Margaret's being one of the few places in which it now locates; and the egg was, therefore, regarded with considerable curiosity. A great number of other eggs were also obtained, and were distributed among the members by the President, Lieutenant Colonel Cox—who took charge of the whole arrangements at St. Margaret's Bay.

A number of ladies and gentlemen remained on board

the "Palmerston," and after landing those who wished to join the party at St. Margaret's Bay, the boat proceeded on a dredging expedition, which unfortunately was unsuccessful. This arose in consequence of the non arrival of a "dredge" from Whitstable which had been promised, and the party had therefore to take the only one they could get, which was much too large in the mesh, and in other respects unsuitable. Several of the party who had gone with the steamer were put ashore at Shellness, and explored the beach for shells, &c., while the dredging party continued their operations off the shore. After cruising about along the Deal and Walmer coast for several hours, the steamer's head was turned, and the exploring party from Shellness having been again received on board, a run was made for Dover, which was reached about four o'clock. The run home was made in the midst of a rougher sea, and a less gentle breeze than the steam out in the morning, but this did not mar the pleasure of the day, except in the case of some of the ladies, who in the coming home were a little sea sick. On reaching Dover, however, this very soon wore off; and when the party assembled at dinner in the Harp Hotel shortly after, all traces of this malady had disappeared.

About sixty ladies and gentlemen sat down to dinner, which was served in excellent style by Mr. Spice's assistants. The chair was occupied by Lieut.-Colonel Cox, president of the Society; and Mr. Alexander Bottle, of Dover, the respected local secretary, filled the chair of the Vice-President.

After dinner the Chairman rose and said there was only one toast which he wished to propose—that was the health of our most Gracious Majesty the Queen—a toast which as Englishmen it was their pride and pleasure to drink on all such occasions. The toast was drunk with all the honours.

The President then called on Mr. Chas. Gordon, curator

of the Dover Museum, to read the paper which he had been good enough to prepare for the occasion.

Mr. Gordon, after expressing the pleasure which it gave him to meet so large a party of ladies and gentlemen, read the following paper on

THE BIRDS FREQUENTING THE KENTISH COASTS.

Ladies and Gentlemen,—Having been solicited by our Secretary, Mr. Bottle, to give a reading on the local birds and their nests along the coast, I do so with much pleasure, so far as in my rambles the different species of birds have come under my notice in my shooting excursions along this cliff for the last 28 years that I have been connected with the Dover Museum.

I have frequently gone along this coast, in search of specimens for our Museums, at all seasons of the year. The Spring time is the most favourable for getting specimens of the rarer species, as they alight a short time before going inland.

The first bird I call your attention to is the Peregrine Falcon (*Falco Peregrinus*). This bird is a frequenter of the seaside during the greater part of the year, and may often be seen taking its flight along our cliffs, and not unfrequently taking a trip inland, to the dread of game preservers, who would, if an opportunity occurred, stop his progress. The boldness of this bird makes him a great enemy to keepers, who do their best to destroy them. Many of their young are destroyed in the first year, from the easy way in which they may be found. When the parent birds feed their young the call attracts the attention of anyone who may be near. This leads to the destruction of great numbers, which are taken from the nest or shot. When the bird arrives at maturity it is more cautious, and is not so easily approached. It builds in various parts of our cliff, generally high; others I have known to nest near

the base, within gunshot. The eggs are from two to four in number, mottled over with pale reddish brown. There are generally two nests of these birds between Dover Castle and Kingsdown. The nest is difficult to find until the young are produced. It is then that the parent birds show great boldness to any one that approaches near their nest, by continually swooping over their heads, uttering a cry of alarm, and woe be to any solitary gull that may be passing near at the time, for it is not unusual to wreak its vengeance on the passing bird by striking it with its talons, as a notice to quit. Lionel Rice, Esq., of Dane Court, obtained a nest of these birds from these cliffs last year for training purposes, but I believe he was not very successful in keeping them. W. O. Hammond, Esq., of St. Alban's Court, also obtained a nest of these birds by the Shakespeare's cliff, for hawking a few years past, and was, I believe, successful in flying them at Partridges. We have several specimens of these birds in our Museum. The young and adults. Also a specimen killed in India. The young Peregrimes leave their nest early in July.

The next of the falcon tribe which locates in our cliff is the Kestrel hawk *(falco tinnunculus)*. This is the most common of all the hawk tribe found on these shores; its general plumage is a light chesnut with transverse bars of black on the back. The breast is of a pale rusty brown. The adult male has the head and tail ash coloured, the latter with a broad band of black. This small falcon may be seen daily soaring high in the air, sailing in a rotary motion, now and then turning its head to the wind and remaining as if stationary, looking to the earth as if it had discovered some favourite prey. Suddenly down it darts on its prey, which is often a mouse, this being the most favourite meal. I believe this bird ought to be watched by the agriculturalist. It may probably do some mischief to the poultry by now and then taking a "chick," but the amount of good these birds do overbalance considerably any

pilfering they may do in the poultry yard. I have known this bird to have been shot with a half-grown rat in its claws. These birds build high up the cliff in crevices, and you may constantly hear the shrill cry of the parent birds along these cliffs during the breeding season. The eggs are of a dark chocolate colour, generally four in number. These birds nesting in woody districts often take possession of an old magpie's nest, jay's, or a deserted crow's, and I have no doubt the same will be carried out in our cliff by their taking possession of the daw's nest.

There are various other Hawks killed occasionally along the coast, but I think the Peregrine and the Keshal are the only species of Hawks that nest in our cliff.

I have known the rough legged Buzzard (Falco Lagopus), also the (Falco Cyanais), Her Berria Merlin, these are stragglers shot generally in the migration season.

The Raven (*Corvus Corax*) is often seen on our coast. I have known a pair of these birds to nest in the Western Cliff, another pair to the Eastward ; they generally build high in the cliff, the nest is not difficult to find, from the quantity of material which it is composed. Its nest is something after the carrion crow, being composed of a large quantity of sticks and lined with hair and small roots. The eggs are generally five in number, very much resembling the Rooks.

The young of these birds are exceedingly voracious and restless for their food, so that the whole number of their young are seldom reared, as it generally happens that some fall from the nest. I have known two of the young captured on the beach unable to fly. Their nests are frequently taken by the fishermen, as there is not much difficulty to get at them. There has been a nest of these birds in the Western cliff this year that have escaped been taken ; I suppose it was owing to the difficulty of getting at the nest. The young birds generally take to flight early in March. I have known the young birds to be captured

in a singular way; there are two persons engaged, one on the top of the cliff the other at the bottom, the man above has a bell attached to a long line. At an indication by the man below as to where the bird is perched, he throws the bell over, causing it to ring, frightening the bird, and by quickly chasing the bird it gets exhausted, goes to the bottom when it is captured by the man below.

I have purchased several young birds but have not been able to keep them long, owing to their mischievous habits. There was a pair of these birds nested for several years near the Langdon Stairs.

The Raven did not nest in this locality in either 1864 or 1865.

The (*Corvus Monedula*) or common Jackdaw builds in great numbers in most parts of the Cliff; the eggs are of a pale bluish white, spotted with ash colour and clove brown. The birds lays from four to six eggs.

There are several of the Sylvidœ build on the shore, such for instance as the Wheatear (*Saxicola œnanthe*). This little bird may be seen often perched on the highest point of large blocks of chalk. The birds are very shy and difficult to approach. The nests are not easily found owing to the falls of cliff, which form a favourite place for their nesting. I have a nest and eggs of this bird at the Museum. The materials of which the nest is composed are dried grass, wool, hair, black, brown, and red worsted.

The eggs are pale blue, from four to six in number, the latter not uncommon. The nest I have contained six.

The next birds I call your attention to are the common Pied Wagtail, (*Motacilla Yarrillu*) and the Wagtail, (*Motacilla Alba*) the last named bird is not very common, I have seen this little bird along our shore, and I am certain it occasionally builds in the cliff. Although I have never found its nest, I have been mobbed by the parent bird on two occasions, but I could never succeed in finding its eggs. The Pied Wagtatail is frequently met with;

there is a great resemblance in the two birds, and it is only by comparing the two that you can really distinguish the difference. Mr. Gabrel in his description of the two birds says—the Pied Wagtail of England, (*M. Yarrillu*), is somewhat more robust in form, and in its full summer dress, has the whole of the head, chest, and back, of a full deep jet black; while on the White Wagtail, (*M. Alba*) at the same period, the throat and head alone are of this colour, the back and the rest of the upper surface being a light ash grey. In winter the two species more nearly assimilate in new colouring; and this circumstance has doubtless been the cause of their being hitherto considered identical; the black back of *M. Yarrillu* being grey at this season which has doubtless contributed to the confusion. The female of our Pied Wagtail never has the black back as in the male—this part, even in summer, being dark grey, in which respect it closely resembles the other species. We have both species in Dr. Plomly's collection in our Museum. If any lady or gentlemen should feel an interest in seeing the two species I have just described, I shall be pleased to give them every information, by company, of every bird we have in our collection.

The Rock Pipit (*Aluda Obscura*), or Shore Pipit, as it is sometimes called, is considerably larger than the meadow species. This bird, as its name imports, inhabits the seashores, especially where there are beaches of sand and mud, low rocks, or benty downs where it can nestle. The eggs are yellowish-grey with reddish-brown spots. The nest is formed of bents and other plants growing near.

The House Sparrow (*Fringella Domestica*) rears its young in the cliff. This bird so well known needs no further comment from me.

The Common Starling (*Sturnus Vulgaris*) build numerously in the cliff. The eggs are of a uniform pale delicate blue.

The Common Gullimot (*Uria Troile*), commonly named

Willock (Willey, as it is known to fishermen), rears its young high in the cliff, near St. Margaret's Bay. The bird lays but one egg, of large size, very variable in colour. We have several of their eggs in the museum collection. These birds were very numerous some fifty years ago, in proof of which I might mention the fact that hundreds of eggs were taken by the coast-guard and others. There was also at the time an annual shooting party which destroyed these birds, until they became too scarce to afford them a good day's sport. There is only a small family of these birds that now breed in the cliff.

I now come to the Gull tribe (*Larus Fuscus*) the herring gull ; this gull is the only one that I know of that nests in our cliff. These birds congregate in large numbers to the eastward, where they nest on the projecting ledges of the cliff. The birds lay from three to four eggs. The general colour of the eggs is a light olive-brown, spotted with two shades of dark brown. The plumage of this bird is a dark and uniform French grey on the back and wings. The head, neck, and breast, pure white. The mandible is bright yellow, the under one tinged with red.

To the westward there are many of the common species build near Folkestone, in the double cliff, such as the Common Linnet, Yellow-hammer, Stone Chat, and Blackbird, the vegetation being more prolific than to the eastward.

I may mention the Common Martin (*Hirunda Urbica*) builds numerously in the cliff.

In the migration season the Black Redstart, Pied Fly-catcher, Hoopœ, Woodcock, and sometimes the Cormorant, have been killed. I am not aware of any other specimens found on our shores worth notice.

I trust you will accept this hasty sketch, and excuse any imperfections which may have been observed, and I beg to assure you that I shall have much pleasure in rendering any further information in my power to Members of this

Society who may honour me with a visit to the Dover Museum.

After the reading of the paper,

The President said he had great pleasure in proposing a vote of thanks to Mr. Gordon for his interesting paper on the ornithology of the district; and in doing so he could not help complimenting Mr. Gordon on the very creditable manner in which the Dover Museum, under his charge, was kept. He advised any of the members of the Society who had a little time to spare to pay it a visit, and they would be much gratified. In reference to the meeting of to-day there could be but one opinion—it was one of a very pleasant character. (Hear, hear.) In one of the local papers (the *Telegraph*) the editor had given a notice of their meeting to-day; but a correspondent of the paper had made some remarks which were calculated to act rather prejudicially towards this Society; he alluded to what was termed their "raid" upon the poor (willocks) or guillemots at the cliffs in St. Margaret's Bay. He scarcely required to tell them that the East Kent Natural History Society did not go out to destroy but to observe. They did not wish to destroy every flower that bloomed, but to see, and to take just such as was necessary for the prosecution of their study in this branch of science. To-day he counted no less than fifty willocks, but they took or destroyed none of them; they found only one egg, and that they took away. It was not an organized Society like the present that attempted to do the injury complained of; it was the number of persons going out from Dover with guns destroying these poor harmless willocks. The members well knew that there was a determination in the willock as in other birds and tribes to go on laying eggs until they bring up a progeny; therefore, by simply taking the eggs they did no damage; but it was different in the case of taking the young bird, when the old bird wailed for the loss of its young. He knew it was the practice of some gentlemen to give large amounts for the

Not Willocks

young of rare birds, and only the other day he knew that two gentlemen offered two guineas for a nest of the perigrine falcon. But this Society did not want to do that: they wanted the eggs, and not the birds: it was their object to protect, and not to destroy. Mr. Lee had kindly stated that, having a number of these eggs, he should be happy to give any member of this Society a specimen. In tendering the vote of thanks to Mr. Gordon, he said if any present would pay a visit to the Dover museum, they would find a charming collection, and would be well repaid the trouble.

The President then said that as the party that day had been divided—one portion pursuing their investigations on the land, the other upon the sea, and as Mr. Bottle had had charge of the marine section—perhaps he would be good enough to inform the members what he and his party had done upon the sea that day.

Mr. Alexander Bottle said before he entered upon what they had done upon the sea, he asked to be permitted to thank the company for kindly assembling at Dover again to venture upon an excursion to St. Margaret's. They had not been so unfortunate as last year, as the weather had been much more favourable; although they had not escaped a *contretemps;* for inasmuch as last year they had a difficulty in getting the dredge on board the steamer, this morning they did not get it at all, and they were, therefore, obliged to make shift with a local dredge, which, not being fine enough for their purpose, they unfortunately dredged nothing. Every available means had been adopted for the purpose of getting the dredge which they had on board put into order, and they had been most persevering in their attempts to secure some specimens, but, he was sorry to say, without effect. With regard to their proceedings of to-day, he had to report that he took the marine section of this Society, under the guidance of their good harbour-master, Mr. Irons, safely to St. Margaret's Bay, and then steamed on with the remainder to opposite Deal Pier and thence to

Shellness, where some landed to make an inspection of the shore, but unfortunately it being nearly high tide they did not make much progress. Returning on board ship, they tried the dredge again, but without success. He hoped on any future occasion when the East Kent Natural History Society might favour Dover for a marine excursion, they would adopt the suggestion of Mr. Irons, and go in the harbour tug down to Dungeness, where they were likely to be more successful than they had been at St. Margaret's. This would be a nice day out, and he hoped the Society would avail themselves of the opportunity for such a delightful marine excursion. He was very glad that all their friends who had joined them that day had enjoyed themselves so much; and he thought the present was about as successful and enjoyable an excursion as they could have desired. (Hear, hear.) Before sitting down he begged to propose the health of Col. Cox, their worthy president; he was a gentleman who took a deep interest in natural history, and without whose energy the Society could not exist. As an humble local officer, he felt much pleasure in serving under such a colonel, and he hoped he would long have the happiness of seeing Col. Cox at the head of the Society, and leading them on in the pursuit of natural history. (Applause.)

Lieut.-Col. Cox returned his warmest thanks for the compliment paid him. He was simply a pioneer in the pursuit of natural history, which was like a flowing river opening up new wonders for study as it advanced. The object of this Society was to do some good; and if they could only inculcate in the younger branches a taste for the pursuit of natural history; if they could bring their children to see that God had made these creatures for our use and not for our abuse; that things so beautiful existed in the ground, in the air, and under the water, so that they might have something better to think of than the follies and frivolities which surround them—then the Society would

have accomplished something worth an exertion. There was an undying pleasure in the study of natural history: it made them wiser people, by imparting to each a knowledge of the beauties of creation. Regarding their excursion to-day, he felt they were deeply indebted to Mr. Irons, in placing at their disposal and himself taking command of the steamer "Palmerston," which had been the means of affording them a large amount of interest, and promising them the vessel for any future excursion; he therefore tendered him a vote of thanks in the name of the meeting. With respect to the little difficulty in obtaining a dredge, he thought it was time the Society should have dredges of its own; for there was a peculiarity about our shores and subsoil, and wherever they found these peculiarities they would be sure to find a peculiar race of animals. He thought it was a happy thing that this meeting of the Society had been postponed till that day, because they had such beautiful weather, and every one seemed to have enjoyed themselves very much. Mr. Irons, to whom their best thanks was due, took a great interest in the Society, and he had shewn his goodwill by placing at their disposal his vessel, and conducting the members on their sea excursion personally. He thought, therefore, he was only expressing the feelings of every member of the Society when he proposed a cordial vote of thanks be passed to Mr. Irons for his great kindness and attention, in giving the use of the "Palmerston" and in himself taking the command. (Applause.)

Mr. Lee said he should be very happy to present the Society with a dredge, remarking that for general dredging and interesting specimens there was none to surpass the East Coast of Kent, being one of the most productive in the kingdom,. In proof of this he was in possession of a most unique specimen of a double star-fish with fourteen rays which he had shown to Dr. Carpenter, and which that gentlemen pronounced to be a very fine specimen.

The President tendered a vote of thanks to Mr. Lee for the dredge with which he had offered to present the Society. Remarking on the huge stones which were now being raised from the bottom of the sea off Dover, he said there was upon them a very curious class of marine zoophytes; on one stone he counted no less than seven distinct classes of animals and sixty different species. He had hoped that Dr. Astley or some other learned local member would have given them a paper on "Deep Water Fishing;" but Dr. Astley, he believed, had been called away from the town to-day on professional business. However, he trusted that by the time the Society met again at Dover Mr. Bottle, with the assistance of Dr. Astley and Mr. Mummery would give them a paper on one of those blocks of stone he referred to, upon which was deposited a large quantity of marine life, and he was sure it would be read with much interest.

The Rev. T. B. W. Briggs proposed the health of the vice-Chairman, Mr. Alexander Bottle, who in this district had thrown so much spirit into the movements of the Society. In all the local districts, if they had not a local secretary or gentleman who manifested an interest in these researches, the Society would be a dead letter in the community. Mr. Bottle, being a man of considerable intelligence and information, brought a vast amount of scientific knowledge to bear on natural history or any other subject which he undertook, and he felt gratified that Dover had him to take so prominent a part in their proceedings. (Hear, hear.)

Mr. Bottle acknowledged the compliment paid him, and said with reference to the stone blocks alluded to by the President, he should be only too happy to make a record, with the assistance of Dr. Astley and Mr. Mummery, of his observations. He also acknowledged the vote of thanks on the part of Mr. Irons—who, he said, had gone to attend a meeting in reference to the erection of a new church in

Dover, and who would be much gratified at having his name mentioned.

In the afternoon some beautiful specimens of the flora of St. Margaret's Bay, which had been gathered by the excursionists who remained there, were handed round the table for inspection. A large number of eggs were also shown by Colonel Cox, and a number of shells and marine specimens by the party who landed at Shellness.

The party broke up about 7 o'clock in the evening, it being close on the hour for the departure of the train for Canterbury. Several of the Dover members accompanied the Canterbury party to the station, and after the interchange of mutual congratulations on the success of the excursion, the train started, and Canterbury was safely reached, every one well pleased with the day's enjoyment.

FOURTH MEETING.

Folkestone, September 6, 1866.

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The second excursion of the East Kent Natural History Society for the season took place on Thursday, and notwithstanding the somewhat unfavourable weather, was very successful. It was intended to visit the lighthouse and coast at Dungeness; and for this purpose the steamer Palmerston, of Dover, had been kindly placed at the service of the Society. Another party was formed for the purpose of visiting and inspecting the undercliff at Folkestone, under the able superintendence of George Dowker, Esq., of Stourmouth; and the excursion, therefore, promised to be one of the best of the season. In the morning a pretty numerous party assembled at the station of the London, Chatham and Dover Railway, at Canterbury, where a

special carriage was kindly set apart for their use by the railway authorities. The excursionists were reinforced at various stations along the line by members of the Society; and the morning, which up to this time had been dull and lowering, began to brighten up, and raised in a corresponding degree the hopes of the excursionists. On arriving at Dover the party were joined by several of the members residing there; but the hopes of not a few of the Canterburians were damped by the intelligence that the Palmerston could not proceed to sea, in consequence of the heavy swell on the coast, and the great difficulty under such circumstances of landing at Dungeness. A personal inspection of the marine element by a number of the party convinced all, save one or two "old salts" among the members, that it was a prudent step to abandon for that day the sea excursion. Several of the old frequenters of the pier on being appealed to for their opinion on the matter, declared that all the appearances were those of approaching "dirty" weather; and how "dirty" it proved may be learned from the account, in another column, of the effects of the gale of Thursday night and Friday morning. The Dover Regatta was to have been held on the same day; but after mature deliberation it was postponed, and the decision of the committee in that case had considerable weight with those who had the charge of matters at Dover. On the whole, perhaps, it was the wisest course which could have been adopted – though certainly an hour after noon, the sea looked calm and quiet enough. There was, however, no choice left; and the whole of the party, therefore, took the train to Folkestone, where they arrived after a somewhat tedious delay near the harbour about half-past eleven o'clock, when the whole of the excursionists (by this time reinforced by the presence of several of the Folkestone members) took their way to the undercliff, under the able guidance of Mr. Dowker. We should have said that previous

to this, and immediately on arrival at Folkestone, Mr. Dowker pointed out the peculiar geological formations and characteristics of the east cliff in a few lucid sentences, to the party assembled on the Pier.

Much disappointment was felt among the Folkstone members of the Society at the non-arrival of the Palmerston; but of course they had not been informed of the turn which affairs had taken at Dover, in consequence of the high sea running at that place, and the impossibility of carrying out the original programme. Eleven o'clock was the appointed time for the rendezvous. At that time several members had assembled, belonging to Folkestone, and remained on the look out for the Palmerston. Dr. Fitzgerald, the Local Sec. for Folkestone, proceeded to the junction station in search of members from Dover or Canterbury. After waiting patiently on the pier for an hour and a half, the conclusion was come to that the excursions both by land and water had been given up, and the few who had assembled were about to separate, when they were met by Dr. Fitzgerald, who informed them that a strong party had arrived from Canterbury and Dover, who, with Mr. Dowker, had started by the lower road for Sandgate. The party, which included a number of ladies, and Lieutenant Colonel Cox, President of the Society, moved along the Lower Sandgate-road to inspect the undercliff. A more interesting walk cannot be found in the neighbourhood of Folkestone. The cliffs — crowned by the fashionable promenade — the Lees — show the peculiar formation of the sandstone beds, and are otherwise geologically interesting, whilst the sloping bank and deep indentions are covered with a profusion of wild flowers, over which flitted moths of many kinds, affording much interest to those who came provided with nets. The small plantations of young trees, too, were explored, and on the foliage were discovered a variety of caterpillars, some of them rare kinds, which soon found themselves prisoners in the

tin cases of the collectors. A halt was made a little distance along the road, the party got together, and Mr. Dowker pointed out the false bedding of the sandstone. He explained the cause of the falling of the undercliff and the urgent necessity there was for the course now being taken by Lord Radnor of draining the accumulations of water from under the cliff which threatened to bring it down in time and the houses with it. By draining away the water the danger was removed. Under their feet were the Sandgate beds. Where the earth had slipped away a quantity of pyrites were to be found. At a little distance from the toll gate on the Sandgate side the cliff juts out to a bold and rugged point, and at this spot Mr. Dowker pointed out the junction of the Folkestone and Hythe beds. The Folkestone beds contained a formation called Chert, a specimen of which he exhibited. It was a kind of flint always found in rocks containing carbonate of lime, which was not to be found in the lower beds. A move was then made through Sandgate on to Seabrook, and the walk being too far for the ladies, they were left behind under a proper escort. At Seabrook Mr. Dowker gave a brief general description of the geology of the neighbourhood, and spoke of the remarkable changes going on in Hythe Bay and at Dungeness by the rapid accumlation of beach, which shut the sea out from Romney Marsh. By this time the sky had become overcast, and a few drops of rain which fell warned members, and especially those who had experience of the drenching they got last year, that it was time to return, and a rapid move towards Folkestone was made, a few more accustomed to "heavy wet" than the others, going by way of the military road over Shorncliffe Camp, to Folkestone.

Whilst many of the members followed Mr. Dowker in his interesting walk, others of the party paid attention to the entomology of the district—nets, boxes, cans, everything being in readiness to secure captures, which unfortunately

did not appear. This was entirely owing to the late very unsettled state of the weather, for the locality visited by the Society is usually exceedingly rich in insect life—many varieties of moths, butterflies and beetles, have been captured along this undercliff. The rare anchorite moth (clostera anchoreta) was taken a few years since in the larva state after having been lost so long to the country as to be recorded, *not a British insect*, but on this occasion rain and heavy murky clouds drove the insect tribe to shelter, scarcely any being seen during the whole excursion excepting a few common larvæ taken off the Bolson Poplars. The Buff tip (Pygœra Bucephala notrodonta Camelina); Herald, (Scoliopteryx Libratix); Poplar Hawk, (Smerenthus Populi); Broom Moth, (Hadena Pisi); Dot Moth, (Hadena Persicaria.)

In the afternoon about forty ladies and gentlemen met in the Pavilion Hotel to dinner. The chair was occupied by the President, Lieut.-Col. Cox, and there were present several representatives of the Society from Folkestone, Dover, and Canterbury, among whom we observed Mrs. Cox and party, J. Pilbrow, Esq., F.G.S., F.S.A., and party (Canterbury), G. Dowker, Esq., Mr. Alderman Brent (Canterbury), J. Reid, Esq., and party, A. Green, Esq., J. Stalkartt, Esq., and party, Dr. Kersey and party, T. M. Gladstone, Esq., C.E. (London), Rev. Thos. Briggs, Capel Lodge, Mr. Saunders, Mr. Warman, Mr. C. Greaves, Mr. S. Harvey, (Hon. Secretary), W. H. Payn, Esq., Coroner of Dover, E. N. Clements, Esq., W. Jacobs, Esq., Alexander Bottle, Esq., local Secretary at Dover, Mr. H. Stock, Folkestone. After the cloth had been removed,

The President rose and said there were only a very few toasts which he had to propose, as the party was not of a formal character. There was one toast which upon all occasions took the precedence, and very properly so. It was to the health of her gracious Majesty the Queen—a Sovereign who ruled her people as none other did; and who

had gained the respect and the love of all her subjects. (Loud cheers.)

The President then gave "The Prince of Wales and the rest of the Royal Family," which was also drunk with all the honours.

Alderman Brent rose in response to the call of the President, and said he had great pleasure in meeting the Society on that occasion, and felt that all these social and scientific gatherings were productive of much good, and tended to the general advantage of the members as well as to the progress of the particular department of knowledge to which they were devoted. It would not perhaps be out of keeping or uninteresting were he to give them some account of the proceedings of the "Somersetshire Archæological and Natural History Society," with whom he spent two most pleasant days during the last week in the month of August. Amongst the leading members of this Society were Mr. Ashworth Sandford, formerly he believed one of the representatives of the county of Somerset; Messrs. Moore, Dawkins, Freeman, Rev. W. Jones, &c. The preliminary meeting was held at Ilminster, in the school-room of that town. A converzazione followed in the evening. The church at Ilminster, which was ably described by Mr. Parker, presented several particulars of interest, especially the Squints or Hagioscopes—constructions adopted with openings into the church or church yard, where—as at the remarkable little church at Stoke-sub-Hampden, the lepers and infected persons stood outside, and looked through into the interior of the church and toward the altar during the performance of certain holy offices, a few centuries since. The great interest, however, of the day was comprised in discourses delivered by Mr. Moore and Mr. Sandford. The former of these gentlemen may be called the leading geologist of the district, if he may not be said to have a general fame, several of his paleontological discoveries such as the "Eryon Moorii," "Leptæna

Moorii," &c., being named after him by scientific friends and Societies. The peculiar strata Mr. Moore undertook to illustrate was that of which many examples existed round Ilminster—the middle and upper Lias. These deposits were particularly rich in fossil remains. In the sea beds were innumerable foraminifera, amongst which was found, in great profusion, the polymorphema. A peculiar clay or sand, a sort of sea or fish bed, exhibited the formation of certain oddly shaped nodules or stones. Those contained various ancient remains. The cuttle fish, the icthyosaurus, the Lethiosaurus, a production almost peculiar to the district, and the pachydormis, a beautiful fish found between the middle and upper Lias. Adjoining this bed was another in in which were ammonites and belemnites in great profusion, the former varying in size from shells of nine inches to half an inch in diameter ; whilst the belemnites existed in such numbers, that in the face of a quarry, which, accompanied by Mr. Moore, I examined, they were sticking out of the deposit like so many ten-penny nails, and might be collected two or three at a time. Mr. Moore rendered his paper particularly interesting by the perfect mastery he exhibited over his subject, and the illustrations he gave from time to time of the geological remains to which he had called attention. In allusion to the curiously shaped nodules containing the fossil remains of fish, crustatea, lizards, &c., the Lecturer selected two or three specimens "He had attained," he said, "perfect knowledge of their contents from their outward conformation. The fish or lizard perishing in the sea or on its bed had attracted around it, certain stony elements, and so remained petrified in its rocky tomb for an infinitude of ages." "This stone," said Mr. Moore "I will wager a hundred pounds, contains a cuttle fish, and this, a lizard." Adroitly applying the hammer to the first, in a stroke or two, it split equally asunder, revealing a beautiful specimen of the cuttle fish. Mr. Moore, placing a moistened finger on the sepia contained in

the specimen, and applying it to a sheet of white paper, made a clear black stripe down it, thus showing that the ink retained all its specific qualities after a lapse of innumerable ages. Above this fish bed, in the upper Lias lay the ammonites. The Society adjourned shortly afterwards to inspect on the spot some of the geological strata Mr. Moore had been describing. Recent researches in the neighbourhood of Taunton, and at Sandford Hill and Wokey Hole had revealed vast stores of osseous remains of extinct animals as in Kent's Hole, the Dardogne cave, and other localities in this country and in Europe. The species exhibited were the elephas primogenius, bison priscus, rhinoceros tichorrhinus, ursa spelœa, felis spelœa, the hippopotamus, &c. All these animals had once been inhabitants of our latitudes; and this department of geology is particularly interesting from the fact that in juxta-position with these bones and the bones of the mammoth, have been found flints, worked artificially by some unknown being, endowed with reason, and made into weapons of war, and implements of the chase, or for domestic use. These implements have been found in our own neighbourhood, in the drift deposits near Reculver, and in juxta-position with the bones and tusks of extinct, or what we were once accustomed to call, antediluvian animals. At the evening meeting at Ilminster, Mr. Sandford gave a most interesting lecture on the comparative anatomy of the animals of the Taunton cave deposits, especially the species Felis, and contrasted in a most scientific manner the formation of the skull of the cave lion, with that of our present denizen of the African wilds. An interesting discussion arose between Mr. Sandford and Mr. Dawkins, respecting the probable temperature of this geological period, the more important as not only being a possible period in which man, or some similarly constructed being might have existed, but because of the anomalies it exhibits in the animal world. Mr. Sandford contended that the

average yearly temperature probably assimilated to our own, with winters, however, of unusual severity, exhibiting the action of ice in the peculiar formation of the boulders of the gravels and river beds. Mr. Dawkins contended strongly for a glacial temperature, and instanced as amongst the fauna inhabiting these latitudes, the reindeer and musk ox, creatures of an Arctic climate—the marmot, the lemur, and the beaver. Mr. Sandford met or endavoured to meet this argument by instancing the fact of the existence of the hippopotamus, an animal unable to exist in a climate where the rivers would be frozen into a solid block nine months in the year, strongly arguing also that the vegetation of this period closely resembled that of the present day, and that the rhinoceros had been found fossilized amongst remains of trees, similar species of which were now growing above the surface; and that in the jaws and stomach of a fossil bat had been detected undigested vegetable food identical with the flora of the present climate of England and middle Europe. A gigantic bear had also been discovered at Taunton; the horse shoe bat, and a bison resembling the Aurock, though larger. The Mendip Hills of the district were said to contain the largest collection of fossil-bones in the world. Allusion was made to the all-important question of the antiquity of man, and the extraordinary discovery, if authentic, made by Dr. Falconer, of the remnant of ivory found in the Dardogne cave, exhibiting a rude drawing of a mammoth in the act of charging—found with the bones of the animal itself, and drawn by some hand, that had skill and cunning enough to design it on the spot, and perhaps to perish with the portrait it had taken, one of the oldest if not earliest designed of pictures! Other papers followed—a chapter from his unpublished "History of England," by Mr. Freeman, giving an animated and graphic account of the battle of Hastings, and death of "Harold, King of the English." Visits were made the second day by the Society, through many of the

green lanes and roads of the beautiful and picturesque county of Somerset to Ford Abbey, a well preserved Monastic building of the time of Henry VII., although portions of the structnre (the chapel especially) dated from a much earlier period. Here the Society was most hospitably entertained by the owner of the property. Visits were also paid to the old Manor House of Donyatts, near Ilminster; to the ancient remains at Chard, and to Jordans the Manor House of the "Spekes." "I know not, Mr. President," concluded Mr. Brent, "that I ought to add more—too much, perhaps, has been said already. We are all pilgrims in pursuit of two branches of science—the old and the new; the unexhausted remains of antiquity, and of that beautiful world now present around us—the ever varying Nature, the same, yet constantly exhibiting new forms of beauty and enchantment. Day by day, hour by hour, we hope to add a stone or a brick to that great edifice built up to modern science; or rather, a great temple, as surely we may call it, erected to the munificent Author of all we have, or hope for. A further revelation of the wonders of design, the depth of knowledge, exhibited in created things around us, must be a tribute and an offering to Him—however silent, and, at the moment, however unacknowledged. I would conclude with giving "The Prosperity of the East Kent Natural History Society," and would couple the sentiment with the name of our worthy President, Colonel Cox, one who is our chairman at this meeting, and one who has his whole heart and soul in forwarding the welfare of the Society and science in general, not only by the talents and energy he contributes, but by his constant attention and watchfulness over its interests. (Loud applause.)

The President responded to the toast. He said he was very glad indeed to have heard the very interesting statements which had been made by Mr. Brent as to his visit to Somersetshire. He quite agreed with him as to the very

interesting places there were in that county, particularly about the Mendip Hills and Cheddar, but he could not go so far as Mr. Brent had done in reference to Kent. There were places of far more interest to him (the President) in his own county. To go no further than where they were at present assembled, he could assure them that the cliffs which they had that day explored, and the range of similar formation between Folkestone and Dover, were exceedingly interesting. (Hear, hear.) He also must express the pleasure he had experienced in hearing of the researches of other societies with kindred objects to their own; as anything which tended to enlarge the sphere of their observations was of especial interest to the members of this Society. (Hear, hear.) Speaking of the excursion they had that day made, the President remarked that it was one eminently calculated to bring about this result, and he was very much pleased to see that all the ladies were highly gratified with the route which had been taken, and were all so much gratified with the exertions which had been made by Mr. Dowker to please and to instruct. (Applause.) These cliffs were exceedingly interesting, and took them back to very ancient times. Some excellent specimens of fossils were found in that locality, and he regretted very much that he had none on the table for their inspection. Any one might pick up these beautiful specimens. There was a man near the upper station who gained his living by collecting them, and he would have been glad to have bought specimens if notice had been given him. He was sorry that the turn out on that occasion was not so large as might have been expected, but this by no means formed an index as to the number of the Society. Some liked the dry land, others were fond of the sea, and he regretted very much to be told that a very large number from Dover had been disappointed of the steamboat trip to Dungeness. The weather had been against them on several occasions recently, and it was a

pity it was so that day. He also regretted the absence of Dr. Fitzgerald, who he had no doubt was absent on professional duty. It was also matter of regret that the Mayor of Folkestone was not present, of whose kindness to them on the last occasion of their visit every one then present would have a very lively recollection. (Hear, hear.) He understood that a friend of the Mayor's, living in the neighbourhood, was very ill indeed, and this was quite a sufficient excuse for his absence. In conclusion he asked them all to drink to the good health of the local secretary for Folkestone, Dr. Fitzgerald, with thanks to him for all his exertions, both on that occasion and previously, to promote the success of the Society. (Applause.)

The Rev. Thomas Briggs responded on behalf of Dr. Fitzgerald, who he said had been called away on professional business, and was unable to be present. He could only say that he should be too glad to report to Dr. Fitzgerald the very flattering terms in which his services had been spoken of; and for himself he could say that the remarks of the President were fully warranted. Dr. Fitzgerald felt very great anxiety about the excursion to Dungeness, and had watched, along with himself, on the Pier for a long time in the expectation of seeing the Palmerston, but without success. They were very glad at last to see the members arrive by the train; but he had been desired by several friends to ask the Society not to give up the excursion to Dungeness, but to try one more day yet. (Hear, hear.) They had been very much disappointed at not getting there that day, but he had no doubt that in the Divine economy the weather which was now being sent would turn out to be the best for the world at large. He urged the Society not to give up the excursion, and said that very often in September, and even in October, the weather was beautiful. (Hear, hear.) On behalf of Dr. Fitzgerald he begged to return his best thanks, and to say that he had done all he could for the Society. He re-

gretted the absence of Folkestone friends, but Dr. Fitzgerald had said to him, in explanation of this want, that though there were a great many naturalists in Folkestone, they did not belong to the East Kent Natural History Society. (Hear, hear.)

The PRESIDENT, in reply to the remark made by Mr. Briggs in reference to another day being fixed for an excursion to Dungeness, said he was sure if the Folkestone people would fix the day for the trip to Dungeness, the Dover and Canterbury members would put their shoulders to the wheel and help them. It was the duty of every one to do his best to support the Society, as the more they were instructed the better they became in every respect. He hoped the weather would be more favourable for a visit to this new land, as it had been called by Mr. Dowker, and if they went they would be able to see the electric lighthouse, which in itself would be a very great treat, and something of which Kent had great reason to be proud—inasmuch as it was the only lighthouse in the kingdom in which the electric element was employed. They could also explore the flora and fauna of the locality, which were very rare and beautiful. Dover was the greatest supporter of the Society, and the success which had attended them was due to the indefatigable exertions of Mr. Bottle, the local secretary, whose health it gave him much pleasure to propose. (Applause.)

Mr. BOTTLE, in responding, said he was not aware that any exertion of his entitled him to be singled out for honour. He was not a naturalist, but only a learner, nevertheless he enjoyed their rambles very much indeed. With respect to Dungeness, if the Folkestone people did not think it was too late in the season, he would do all he could to get up an excursion, and he believed Mr. Irons, the Harbour Master, would grant them the use of the Palmerston steamboat for the trip. He would name that day fortnight for the trip, and no doubt he should be able

to bring a large cargo from Dover. He concluded by proposing "The Health of Mr. Dowker," who had given them such an interesting account of the geology of the locality, though he was sorry they had travelled rather too far for the ladies to hear all he had said. (Applause.)

Mr. Dowker responded. After thanking the members for the way in which the toast had been drunk, he said he felt a strong attachment for Dungeness Point, and if the Palmerston had come he should have thrown himself in with the party, however rough the weather might have been. It was entirely new land, having sprung into existence within the last century. It was a place difficult to get at except by steamboat as there were no roads to it, the growth of the beach having outstripped the growth of the roads. He did not wish to give up the excursion, but he was afraid there was but little probable chance of fine weather for the next fortnight, and they could not look forward for settled weather for a month. Under these circumstances perhaps it would be as well to defer the trip till early next season. It was a place which he thought the East Kent Natural History Society should visit for two reasons, first, on account of the extraordinary accumulation of beach, and secondly on account of the flora of the district. Marine plants were to be found there such as could not be found in any part of England. Taking all things into consideration he thought they had better defer the trip to May or June next year. With respect to his services, he was very glad they had been appreciated; but he must tell them that to profit by what they had heard they must take a part of the work themselves. There was not a cliff which they had passed over which could not unveil to them a vast history and which contained a flora of which they knew nothing. He alluded particularly to the junction of the chalk formation with the gault with its innumerable fossils of unsurpassed beauty. These were to be found only at Copt Point, at an elevation of about 100 feet. Then

came the Folkestone or upper beds of the lower greensand, which could be traced westward till they died out, and other beds were seen cropping out above them. These were the Hythe beds, the lower division of the same series, in which could be found a vast assemblage of fossils of gigantic reptilia—one of these in particular having originally been so large that its size would take up more space than the large room they were occupying. They could hardly conceive the great changes this globe had undergone since such monstrous reptiles had their existence. He had only given them a general view of the geology of the district which they might study for themselves in detail. He could not resist going to the end of this remarkable series of beds that afternoon. The Hythe beds contained the stone called Kentish Rag—used principally for building churches, and it was in these beds that the remains of these gigantic reptiles were found. With reference to Hythe, it was an important port at one time, but now it was a long way to travel to it from the sea, and then it was all over beach. Further on they came to Romney Marsh, a most extraordinary place, said to have been dropped from the clouds, so that it might be said there were now five great divisions of the globe, instead of four, viz.,—Europe, Asia, Africa, America, and Romney Marsh. (Laughter.) At one time this marsh must have formed the bed of the ocean. Lympne was once a port in the time of the Romans, and Appledore another, but in a most extraordinary manner it had been reclaimed from the sea. Millions of tons of beach had accumulated there, and banked out the sea, and it would be for them to find out how the change had taken place; his own opinion was that it must have been caused by some peculiar alteration in the set of the currents forming local sandbanks. The whole appearance and character of the district had undergone a change, and it presented features well worthy of special study. He did not intend to weary them, but would merely conclude

by saying that he should always be happy to advance the interest of the Society in any way he could. (Applause.)

The PRESIDENT said there was yet one more toast which he desired to give before the meeting broke up, as he saw by the clock that the time for the departure of the train was approaching. It was to the good health of Mr. Harvey, the hon. secretary at Canterbury—a gentleman who had shown a very great desire to do all he could to advance the interests of the Society, and whose attention to all the details of their meetings it was the duty of the members thus to acknowledge. (Applause.)

Mr. HARVEY responded. He said he was very much gratified if anything which he had had the opportunity of doing had in any way advanced the interests of the So- of the Society. Their object was a high and a noble one, and it was to him a great pleasure to be instrumental even in a very slight degree in advancing their interests, or in promoting the prosperity of the Society. (Applause.)

Dr. KERSEY said they could not separate without proposing the good health of the ladies, coupled with the name of Mrs. Cox, the wife of their much esteemed President. (Applause.) He was sure this was a toast which would be cordially received, as they were all highly honoured by the presence of the ladies on that occasion. They had that day shown themselves ardent students in the pursuit of natural history, and he trusted the la lies had all been gratified by their visit to Folkestone. (Applause.)

The PRESIDENT returned thanks for the compliment paid to Mrs. Cox and the ladies in a few very happy remarks, after which the meeting broke up.

The time for the starting of the train on the return journey had now arrived, and after a brief but pleasant ride the Dover party were safely landed, and the train sped on to Canterbury, which was reached as the shades of evening were closing in. Thus terminated a very pleasant and profitable excursion.

REPORT

OF

THE EAST KENT NATURAL HISTORY SOCIETY,

WITH A

List of Books belonging to the Library,

&c., &c.

SESSION, 1867.

CANTERBURY:

PRINTED AT THE "KENTISH GAZETTE" OFFICE, HIGH-STREET.

REPORT.

The Committee in laying their tenth annual report before the members have the pleasure of congratulating them on the financial condition of the Society, the balance in hand being £14 1s. 6d.

Since the last report the Society has lost by resignation, death, and various causes, sixteen members, and six new members have been elected, leaving a nett deficiency of ten. This loss is however, more apparent than real (as the financial balance will show), being the result of a thorough revision of the list of members, and the expunging several names that had been retained by accident long after the members had left. The annexed report, reprinted from the "Kentish Gazette," contains an account of all the meetings of the year, including the two Excursions, both of which were well attended. The collection of plants at the first was tolerably large and rich in flowers of comparative rarity, and would probably have been larger, but for a sudden and heavy shower which put a stop to collecting. The Committee have to thank T. Sawbridge Drax, Esq., for the permission to meet on this occasion in his park.

The second Excursion to Dungeness and Lydd Beach was unmarred by weather or any other drawback, except that from unavoidable delays it was too late in the year to find the flora of the district in perfection, and the short time allowed on land, in consequence of the tide, did not admit of any comparison of results.

The success of the meeting was greatly to be attributed to the kindness of R. Iron, Esq., harbour superintendent of Dover, in lending the Palmerston steam-tug for the use of the members. Early in the year your Committee instituted monthly meetings for microscopic and conversational purposes, at Canterbury, which at first were well attended, and at which

some very interesting papers were read, notably one by Dr. Mitchinson, on "Siluria," a continuation of which your Committee hope to have in the ensuing session. Dr. Mitchinson also kindly offered to the members the opportunity of seeing several rare British flowers in bloom in his garden where he had been very successful in bringing them to perfection. From some cause, however, the interest in the monthly meetings flagged, or their days were forgotten, and six only were held. Your Committee regret this the more as much useful information was circulated at these meetings in a pleasant conversational manner after the reading of the papers. Reports of all the papers will be found annexed.

Your Committee are indebted also to Messrs. Geo. Dowker and Jas. Reid for extended lists of the flora of the two districts investigated at the Excursions, which will be found printed with the reports of meetings.

The two general lecture meetings were also successful, though the bad weather militated against the attendance at the last, a fact the more to be regretted as the lecture by the Rev. J. B. Reade was so highly interesting and instructive.

It will be seen on reference to the Librarian's statement that some valuable additions have this year been made to the Library, being 14 volumes of new books and 3 volumes of periodicals.

The Treasurer's account duly audited is also annexed.

In concluding their annual account, the Committee feel that during the past year the Society has been moderately successful, and if the members generally, or at least those whose business or pleasure carries them into the rural districts of the county, would follow the excellent example of Messrs. Reid and Dowker in recording for the benefit of members generally the flowers, insects, or migratory birds they notice in their walks, in each month, an amount of information really large and valuable would be accumulated, and these annual reports become useful records, not only to ourselves, but to those who may come after us.

As the great majority of the members reside either in Canterbury or Dover, and as one or other of these places is

accessible to most, it is proposed to hold the monthly meetings this year alternately in each place, at which any such records of flora or fauna will be noted if forwarded to the Secretary a day or two previously.

Your Committee have to regret the loss of the services of their late Hon. Treasurer, whose kindness and energy has greatly conduced to the financial prosperity of the Society during the last eight years.

LIST OF BOOKS AND PERIODICALS

Belonging to the East Kent Natural History Society.

1. British Land and Fresh Water Mollusks, 1 vol. (Reeve)
2. Bryologia Britannica, 1 vol. (Wilson)
3. Synopsis of British Sea Weeds, 1 vol., (Harvey)
4. Flora of Surrey, 1 vol., (J. A. Brewer)
5. Manual of Geology, 1 vol., (Professor Phillips)
6. Flora of East Kent, 1 vol.
7. Morris's British Butterflies, 1 vol.
8. Ramsay's Physical Geography of Great Britain, 1 vol.
9. Dallas' Animal Kingdom, 1 vol.
10. Johnstone's British Zoophytes, 2 vols.
11. A Catalogue of rare Phœnogamous Plants collected in South Kent in 1829.
12. Memoirs of the Geological Survey of Great Britain, 2 Nos. referring to Sheets 4 and 7.
13. British Hemiptera Heteroptera, 1 vol., 1865, (Douglas and Scott)

14 15. Hand Book of British Flora, 2 vols., (Bentley)

16. Miscellaneous Botanical Works of Robert Brown, 1 vol.
17. Recent Memoirs on the Cetaceæ, 1 vol.
18. Monograph of British Spongidiæ by Dr. Bowerbank, 1 vol.
19. Conybeare and Phillips' Geology, 1 vol.
20. Bell's British Quadrupeds, 1 vol.
21. Atlas of British Sea Weeds, drawn by Mrs. Gatie from Professor Harvey's Phycologia Britannica, 1 vol.

*22 25. Couch's Fishes, 4 vols.
*26. Forbes British Star Fishes, 1 vol.
*27 28. Owen's Comparative Anatomy, 2 vols.
*29 30. Kirby's British Bees, 2 vols.
*31 34. Smith's English Flora, 4 vols.
*35. Ralf's Desmidiæ, 1 vol.
*36. Nitzsch's Pterylography.

Those marked * were added this year.

PERIODICALS.

Natural History Review, vol. 3, 1863, and 4, 1864. (Half bound Calf)
The Zoologist, from 1843 to 1852. (In Cloth)
" 1853 to 1855. (Half bound Calf)
" 1856 to 1857. (In Cloth)
" 1858 to 1861, and for 1863 to 1865. (Half bound Calf)
N.B.—The Zoologist for 1862 is incomplete at present.
The Quarterly Journal of Microscopical Science, vols. 7 and 8, old Series. Vols. 1, 1861, 3 to 6, 1863 to 1866, new ditto. (Half bound Calf)
Magazine of Natural History, vols. 3 to 8, and 11 to 16, 3rd Series. (Half bound Calf)
The Geologist, vols. 2, 3, 4, 6, and 7. (Half bound Calf)
The Phytologist, vol. 3, 1859. (Half bound Calf)
British Moths, Nocturni.
" Geometræ.
Proceedings of the Geologist's Association, 1863-4.
Geological Magazine, vol. 1, 1864, and 2, 1865.
Journal of Science, vol. 1, 1864.
The Librarian regrets to state that in consequence of several Periodicals not having been returned to the Library, nor any entry of them made in the book kept for the purpose in the Society's reading room, he has been unable to have the volumes to which they belong bound.

THE FOLLOWING PERIODICALS

ARE TAKEN IN BY THE SOCIETY, VIZ:

1. Natural History Review
2. The Annals and Magazine of Natural History
3. Quarterly Journal of Microscopical Science
4. The Zoologist
5. The Geological Magazine
6. Quarterly Journal of the Geological Society
7. " " of Science
8. Land and Water

FINANCIAL STATEMENT.

RECEIPTS.

	£	s.	d.
Balance in hand, Dec. 31st, 1866	9	7	1
Subscriptions for 1866	7	10	0
Ditto for 1867	36	10	0
	53	7	1

EXPENSES.

	£	s.	d.
Mrs. Ward, printing, &c.	8	13	6
Dr. Murie, lecturer	4	4	0
Contribution to the Library	10	0	0
Rent of room	10	0	0
Fire and candles	1	0	0
Subscription to the Ray Society	1	1	0
Expenses of Meetings at the Museum	1	0	0
Mr. Bottle, for expenses at Dungeness	0	10	0
Secretary, for sundries	2	12	1
Treasurer, for stamps and paper	0	5	0
	39	5	7
In Treasurer's hands (£ 12, s. 16, d. 9)			
In Secretary's hands (£ 1, s. 4, d. 9)			
Balance	14	1	6
	53	7	1

Examined and found correct—

FREDERICK ROUCH, Chairman of Committee.
January 17th, 1868.

GEORGE RIGDEN,
Hon. Treasurer.

List of Officers and Members.

—:o:—

President:

COLONEL HORSLEY, St. Stephen's Lodge, Canterbury.

Vice Presidents:

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SIR WALTER JAMES, BART., Betshanger.
COLONEL C. J. COX, Fordwich House.
MATTHEW BELL, Esq., Bourne Park.
WM. OXENDEN HAMMOND, Esq., St. Albans.
REV. F. SCOTT, Sibertswould.
CAPT. CROOKES, Dover.
REV. J. MITCHINSON, D.C.L., King's School.
REV. J. B. READE, M.A., F.R.S., Bishopsbourne.
GEO. DOWKER, Esq., F.G.S., Stourmouth House.

Treasurer:

MR. J. S. LINFORD, Burgate Street.

Librarian:

COLONEL HORSLEY.

Secretaries:

MR. JOHN S. LINFORD, Burgate Street.
MR. S. HARVEY, High Street.

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CAPTAIN KEMP.
H. B. MAKESON, Esq.
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G. RIGDEN, Esq.
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MR. S. SAUNDERS.
F. SLATER, Esq.
T. O. WELSH, Esq., M.D.

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A. BOTTLE, Esq., Dover.
Dr. PITTOCK, Margate.

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Astley, Dr.	Dover.
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Briggs, A., Esq.	Tenterden.
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Browne, Miss L.	4, Victoria terrace, ditto.
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Cox, Mrs. C. J.	Ditto.
Chafey, Mrs.	Doddington, near Faversham.
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Gordon, Mr. W. C.	Museum, Dover.
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Gulliver, Esq., F.R.S.	Clovis Terrace, Canterbury.
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Hatfield, G. T. Esq.	Hartsdown, Margate.
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Horsley, Colonel	St. Stephen's Lodge.
Hart, R., Esq.	Folkestone.
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Hilton, Captain	Nackington House.
Hanvey, John, Esq.	Waterworks, Dover.
Haddon, Miss	Effingham Crescent, ditto.
Haddon, Miss C.	ditto ditto.
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Jones, R., Esq.	Clyde House, Dover.
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Kersey, Mrs.	Ditto.
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Kingsford, Montague, Esq.	Littlebourne.
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Knocker, Captain	Dover.
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Linford, Mr. J. S.	Canterbury.
Lewis, T., Esq.	Castle Street, Dover.
Mummery, Mr. W. P.	Strond Street, Dover.
Makeson, H. B., Esq.	High Street, Hythe.
Mitchinson, Rev. Dr.	King's School, Canterbury.
Munn, Major	Churchill House, Dover.
Neame, Mrs. A.	Lamb Lane, Canterbury.
Neame, Miss C.	Orchard Place, Canterbury.
Neame, E., Esq.	Selling.

Neame, Mrs. E.	Selling.
Pittock, G. M., Esq., M.D.	Margate.
Parker, R. D., Esq.	Barham.
Pool, Mr.	High Street, Canterbury.
Payn, W. H., Esq.	St. Martin's Hill, Dover.
Plumptre, C. J., Esq.	Fredville.
Plummer, E., Esq.	The Firs, Canterbury.
Puckle, Rev. J.	St. Mary's, Dover.
Poynter, A., Esq.	3, Marine Place, ditto.
Peckham, T. G., Esq.	Hall Place, Harbledown.
Pilbrow, J. S., Esq., F.G.S., F.S.A.	Wingfield House, Canterbury.
Powell, Mrs.	4, Dane John Grove, ditto
Payn, G. H., Esq.	Saxon Street, Dover.
Reid, Jas., Esq.	Bridge Street, Canterbury.
Rigden, G., Esq.	Burgate Street, Canterbury.
Rouch, Rev. F.	Precincts, Canterbury.
Reade, Rev. J. B.	Bishopsbourne.
Reade, Geo., Esq.	Ditto.
Scott, Rev. F.	Sibertswould.
Sankey, F. H., Esq.	Wingham.
Sankey, Mrs.	Ditto.
Saunders, Mr. Sibert	Whitstable.
Slater, F., Esq.	Chislett.
Smith, Capt. Carleton	Dover.
Stock, Henry, Esq.	Folkestone.
Sutton, Dr.	Liverpool Street, Dover.
Spice, C., Esq.	Strond Street, ditto.
Solomon, — Esq.	Little Kenfield.
Smith, Miss J.	Dane John, Canterbury.
Smith, J. G., Esq.	Effingham Lawn, Dover.
Sicard, A., Esq.	Bridge.
Stillwell, J., Esq.	Victoria Park, Dover.
Tucker, Mr. E.	The Grove, Margate.
Thurston, Thos., Esq.	Ashford.
Tuckey, C., Esq., M.D.	St. Dunstan's, Canterbury.
Tylden, Rev. M.	Stanford Rectory, Hythe.
Taylor, Mrs., A.	North Street, Herne Bay.
Thornton, W. H., Esq.	Hawley Square, Margate.
Tyson, W. T., Esq.	Folkestone.
Thorpe, J. C., Esq.	5, Claremont Place, Dover,
Thomson, R. E., Esq.	Kenfield House, Petham.
Walker, Mrs.	St. George's Place, Canterbury.
Ward, Miss	High Street, Canterbury.
Worsfold, Christopher, Esq.	Castle Street, Dover.
Weston, L., Esq.	Waterloo Crescent, Dover.
Wightwick, W., Esq.	Folkestone.

Wray, Miss	Barton Fields, Canterbury.
Warman, Mr. W.	St. Peter's Street, Canterbury.
Warman, Mrs.	Ditto ditto.
Winch, A., Esq.	Norman Street, Dover.

Honorary and Corresponding Members.

Bates, H. W., Esq.	London.
Boycott, J., Esq., M.D.	London.
Sandilands, —, Esq.	Cannings Down, Queensland, Australia.
Saunders, J., Esq.	Reigate.
Whitaker, W., Esq.	Geological Museum, Jermyn Street, London.

Associates.

Baker, Mr.	Cattle Market, Sandwich.
Coppen, Mr. E.	Sibertswould.
Else, Mr. R.	Burgate Lane, Canterbury.
Gutteridge, Mr.	Faversham.
Kennett, Mr. W.	Fordwich.
Parren, Mr. W.	Canterbury.
Prebble, Mr. J. G.	Ramsgate.
Young, Mr.	Sittingbourne.

EAST KENT
NATURAL HISTORY SOCIETY.

:o:

TITLE & OBJECTS OF THE SOCIETY.

:o:

The objects of the East Kent Natural History Society shall be the Collection and Diffusion of Practical and Theoretical Knowledge respecting Natural History, in all its Branches, both in relation to the particular District and the General Science.

Rules and Regulations.

MEMBERSHIP.

1. The Society shall consist of Ordinary, Honorary, and Corresponding Members, and of Associates.

2. Every candidate for admission into the Society as an Ordinary Member, must be proposed in writing by two Members, and the election shall be by ballot, taken at any meeting of the Committee, or at a General Meeting—one black ball in five to exclude.

3. The Annual Subscriptions, to be paid by Ordinary Members, shall be Ten Shillings; the Subscription shall become due on the 1st of January in each year, and shall be paid in advance for the current year.

Any Member neglecting to pay his Subscription for three months after it is due, shall be applied to by the Secretary, and if the Subscription remain unpaid for three months after such application, he shall cease to be a Member of the Society.

4. The Committee shall have power to admit, without ballot, on the nomination of two Members, any Lady who shall be desirous of becoming an Ordinary Member, and her subscription shall be Five Shillings.

5. Any persons distinguished for their researches in Natural History, for their liberality to the Society, or for their connection with similar Societies may, on the recommendation of the Committee, be elected Honorary or Corresponding Members of this Society, provided they do not reside within the district: such Honorary and Corresponding Members shall not be subjected to any of the expenses of the Society, and shall have no vote in its affairs.

6. In order to encourage the study of Natural History among individuals of the class of mechanics, &c., residing in the district, the Committee shall have power to admit individuals of that class as Associates, provided they shall first communicate some information or observation on Natural History, exhibit such specimens or present them to the Local Museums, as shall by their merits satisfy the Committee. Such Associates shall enjoy the privileges of Honorary Members.

MANAGEMENT, AND BUSINESS MEETINGS.

7. The affairs of the Society shall be conducted by a Committee of Management, which shall consist of a President, Vice-Presidents, a Treasurer, and an Honorary Secretary, and not less than six Members, who shall all be chosen at the Annual Meeting. Three Members of such Committee shall form a quorum. The Meetings shall be held on the same day as the February and November General Meetings, and at such other times as the Secretary may deem necessary.

8. An Annual Meeting shall be held on the last Tuesday in January

in each year, at Canterbury, for the purpose of electing the Officers for the current year, receiving the Annual Statement of Accounts, and Report of the Committee, and conducting the general affairs of the Society.

9. Special General Meetings may be summoned by the Committee, or by the Secretary, on the requisition (in writing) of any six Members of the Society, the specific purposes of the Meeting being stated in the notice, which shall be sent to each member not less than one week before the time of such Meeting.

10. All questions discussed at the Meetings shall be decided by a majority of votes; and if upon any question the votes shall be equal, the Chairman of the Meeting shall have the second or casting vote.

11. In the event of any vacancy occurring in the Officers or Committee, between the Annual Meetings, the same shall be filled up by the Committee.

12. In order to facilitate the objects of the Society, the Committee shall be empowered to appoint any member Local Secretary for the town or district he may reside in. Such Local Secretary shall be *ex-officio* a Member of the Committee.

SCIENTIFIC MEETINGS AND EXCURSIONS.

13. Two Meetings shall be held in Canterbury yearly, during the first and last quarters for the purpose of reading Papers, exhibiting Specimens Lectures, &c. Each member to have the right of introducing a Visitor at these Meetings.

14. Two Excursions are appointed to take place yearly, during the Summer, for the purpose of investigating the natural objects of interest in some district in East Kent; the arrangements for these Excursions to be made at a Committee Meeting to be held in the first week of each of the Summer Quarters.

15. A Minute of the Proceedings of all Meetings shall be entered by the Secretary in a Book kept for that purpose.

16. The Secretary to give seven days' notice of such Meetings and Excursions to every Member, stating the time and place of Meeting, &c.

LOCAL MEETINGS.

17. To promote still further the objects and interests of the Society, Local Secretaries and Members are invited to organize Meetings or Excursions in their districts; and to give notice of the same to the General, and all the Local Secretaries, stating the time and place of Meeting, and what particular subjects are to be brought forward.

COLLECTIONS OF SPECIMENS.

18. The Society shall endeavour to make a Collection of Objects of Natural History, both with a view of forming a Museum and distribution of Duplicate Specimens, according to Regulations to be adopted by the Committee.

LIBRARY.

19. Only Books and Periodicals connected with Natural History are to be purchased by the funds of the Society, and the number to be purchased shall be determined by the Committee.

20. All the Books and Periodicals shall be kept in some convenient place, so that Members may be able to refer to them, or take them out, under such regulations as the Committee from time to time may think proper to make.

21. Members are also invited to lend Books for the use of the Library, reserving to themselves the full right of ownership; such Books to be under the care of the Committee, and not allowed to be taken out of the Library.

FIRST MEETING.

Canterbury, March 7, 1867.

Reprinted from "Kentish Gazette," March 12, 1867.

A meeting of the members of this flourishing Society was held on Thursday afternoon, in the Lecture Hall of the Museum, Guildhall Street, Canterbury, for the purpose of hearing a lecture by Dr. James Murie, F.G.S., prosector to the Zoological Society, on "Mermaids," or, the structure and geographical distribution of the order Sirenia.

There was a large attendance—among whom were Col. Cox, President of the Society, Mrs. Cox and party, Mr. Lee, Mr. T. G. Peckham, Mr. Pilbrow, C.E., Mr. John Brent, jun., Mr. Linford, Mr. Rigden, Mr. S. Harvey, Dr. Mitchinson, &c., &c.

The President, in taking the chair, said the present meeting was convened for the purpose of hearing a lecture from Dr. Murie, on the order Sirenia; and from the ability of the lecturer, as well as the interest and importance of the subject, he was sure that Dr. Murie would receive a patient and attentive hearing from all who were present.

Dr. Murie then rose, and was received with applause. In introducing the subject, he said—The first part of the present lecture "Upon Mermaids," may give rise in your minds to the idea of my delivering a sensational lecture upon objects which all persons, be they young or old, look upon as but a fireside story, or at best an ancient superstition; but the concluding clause of the title "The structure and Geographical distribution of the Order Sirenia," to any person moderately acquainted with Natural History, supplements, or is explanatory, of the real objects of the lecture. It is truly interesting to trace the sequence of fables onwards to the facts on which they originally have been based; it bears a comparison with the growth of the

human mind from childhood to man's estate, at first a credibility to all the stories told us, which once firmly imprinted on our memory, as we grow older shape and reshape themselves, until finally analogies are traced between the nursery tale and what is really a true historical narrative. Much in the same manner have the ancient traditions about mermaids been handed down from generation to generation, till at last natural historians have established the existence of animals whose physical appearance and general habits easily accounted for the fictitious narratives regarding creatures, believed to possess the attributes of human beings and fish. While patiently waiting, therefore, a telegram from the mermaids themselves, per the recently and successfully laid sub-atlantic wires—(for as *Punch* gave forth in one of his droll cartoons last year, these folks were very busy in this submarine undertaking)—we shall proceed to anticipate their communication, by a genial account or summary, of what naturalists know regarding some of the tribe. Notwithstanding the number of travellers and seafaring persons who for centuries have been visiting distant regions, it is only in comparatively recent times that a fair knowledge of the structure and position in the scale of beings of these quondam mermaids has been obtained; even now their affinities with different groups of animals is a subject which occasionally provokes fresh discussion among naturalists. Probably one of the best examples of mermaids is that which represents them in the human female form, the posterior part being composed of a fish's tail, and as such they were mentioned by many of the old writers. Pliny, in his natural history of Fishes, devotes a chapter to "The forms of the Tritons and Nereids." He says that word was brought to the Emperor Tiberius that a Triton had been both seen and heard in a certain cavern, blowing a conch shell, and of the form under which they are usually represented. Nor yet is the figure attributed to the mermaids at all a fiction; only in them the portion of the body that resembles the human figure is still rough all over with scales. For one of these creatures was seen upon the waves, and as it died, its plaintive murmurs were heard

even by the inhabitants at a distance. I, too, have some distinguished informants who state that they themselves saw once in the ocean of Gades a sea man, which bore in every part of his body a perfect resemblance to a human being, and that during the night he would climb up into the ships; upon which, the side of the vessel where he seated himself would instantly sink downward, and if he remained there a considerable time even go under the water. Among the older naturalists Juvenal speaks in his fourteenth satire of "the monsters of the ocean, and the youths of the sea." Pliny too talks of "human beings who have been beloved by dolphins." And in the Eastern Archipelago and in regions thereabouts are animals found which bear a very striking resemblance, or at least give colour to, many of these old tales. There can be no doubt that the old stories of mermaids were brought down to us by travellers, who, like du Chaillu, had their statements magnified to an indefinite extent. Without entering further into the stories of mermaids—for he imagined they as a Natural History Society wanted something more than mere story telling—he would only indicate in a few words how these stories had their origin, and then pass on to the more serious part of the lecture. In the reign of Alexander a great number of his sailors brought stories as to enormous sea monsters who possessed attributes in common with man. The sylphs and sirens of old were familiar to all readers of classical literature. In the reign of the Emperor Augustus, a very affecting incident was recorded of a boy who was a good player on the lute, and who used to play that instrument daily when going to school. An attachment sprung up between him and a dolphin who inhabited a lake on the road which the boy took daily. The fish used to come to the surface and listen intently to the strains of music, and when the boy left, retire to the deepest part of the lake as if sorrowing for his absence. At last the boy died, and when the poor dolphin found he was not coming any more, he also sickened and died. It was also recorded that Alexander the Great made a boy high priest of Neptune at Babylon on account of his love for a dolphin, and his skill in music.

Arion, too, who was a beautiful performer on the lute or lyre was at one time on board a ship, and from some cause or other the sailors took a dislike to him, and pitched both him and his lyre overboard. The dolphins who were following the ship in great numbers bore him on their backs safely to the promontory of Tanacrum. In the "Arabian Nights Entertainment," too, frequent mention was made of fish, and many stories are told concerning them. Leaving the more fanciful portion of the subject, the lecturer went on to say that he should endeavour to show what the old mermaids really were—because there were in the animals which had been grouped together into the order called sirenia, certain characteristics which were specially worthy of notice, as showing the connection between them and the class of animals which doubtless had given rise to the stories now current about mermen and mermaids. The order sirenia was in some respects synonymous with the group which embraced the dolphin tribe; and these were not to be confounded with fish, inasmuch as they breathed pure air only, coming to the surface and blowing like whales. To this group of mammalia, the name cetacea had been given. The tail was quite different from an ordinary fish, and was worked in a horizontal instead of a perpendicular manner. They had the nasal organ fixed in the crown of the head, one fin at each side, and another at the top. [All these peculiarities were explained fully by Dr. Murie, by the aid of a series of beautifully executed representations of the animals described, which it is, of course, impossible to reproduce here.] The order sirenia consisted of four different groups or kinds, to which he would allude in detail. The first of these was the halicore, or dugong. These animals were herbiverous, or feeders on vegetal life, and they bore some resemblance to cows, in this respect—that they did not live always in the water, but often came up the creeks which they inhabited on to the land and browsed like oxen. They were thus carnivorous and herbiverous. Cuvier, and some of the older naturalists, had noted these peculiarities, and pointed out that they seemed to belong to

an order by themselves. Dr. Murie then spoke at length of the sirens who of old were supposed to assume the shape of beautiful women, and by their beautiful singing enticed the unwary sailor to destruction, and pointed out that seemingly all the foundation there existed for this was that many of the animals in the order sirenia bellowed in so peculiar a way, and sat upright in the water when nursing their young, that it was by no means difficult in the dusk or distance to imagine that it was a human form in the water—imagination easily filling in the rest of the story. [The anatomical structure and other peculiarities of the dugong were then explained at length, and illustrated by life sized plates.] They were also possessed of such peculiarities as the following : An external rough skin, very tough and something like a gnarled oak, the nostrils, open in front, the mouth distinct and small, whereas in the dolphin the mouth was extremely large. These animals were found in Australia and the Indian seas, and from all that was known of them, there was every reason to believe that they were members of a distinct order and entitled to take rank by themselves. The second member of the order was the rytina, which was not now known to exist. A hundred years ago it lived only in Beering's Straits, and was made food of by the Russian arctic expeditions of 1731 and following years—it being found to be an excellent substitute for the salt beef usually carried by their ships. The rytina was the largest of all this group, some specimens being found twenty-six feet long, but now it might be said to be extinct. The third branch of the order was the manatus or manatee, which possessed many of the attributes of the dugong. Its tail was flat like that of a beaver, and instead of being a mermaid, to which family it undoubtedly belonged, you would imagine it to be a badly made bottle, with a couple of handles. [The illustrations of the animals in various positions were here shown and fully explained by Dr. Murie.] There were some peculiarities which distinguished this animal from all others of a similar kind. Instead of having seven cervical vertebræ it had only six. In the order of sirenia, too, there was a peculiarity in the stomach

—it being what might be called double, and having a sort of horny substance like a sausage, composed of little cells, which probably was intended to aid digestion. The only other animal in which this horny substance was found, was in the hyrax or coney of Scripture, but in other respects such as dentition, &c., it was very like the hippopotamus, as well as the class of animals of which he was speaking. Dr. Murie then showed from the skulls of the seal, lion, and hippopotamus, that the manatee belonged to this tribe of animals—the explanations being illustrated by excellent specimens obtained from the Museum. The manatee was supposed by many to be a kind of seal; and Tom Hood had written a series of funny verses on one poor animal which was obtained by the Zoological Gardens at great trouble and expense. These verses were read by the lecturer, and were much appreciated, as was also some particulars regarding the feeding of this creature with milk from a bottle, by the keeper sent out to bring him home to England. The fourth class of the order, the halitherum, was an old fossil mermaid, now extinct, which was found in Central Europe, and besides possessing many features in common with the other classes had the rudiment of a hind limb, thereby showing its affinity to the class of hippopotami. If the question were asked an ordinary observer – What class of animals does the manatee belong to ?—there is a great chance of the reply being – a kind of seal; and, indeed, in so far as mere rough external appearance goes, it is as like some seals as anything else. Nevertheless, the manatee belongs to a small group of aquatic mammalia bearing close relation to whales, although differing in several essential particulars from them, and, on the other hand, rather approaching elephants in general organization. As to seals, these amphibious carnivora can be confounded with the manatee tribe only by an outward approach in form, and the fact that much of their lives is spent in a watery element. Like the manatee their body is elongated, round, fat, and tapering posteriorly. There is a want of external ears, and the nostrils are valvular. Their fore

limbs have a paddle form, and their hind limbs are webbed together in such a manner as to appear as if one large candal fin. But these resemblances are deceptive, for the seal has distinctly four well-developed limbs besides a tail, its body is covered with abundance of fur, the eyes are large, and the teeth are akin to those of the dog tribe; which characters in themselves, without further details, are enough to separate a seal from a manatee by the most casual observer. Having spoken thus, it would seem that the manatee and its immediate *confreres* have some sort of resemblance to seals, to elephants, and to whales, besides the historical half human, hnlf fish like character accorded them. However, instead of entering into too long and learned an account of the comparative anatomy of these creatures, it appears quite enough for the present purpose to have sketched out the main distinctions which every one may be expected to know something of.

So far then as mermaids are concerned, the mere fancied resemblance to the human form through animals of the manatee tribe half raising themselves out of the water, and disporting themselves, at the same time displaying a rounded head, or suckling their young at their breasts, was easily dispelled by an examination of the various likenesses of these animals which hung round the lecture room, and which were described with much minuteness by Dr. Murie. As to mermaids, pure and simple, they might be said all to come from one workshop, and that was Japan. Captain Cuming, R.N., son of Mr. Cumming, of Braidwood-terrace, Plymouth, has returned from Yokohama, bringing with him a great variety of curiosities – from bronze buckles to playbills – from a joss to Japanese jars four feet in height – maps, plans, toys, puzzles, and some superb bronzed vases – in fact, a regular curiosity shop. Amongst them is a mermaid. The head is that of a small monkeys with prominent teeth, a little thin wool on the head and upper parts; long, attenuated arms and claws, below which the ribs show very distinctly; beyond these latter the skin of a fish is so neatly joined that it is hardly possible to detect where the joint is

made; in fact, where the fish begins and the monkey leaves off. The fish has large scales, spines on the back, a square tail, and appears to be a species of chub. It is quite perfect except the head, which only seems to have been removed to make the joint. Total length, about sixteen inches; colour of monkey, dull slate; the fish, its natural colour; and the whole in a state of excellent preservation.

This specimen of Japanese manufacture was shown and explained by Dr. Murie at the close of the lecture, as were also several photographs of manatees, and other animals of the order sirenia. The lecture, of which the above is an abstract, was delivered without notes, and was listened to throughout with the utmost attention. On resuming his seat, Dr. Murie was loudly and deservedly applauded.

Colonel Cox then rose, and in a few appropriate remarks proposed that the cordial thanks of the Society be given to Dr. Murie for his able, entertaining, and instructive lecture.

Mr. Dowker seconded the motion, and in the course of his remarks asked Dr. Murie to what particular classes of animals the order Sirenia was allied?

Dr. Murie replied that the order might be placed between the cetaceous and the pachyderm—between the whale and the hippopotami. As to the mermaids, pure and simple they were only the manatees transformed into the supposed shape of half women, half fish, by the imagination of the poets, or by the old Grecian and Roman sailors, who seeing animals of this tribe, transformed them into sweet damsels playing on lutes. (Applause.)

The cordial thanks of the Society were then awarded to Dr. Murie, and having been suitably acknowledged by that gentleman, the meeting adjourned.

SECOND MEETING.

Canterbury, March 20, 1867.

Reprinted from "Kentish Gazette," April 2, 1867.

The first of a series of monthly meetings in connection with this Society was held on Wednesday, the 20th ult., in the Museum, Guildhall-street. The chair was ccupied by Colonel Cox, the respected President of the Society, and there were present about forty members of the Society. A very interesting letter was read by the Secretary from M. Bell, Esq., relative to the capture of a specimen of the American Badger in his preserves. Mr. Bell having promised to exhibit the specimen to the Society, a vote of thanks was unanimously passed. The President exhibited some recent fruits from Jamaica, brought over by Colonel Farren, C.B.; also the Jamaica Tarantula Ctiniza Nidulans (a species of hunting spider), its singular nest, and a brood of young ones. Some ripe bananas were tasted by the members present. The subject for illustration was "The circulation of the blood in the young salmon," which was handled in a very masterly manner by Mr. George Dowker, F.G.S., of whose address we give an abstract.

Ever since the discovery by Dr. Harvey of the circulation

of the blood, said Mr. Dowker, this interesting sight has been a favourite study by the microscopist. Indeed, the frog plate was considered an indispensable part of the apparatus of the older microscopists. This was a contrivance by which a frog could be placed under the microscope, so as to exhibit the circulation of the blood in the web of the foot. The young salmon, presents to us facilities for studying this interesting phenomena, in a far greater degree than in the Frog, Newt, or any other animal with which we are acquainted. Before pointing out the peculiarities in the young salmon, to render the subject plain to you all, I propose to exhibit by means of a diagram, the course of the blood in the human subject. I will be seen from this diagram, which represents a section of the human heart, with its accompanying large blood vessels, that the heart is first divided into two separate cavities, a right, and a left, and these again subdivided by a series of valves into upper and lower cavities; thus we have a right left auricle and right left ventricle. The office of the auricles is to receive the blood, and force it into the ventricles; the ventricles receive the blood from the auricles, and force it through the lungs and through the body. The vena cava receives the blood from the system, and conveys it to the right auricle, from which it descends to the right ventricle, which forces it through the pulmonary artery into the right and left lungs, where it is exposed to the influence of the air in minute vessels—thence it is collected by the pulmonary veins and conveyed to the left auricle, thence to the left ventricle, which contracting, forces the blood by the great aorta through the entire system by means by the arteries. After passing the capilaries, the return current is collected in the veins to go through a similar course. It will thus be seen that the heart in the human subject and also in all mammalia is double, and it was pointed out by Dr. Murie, that a peculiarity of some of the Sirenia, was the presence of a heart, in which the two halves were separated. The circulation of the blood in fishes, differs in this important peculiarity from that of mammalia, that the heart is

single, and the branchiæ serve the purpose of lungs; the water passing through the gills effecting that change in the blood which is performed by the air in the lungs in the latter. Among the peculiarities noticeable in the circulation of these young salmon, perhaps the most interesting is that we perceive in the appendage to the abdomen, termed the umbilical vesicle. I should observe that the young salmon immediately it is hatched, possesses this strange vesicle, which appears, as far as I can ascertain, to contain a large amount of albuminous substance, and coloured oil globules, and to be supplied with innumerable blood vessels. In this stage of growth, the young salmon is perfectly transparent, and on being placed under the microscope, we may observe the entire circulating vessels, the beating of the heart, and the course of the blood through the system. The vertebra and viscera are also easily seen. The umbilical vessel is of large size, compared with the young fish. During its growth, this appendage is gradually absorbed, and at the same time the different portions of the young fish as they are built up, become gradually opaque. The following is the result of the observations I have made during some weeks, examination of these minute fish. Firstly, with regard to this umbilical vesicle. All the blood with which it is supplied appears to proceed from the liver, at least from an organ which I suppose to represent the liver, and the blood sent to this organ comes from the vena cava, that great dorsal blood vessel which brings the blood back to the heart after traversing the system. This blood, after passing the liver, is spread over the whole umbilical vesicle by a network of veins which lastly unite, towards its inferior extremity, into large veins (vena porta), by which it is conveyed to the heart. This vena porta unites with the vena cava, and thence the blood enters the auricle, which is placed above the ventricle, the whole organ being situated in what I should term the *cervical* region, or between the gill openings and the body—the fish possessing no neck; or, I should have said, his heart was in his neck (not in his mouth). The contraction of the auricle

sends the blood into the ventricle, the two cavities being apparently separated by a muscular substance. The auricle and ventricle are crimson red, and are conspicuous objects. Towards the upper portion of the auricle a valve exists, but I could not clearly ascertain this by examination. The ventricle has a bulbous thickening towards the junction with the artery which supplies the branchiæ; the blood here traverses the leaflets of the gills, and from thence it is collected into an aorta, a great dorsal artery, which distributes it to all parts of the animal. It is wonderful and instructive to see this circulation. The blood disks, where they pass through the smaller vessels of the capilaries, are squeezed into an oblong shape, the return of the blood can be traced into the veins, in which, from their larger size, they resume their proper figure. There is a peculiarity in the circulation in the *tail* of the fish, which has been before observed and I think mentioned by Mr. Buckland, but I have not been able to read what has been written on this subject, and give you but the results of my own observations, which are as follows:—When the young salmon is only a few days old, on examining its tail, it will be found, in the first place, that the dorsal vertebra bend at right angles and form a caudal extremity similar to that shown in the cartilaginous fishes, the Sturgeon and the Shark and Ray. At this time no appearance of rib is seen in the caudal fin, but it is abundantly supplied with blood vessels, which ramify in a radiate form from the end of the dorsal artery, where this caudal vertebra bends, and the return blood brought back by the veins, which all converge towards this point, collects in a sort of sinus, from whence it appears propelled into the dorsal vein towards the heart. I say appears, for it is difficult to determine if the acceleration of the blood is due to a determined action of this vessel or from its escape into the much larger calibre of the dorsal vein. I believe this vessel (whatever may be its nature) has given rise to the statement that the young salmon has a heart in his tail. The drawing I here exhibit shows what I describe. I have drawn the heart of the tail as if it had a valve, having on one occasion thought I detected it,

but am not sure of the circumstance. There is, however, another point in connection with this of great interest. It appears as the fish grows, that this caudal extremity of the vertebra is entirely absorbed, and instead of it we find a number of cartilaginous striæ, which extend equally on each side of the vertebra, and form the caudal fin of the fish – and while this is going on, the dorsal fins are likewise being strengthened by additions of cartilage disposed in striæ. As I have explained, that during the growth of the young fish the umbilical vesicle is gradually absorbed, and that during that time various other changes are taking place in other parts of the animal, such as the formation of cartilage and skin and bone – it appears to me a point of peculiar interest to determine, how the contents of the vesicle aid in this change. Now, physiologists tell us that all parts of the frame are built up by the blood, and that this blood is renewed by the absorption of the nutritious elements contained in the food we eat; no matter what that food is, it is all converted into flesh and bone by the wonderful elaboration of nature. It appears, also, that the liver plays an important part in the chemical changes produced on the food. May not this liver in the fish, taking up, as it appears to do, the venous blood returning by the great dorsal vein, aid in preparing the contents of the umbilical vesicle for assimilating in the body? This is merely my surmise, which I offer with some diffidence. The contents, again, of this vessel are, I believe, albumen and oil globules. At any rate, the former fluid coagulates with alcohol, and the latter float on the water when the contents of the cist are burst. Again, the colouring matter of the oil appears gradually in the fins and vertibra of the fish, as I have frequently observed. In conclusion, let us consider the obvious reason why the young salmon should be born in so incomplete a state with this umbilical appendage. The parent fish deposits her eggs in the gravel of running water, where they are exposed to numerous enemies, and consequently where, if hatched quickly, they will better have an opportunity of escape. The ova are about 90 days hatching, but are not perfected under 140 days, during

which time the young fish buries himself under stones, and most carefully conceals himself from his numerous enemies. In my hatching boxes, although they contain hundreds of young fish, but very few are to be seen. The eye is the first organ developed, and can be seen in the ova, and shows a beautiful provision of nature to provide thus early for the safety of the fish. The young fish feeds on the contents of the umbilical vessel until old enough to shift for himself, and by the time this has disappeared he is a most active little fellow and by no means an easy object to catch.

At the close a cordial vote of thanks was passed to Mr. Dowker for his able illustration of the subject.

THIRD MEETING.

Canterbury, April 17, 1867.

Reprinted from "Kentish Gazette," May 14, 1867.

At the second of the series of monthly meetings of this Society, held in the Museum, Guildhall-street, on the 17th April, in the absence of the Rev. Dr. Mitchinson, who was expected to address the members of the Society on a geological subject, Colonel Cox, the president of the Society, delivered an excellent address on a rare spider of the West Indies, and showed its nest and male and female specimens to great advantage through very powerful microscopes.

The chair was occupied by Mr. Alderman Brent, who apologised for the absence of the Rev. Dr. Mitchinson, who was expected to deliver an address on a geological subject. He had much pleasure in intimating that Col. Cox, the respected President of the Society, had come forward to fill the gap thus occasioned, and would give an address, with illustrations, on some of the rare spiders of the East—particularly the *cteniza nidulans*; and he (the Chairman) was sure that the place of the rev. doctor would be well supplied.

Colonel Cox said he had been called unexpectedly to address the meeting, and had not the time for preparation which he could have wished. The subject he was to say a few words upon, was a very interesting one, and at the outset

he was afraid he should destroy some popular fallacies in the matter of spiders. When we spoke of these animals, we called them insects, but in reality they were not so. The spiders lay between the insect group, and were called arachnidæ. What in reality was an insect? Insects possessed no back bone. Those creatures which possessed a back bone were called vertebrate, and those which did not were called invertebrate. The insects were built up of a series of rings, and it was called an insect, because it had the appearance of being cut. Then the insect breathed by the tracheæ through spiracles, the system being illustrated in a very pleasing manner by Col. Cox, by means of diagrams. An insect possessed six legs; it also underwent a state of metamorphoses—it came out of an egg, and was then called a caterpillar, and it then underwent two, three, or four changes, until it reached the perfect state. The spider, on the contrary, was an invertebrate animal, and might be summed up, scientifically, as an articulate invertebrate animal, breathing sometimes by lungs and sometimes by the trachea. It possesses no antenna, but has from six to ten legs, and undergoes no metamorphoses. From this enumeration, it would be seen that it differed in many respects from the insect tribe. Then the eye of the insect was also different from that of the spider—in the latter there was no separation of the head from the body. In the insect the eye was always placed on the side of the head—in the spider on the top of the head. This complex organ of vision was also described fully by Col. Cox on the black-board and by diagrams, which, of course, we cannot re-produce. The lecturer then described at considerable length the hybernation of insects, and then showed a most beautiful specimen of the nest of the spider, *cteniza nidulans*, in a perfect state of preservation and almost translucent. The male and female *cteniza* were also shown much enlarged by means of the microscope. Speaking of some extraordinary characteristics of the arachnidæ tribe, Colonel Cox remarked that if a leg was taken away it grew on again. Then this order merged into another, sometimes by imperceptible

changes, until at last we came up to man, the greatest work of the Almighty. Colonel Cox here made some very appropriate remarks on the importance of the study of natural history, as showing at every time the greatness and the goodness of God, as enlarging the mind, and giving it a pure and healthy tone which could not be imparted to the same extent by any other study. Reverting again to the insect tribe, he showed that they all produced silk or a glutinous matter resembling it, and that the moment this glutinous substance came in contact with the air it was turned into a silky matter. He then showed the way in which the spider constructed its nest, as illustrated by the splendid specimen on the table. Coming next to speak of the habits of some of the large spiders he spoke of the *tarantula nidulans*, whose bite was poisonous, and who marched boldly out in search of food. The mode in which the poison was communicated to the human subject was explained at great length, and with much perspicuity by the lecturer, and as the bite of the latter spider produced tetanic symptoms, this was the origin of the tarantula dance, the natives of the West Indies supposing that music would have some effect in allaying these symptoms. The nest of the tarantula was of considerable size, inasmuch as this spider burrowed in the soil, sometimes to the depth of four or five inches. He first spun the silk, and then mixed it up with soil, making the nest a very compact looking article. Col. Cox concluded by a very interesting account of the eggs of the spider, and the manner in which they were exuded from the body, and at the close of the lecture the *cteniza nidulans* was shown to all the audience through the microscope, along with a number of other specimens of interesting objects from Colonel Cox's private collection.

At the close of the lecture, the Chairman, in neat and appropriate terms, moved a vote of thanks to the President for his very interesting address, which was heartily responded to, and the proceedings then terminated.

FOURTH MEETING.

Canterbury, May 22, 1867.

Reprinted from "Kentish Gazette," May 28, 1867.

The third of the monthly afternoon meetings of this Society was held in the Lecture Room of the Philosophical Institution on Wednesday last. Colonel Cox, the president of the Society occupied the chair; and the attendance was pretty numerous. The subject for illustration was "Siluria," by the Rev. Dr. Mitchinson, of the King's School, Canterbury, and it was handled with the reverend gentleman's usual ability. After disclaiming all intention of reading an elaborate paper on the subject, Dr. Mitchinson said his intention was only to give an extempore address or conversation on the subject of Siluria, not the Silurian system, which would open a much wider field than he could possibly hope to traverse in the time during which he was to speak. The Silurian system embraced so wide and varied a field, that anything like a description of it would require a treatise rather than a lecture to do it justice. He had chosen the title Siluria, as the theme of his address, because it was always more interesting to be told the personal experiences of an eye-witness, and he had himself been over theground in the course of 1866. It might appear to some to be a novelty to talk about the geology of other parts of the country, while the object of their Society

was really to deal only with our own district. But he thought it was a wise thing sometimes to extend one's range of view in all departments of science, so as to familiarise ourselves with the phenomena of other regions as well as of our own county. Their first duty was with East Kent; but in these days of rapid railway trains, travellers could easily become acquainted with other localities than those in which their ordinary sphere of duty lay. He therefore proposed to lay before them some account of a very interesting district which he had traversed during last year, in connection with the subject of his address. And first it might not be out of place to say that "Siluria" was a term given by the great geologist, Sir Roderick Murchison, to that tract of country which contains what were at one time believed to be the earliest stratified rocks. The reason for giving it that name was that the tract was that which was inhabited by the ancient Silurians –a people who occupied a portion of the counties of North Wales, and who under King Caradoc made a gallant stand against the Romans. [Dr. Mitchinson here traced on a geological map the course of the Silurian deposits—stating that they were contained in the counties of Pembroke, Cardigan, Brecknock, Radnor, Shropshire, Hereford, and the entire range of North Wales with the exception of Flintshire.] Siluria was classic ground, inasmuch as it was the site upon which were worked out the Cambrian and Silurian systems. Previous to the researches of Sir Roderick Murchison nothing had been investigated lower than the old red sandstone; all below this was called grauwacke, and before this distinguished geologist appeared on the field, it was supposed to be impossible to elicit anything like order out of the mass of deposits now called by the name Silurian. Sir Roderick, previously to engaging in the investigations which have been so beneficial to science, consulted his old friend Dr. Buckland as to where he should begin his researches, and that gentleman indicated the valleys of Wye and the Usk, which Sir Roderick at once explored. As the result of his patient labour, he succeeded, partly by tracing the strata under one another, and partly by the fossils em-

bedded in the limestone of the neighbourhood, in evolving a definite system of rocks, until he reached a stratum in which even his industrious researches failed to distinguish a single fossil. Meanwhile Professor Sedgwick was investigating the slaty rocks of North Wales, and the result of his labours was to bring to light an entirely new system of rocks, and apparently underlying those which Sir Roderick Murchison was investigating. These were called provisionally and apparently Cambrian ; but when a comparison of the fossils which were unaltered by slaty cleavage was made, they were found to be one and the same with Murchison's Silurian fossils. Subsequent investigations pressed this still more strongly, and now it was a generally accepted doctrine that they were the same, but it was agreed as a matter of convenience to separate the lower portion of Professor Sedgwick's from the Silurian system of Sir Roderick Murchison's, and restrict the term Cambrian to it. Dr. Mitchinson then proceeded to speak of the classification of the Silurian rocks. at length. The Longmynd was the basis of the Silurian system—so called from its geographical position. The Longmynd mountain was then described with great felicity of language by Dr. Mitchinson. This formation disappeared under the mountains of North Wales, until it cropped out again in large masses between Barmouth in Merioneth, and Festiniog in Carmarthenshire. They then appeared again in the great slaty rocks which were quarried on the eastern shores of the lake of Llanberris and in the Bethesda quarries, belonging to Lord Penrhyn, out of which the finest roofing slates in England were got. These slates were Cambrian rocks, identical with the Longmynd rocks of Sir Roderick Murchison. In England these rocks had never yielded any fossils. They again dipped under the sea at Holyhead, and reappeared at Bray, in Ireland. There they had yielded one or two species of fossils of a very low organisation—one a polype resembling the horny-textured Sertularia. Oldhamia was the name of the genus, of which two species had been described ; and Sir Roderick Murchison, speaking of this animal, called

it the lowest form of fossil. Since then, however, an immense mass of strata had been found below this, containing a small formation of genus fossil, which showed that it was quite useless for scientific men to fix prematurely any limit to their discoveries. This species to which he had referred was called the *Eozoon Canadense*; it was found in limestone of a highly crystalline character. Thus it could be seen that the attitude of every student of science should at all times be purely tentative, as much apart as possible from the dogmatism which was the great snare of scientific men at the present day. The watchword of science was patience and humility, and it was only as far as these conditions were observed, that true success would be found. Dr. Mitchinson then explained conformable and unconformable stratification, as applicable to the succession of Silurian rocks. Upon the Longmynd or Cambrian rocks lay conformably the first truly fossiliferous strata, viz., the Lingula Flags, called by the continental geologists the "Zone primordial," and forming the true base of the Silurian system. The Lingula was merely a bivalve shell, belonging to the order in zoology, called the Brachiopoda. This was one of the oldest forms which existed in the ocean, but is to be found to this day on our own Southern coast. It had little calcareous matter in its shell, which was horny in texture, that primeval sea apparently containing little carbonate of lime; but when we get to the limestone beds, there we find that life was getting more largely developed, and then we get a profusion of animal remains. In the Lingula Flags, there are a few species of Trilobite, an animal which the lecturer described on the black board and by means of an engraving. This trilobite belonged to the class crustacea, and was somewhat like the wood louse. It was derived from *tres* three, and *lobos* a lobe, because it was divided into three lobes, with two very large eyes, something like those of a fly. Upon this reposed the whole of the Silurian system. Dr. Mitchinson then exhibited some very fine specimens of fossils—particularly the trilobite of the Llandilo flags, the Ogygia Buchii—one of the characteristic fossils of the lower Silurian

age. The lecturer then spoke of the Caradoc formation, which overlay the Llandilo Flags, which could be studied with great success on the summit of Snowdon. After speaking of the peculiar geological structure and formation of this remarkable mountain, Dr. Mitchinson said that as he had now spoken an hour, he would, with the permission of the President, defer his remarks on the other portions of his subject till another evening later in the year.

Col. Cox then moved a vote of thanks to Dr. Mitchinson for his able address, and signified the pleasure which he personally felt at the anticipation of another treat from Dr. Mitchinson later in the year. The motion was most cordially agreed to.

Dr. Mitchinson, in thanking the members of the Society, said he might mention that he had been particularly successful in getting some rare British plants into flower in his garden, and he should be much pleased when any particular one was in flower, to see any of the members of the Society at his house, and shew them the plants. (Applause.)

Some interesting conversation then took place on the subject of the paper among the members, and the evening was spent in a very pleasant manner.

FIFTH MEETING.

Excursion to Wye Downs, May 27, 1867.

Reprinted from "Kentish Gazette," May 28, 1867.

The first excursion of this Society took place on Monday, the 27th May, when, by the kind permission of T. Sawbridge Drax, Esq., the members assembled in the grounds of Ollantigh Towers, and after inspecting the foreign conifers and other shrubs there collected, and seeing with regret how severely they had suffered by the late frosts, departed in parties for Wye Downs. The members who came by the South Eastern Railway unfortunately failed to fall in with those who went from Canterbury by the road, whereby the party at luncheon was somewhat restricted, and the collection either of rare plants and insects, having been interrupted by a heavy shower lasting half-an-hour, was not so large or so varied as on the last occasion of the Society visiting these Downs. In consequence of the wet weather, the proprietor of Little Ollantigh Farm kindly lent his barn for luncheon, the grass being too wet for picnicing out of doors. The party here consisted of the worthy President and Mrs. Cox and party; Col. Horsley and party; J. S. Pilbrow, Esq., and party, Capt. Kemp and party; John Brent, Esq., and Mrs. Brent; A. B. Andrews, Esq.,

and party; F. Slater, Esq., and Mrs. Slater; F. Sankey, Esq.,; Mr. and Mrs. Linford and party, &c. A pleasant hour was spent here, and then the weather having cleared, the parties resumed their search for objects of natural history for a time, and then a bright sunny evening made the ride home not the least pleasant part of the day.

The plants observed in flower have since been tabulated by Jas. Reid, Esq., and G. Dowker, Esq., and were found to number eighty-eight, belonging to the following natural orders:—

RANUNCULACEÆ—
- Ranunculus aquatilis
- Ranunculus hederaceus
- Ranunculus auricomus
- Ranunculus acris
- Ranunculus repens
- Ranunculus bulbosus
- Caltha palustris

CRUCIFERÆ—
- Cardamine Pratensis
- Sisymbrium officinale
- Alliaria officinalis
- Brassica sinapistrum
- Lepidium Campestre

RESEDACEÆ—
- Reseda Lutea

CISTACEÆ—
- Helianthemum vulgare

VIOLACEÆ—
- Viola tricolor

POLYGALACEÆ—
- Polygala vulgaris

CARYOPHYLLACEÆ—
- Silene inflata
- Lychnis vespertinæ
- Lychnis diurna
- Lychnis Flos-cuculi
- Cerastium vulgatum
- Stellaria holostea
- Stellaria media
- Arenaria trinervis

LINACEÆ—
- Linum catharticum

GERANIACEÆ—
- Geranium Molle

GERANIACEÆ—
- Geranium Robertianum
- Oxalis acetosella

CELASTRACEÆ—
- Euonimus europans

PAPILIONACEÆ—
- Ulex europœus
- Sarothamnus scoparius
- Trifolium pratense
- Trifolium repens
- Lotus corniculatus
- Vicia sepium
- Onobrychis sativa

ROSACEÆ—
- Geum Urbanum
- Rubus fruticosus
- Fragiaria Vesca
- Potentilla Anserina
- Poterium Sanguisorba
- Rosa Canina
- Cratægus Oxycautha
- Pyrus Malus

RIBESIACEÆ—
- Ribes Grossulariæ

UMBELLIFERÆ
- Chœrophyllum Sylvestre
- Sanicula Europœa
- Bunium flexuosa
- Scandix Pectum

CORNACEÆ—
- Cornus sanguinea

CAPRIFOLIACEÆ—
- Sambucus Niger
- Viburnum lantana
- Viburnum Opulus

STELLATA—
Galium cruciatnm
Galium aparine
Asperula odorata
Sherardia arvensis
COMPOSITÆ—
Bellis perennis
Hieraceum Pilosella
Sonchus arvensis
PRIMULACEÆ—
Primula veris var. b.
SCHROPHULARINÆ—
Myosotis arvensis
Veronica serpyllifolia
Veronica chamædris
Veronica hederifolia
Veronica agrestis
Veronica arvensis
Rhinanthus Crista-galli
LABIATÆ—
Nepeta Glechoma
Laurium Galeobdolon
Ajuga reptans (blue and white)
PLANTAGINEÆ—
Plantago Media
EUPHORBIACEÆ—
Euphorbia Helioscopia
Euphorbia Amygdaoides
Mercurialis perennis

ORCHIDACEÆ—
Cephalanthea grandiflora
Listera ovata (one with three leaves)
Orchis Militaris – fusca
Orchis ustulata
Orchis morio
Orchis mascula
Orchis maculata
Orchis latifolia
Habenaria trifoliata (two varieties)
Ophrys aranifera
Ophrys muscifera
LILIACEÆ—
Paris quadrifolia
Allium ursinum
CYPERACEÆ—
Carex prœcox
Carex paniculata
GRAMINEÆ—
Anthoxanthum odoratum
Melica uniflora
EQUISETACEÆ—
Equisetum limosum
FILICES—
Aspidium Filix mas
Asplenium Trichomanes
Asplenium adianthum nigrum
Asplenium ruta muraria

The insects found were very few in number, shewing the effect of late frosts in lessening their numbers—a result which, however disappointing to the naturalist, will not be regretted by the farmer and gardener.

SIXTH MEETING.

Canterbury, June 19, 1867.

Reprinted from "Kentish Gazette," June 25, 1867.

On Wednesday afternoon last, Mr. Harvey in place of the Rev. J. B. Reade (prevented by domestic affliction), delivered a discourse to the members of the above, in the Museum lecture-room. The subject was "Orchids," a very peculiar family of flowering plants, many of them having their petals so fancifully formed as to resemble several species of insects, and which are consequently termed *Fly-orchis*, *Bee-orchis*, *Frog-orchis*, &c.; there is also a little mystery respecting the mode of fructification in at least one species, and which Botanists are not yet agreed on. The lecturer had specially directed his attention to this part of his subject, and had drawn some very clear *diagrams* of the same.

The audience was somewhat small, but deeply interested, and at the close, the chairman, G. Rigden, Esq., (Col. Cox being unavoidably absent) paid a well-merited compliment to Mr. Harvey, for coming forward so readily, and on so short a notice.

Mr. Linford (one of the secretaries) stated that he also had derived a great deal of information from the lecture; and a tray of flowers, supplied by Mr. Andrews, afforded a

considerable amount of interest and instruction to the parties present, who, gathering round them, the lecturer, and the donor, could learn the names and properties of the specimens, in a pleasant and familiar manner, a distinctive and very commendable feature of this energetic little society. The little floral beauties were so numerous, that most of the ladies were supplied with a tiny bouquet, to take home and preserve alive; the silent monitors, long as they may live, reproducing and repeating the several propositions of the lecture.

SEVENTH MEETING.

Canterbury, July 17, 1867.

Reprinted from "Kentish Gazette," July 23, 1867.

A meeting of the members of this Society was held in the Museum Lecture room, on Wednesday last, under the presidency of Colonel Cox. It was expected that the Rev. J. B. Reade would read a paper on the microscope, but the President explained that from unavoidable circumstances, that gentleman was unable to be present. Mr. Dowker, of Stourmouth, at very short notice, very kindly consented to give an account of a botanical excursion from Appledore to Lydd and Dungeness Point, which the President was sure would prove very interesting.

Previous to the reading of the paper, Colonel Cox exhibited a case of insects brought from Jamaica by Colonel Farren, C.B., and collected by him in that island during his leisure hours. In introducing the objects collected by Colonel Farren, the President availed himself of the opportunity to make a few pertinent remarks, showing the uses of a union like the East Kent Natural History Society, and the important part it played in the advancement of science, and a love of the true, the beautiful, and the good among its members. The President then went on to say that Col. Farren had no idea of collecting insects till he joined

the Society, but the many beautiful objects which had been placed before him by various members induced him to collect. Thus he went out to Jamaica with his mind prepared to imbibe a taste for the study of the beautiful objects with which these islands abound; and hence the occupation of collecting the many splendid specimens which now adorned the table had been to him a source of great pleasure and interest, after the anxious and laborious duties which he had to discharge as president of the Court Martial in the Jamaica trials. The case was then exhibited, and contained many beautiful specimens of insects (principally butterflies and moths) and was much admired by all who were present.

ROMNEY MARSH—ITS PHYSICAL FEATURES.

This large tract of low land has almost all been recovered from the sea during historical times. In Roman times, a harbour existed at the foot of Lympne Hill, and there yet exists the remains of the Roman castrum now termed Stutfall Castle. In A.D. 833, King Egbert granted to the monastery of Lyminge a piece of land at Sandtun, that was bounded on the south by the river Limen (now named Rother), the military canal now occupying nearly its course. Subsequently the Rother shifted its course and flowed out to sea at Romney, this was most likely before the Norman conquest. In those days the Rother flowed from Newenden, round the north side of the Isle of Oxney, by Small Hithe and Reading Street to Appledore, and from this latter place to Romney its course was along the Ree Wall, the present high road. With regard to Dungeness beach, if true as supposed by Mr. Drew, in his memoir on Romney Marsh, that the river at that time took its course between New Romney and Lydd, it follows that all that great mass of shingle forming Dunge beach, which lies to the east of this point, must have collected since the Rother first came to Romney. We have no accurate maps to guide us before the time of Queen Elizabeth, during whose reign a chart was made of the Marsh and Ness. It appears from Mr.

Redman's researches, that, at that time, Dungeness point was just three miles from Lydd church, whereas in 1844 it was three miles and seven eights. In the middle of the thirteenth century some destructive storms forced the river to seek a new channel. It then changed its course at Appledore and fell into the sea at Rye, and from that time New Romney decayed as a port.

I will now speak of this Lydd beach. One characteristic of this and all similar beaches, is that it accumulates above high water mark, and thus drives back the ocean and protects the land. At present the whole of Romney Marsh is below high water mark, so that were it it not for this protection and the Dymchurch wall connecting it with Hythe, the marsh would be subject to constant inundation. The whole of the beach is formed of rounded chalk flints, which must have been derived from the South Downs, washed by the sea. These flints washed out of the cliffs and broken by the waves, are carried by the sea currents directed by the prevailing winds, along the shore, till deposited or checked by counter currents; and thus we may suppose that prevailing south-west winds have accumulated this beach. Now, it is worthy of remark that this beach is accumulated in certain fulls or ridges which correspond with periodical high tides, and as these ridges remain, the beach shows a continuous succession of these, marking the successive changes that have taken place in the shore; and thus we learn that an ancient beach which existed west of Lydd, has been cut off by the waves and deposited towards the east. Between Lydd and the sea, certain breaks occur in the regularity of this beach, which now constitute large fresh water ponds of some acres in extent. The present beach is about eighteen feet above low water mark.

Now, with regard to the geology of the district, I may observe that the Marsh is surrounded on one side by high ground, consisting on the eastward towards Hythe, of the Escarpment of the Lower Green sand, and south westward by the Wealden beds, which I have represented by green and

umber in the map here exhibited. The Marsh itself consists of what is termed alluvium, a recent deposit of sand, beach, and Estuary mud, at places at least fifty feet deep. Near Appledore, which is the lowest part of the Marsh, the peaty soil is full of oak stumps, which appear to have grown in the situation they now occupy.

It now remains for me to gave an account of the wild plants noticed growing between Appledore Station and Dungeness Point.

The plants observed were as follows, being 103 in number, and they were only those attracting our attention during the ride and walk.

They are arranged in the Natural Orders :—

RANUNCULACEÆ—	
Ranunculus Aquatilis, var. Circinatus	Dike, Denge Marsh, from Beach.
Ditto Flammula	Ponds, Beach.
Ditto Lingua	Ditto, ditto, abundant.
PAPAVERACEÆ—	
Papaver Rhœas	Cultivated ground.
FUMARIACEÆ—	
Fumaria officinalis	Ditto corn fields.
CRUCIFERÆ—	
Teesdalia nudicaulis	Beach sparingly.
Cardamine pratensis	Beach, ponds, double variety.
Nasturtium officinale	Ditches about Lydd.
CARYOHYLLACEÆ—	
Silene maritima	Beach, abundant.
Ditto nutans	Of this rare plant several specimens were found on the beach.
Lychnis diurna	A few specimens.
Ditto floscuculi	Beach, ponds, abundant.
Sagina prôcumbens	Beach, near ponds.
Stellaria uliginosa	Beach, ponds.
Cerastium vulgatum	Near Beach ponds.
MALVACEÆ—	
Alhœa officinalis	Plentiful along the roads, near Lydd.
Malva sylvestris	Near Lydd.
GERANIACEÆ—	
Geranium Robertianum	Plentiful all over Beach.

PAPILIONACEÆ	
Sarothamnus scoparius	Particularly procumbent and abundant on the Beach.
Ulex europæus	On the Beach with the same procumbent habit.
Ononis arvensis	Beach.
Medicago denticulata	Beach.
Lotus coniculata	Beach.
Variety Major	Beach Pond.
Vicia Cracca	Roadside, near Lydd, abundant.
ROSACEÆ—	
Prunus spinosus	Beach, densely matted, and procumbent.
Potentilla repens	Between Lydd and Beach.
Do. comarum	This plant, so rare in the South, appears in great profusion in the beach ponds—the only habitat I know in East Kent.
Rubus fructicosa	Procumbent on the beach.
ORNAGRACEÆ—	
Epilobium palustre	Ponds, Beach.
,, tetragonum	Ponds, Beach.
Myriophyllum spicatum	Beach, Ponds.
LYTHRACEÆ—	
Lythrum salicaria	Ditches near beach.
CRASSULACEÆ—	
Sedum anglicum	Beach
UMBELLIFERÆ—	
Hydrocotyle vulgaris	Beach, ponds, abundant.
Conium Maculatum	Near Appledore station
Apium graveolens	Ditches from Appledore to Lydd
Ænanthe fistulosa	Ditto ditto.
,, pimpinelloides	Ditches near Lydd.
Æthusa cynapium	Cultivated ground, Lydd.
Caucalis infesta	Near Light-House, Dungeness.
Chærophyllum temulum	Denge Marsh farm.
Pastinaca Sativæ	Station.
RUBIACEÆ—	
Galium Verum	Between Beach & Lydd.
,, palustre	Ponds and dikes, Beach.
,, uliginosum	Ponds, Beach.
,, saxatile	Beach.
,, Mollugo	Between Beach and Lydd.

VALERIANEÆ—	
Valeriana officinalis	Dike, Lydd.
COMPOSITÆ—	
Helminthia echioides	Road side, Lydd.
Sonchus arventis	Cultivated land.
Arctium lappa	Beach.
Leontodon autumnalis	Beach.
Senecio viscosus	Beach.
Carduus pycnocephalus	Coast guard St. near Light house.
CAMPANULACEÆ—	
Jasione montana	Most abundant on beach.
GENTIANACEÆ—	
Menyanthes trifoliata	Beach ponds.
PRIMULACEÆ—	
Anagallis tenella	Sides of ponds carpeted with its beautiful blooms.
Samolus Valerandi	Sparingly, beach ponds.
CONVOVULACEÆ—	
Convolvulus arvensis	Between Beach and Lydd.
Cuscuta Epithynum	Beach on Ullex Enropens.
BORAGINEÆ—	
Echium vulgare	Beach.
Myosotis palustris	Ponds.
,, arvensis	
Cynoglossum officinale	Beach.
SOLANACEÆ—	
Solanum Dulcamara	Beach.
SCROPHULARINEÆ—	
Veronica scutellaria	Beach ponds.
,, Anagallis	Dikes,
Digitalis purpurea	All over the Beach, abundant.
Verbascum thapsus	Beach.
LABIATÆ—	
Mentha aquatica	Dyke, Denge Marsh.
Teucrium scorodonia	Beach, abundant.
Galeopis Ladanum	Beach abundant.
Prunella vulgaris	Beach.
PLUMBAGINEÆ—	
Armeria maritima	Covering portions of Beach.
POLYGONACEÆ—	
Polygonum amphibium	Ponds, Beach.
Rumex Acetosa	Beach.
,, Acetosella	Ditto.
,, Aquaticus	Dikes, Lydd.

URTICACEÆ—	
Urtica dioica	Beach.
ARMENTACEÆ—	
Salix repens or myrica gale	In Pond on Beach.
TYPHACEÆ—	
Typha angustifolia	Pond Beach.
Sparganium ramosum	Dikes, Denge Marsh.
NAIADEÆ—	
Potamogeton pusillus — Heterophyllus	Ponds, Beach, the latter sparingly.
ALISMACEÆ—	
Alisma plantago ,, Ranunculoides Triglochin maritimum	Ponds, Beach.
HYDROCHARIDEÆ—	
Hydrocharis morsus-ranæ	Dikes Marsh.
IRIDEÆ—	
Iris pseudacorus	Ponds.
JUNCACEÆ—	
Juncus communis ,, Articulatus ,, Acutus	Around Ponds, Beach.
CYPERACEÆ—	
Scirpus Lacustris	Abundant in ponds.
,, Palustris	,, ,,
,, Maritimus	Between Beach and Lydd.
Carex pseudo-cyperas	Ponds.
,, Vulpina	
Eriophorum polystachyum	Beach Ponds.
GRAMINEÆ—	
Anthoxanthum odoratum Arrhenatherum avenaceum Hordeum maritimun	Beach, being the first vegetation next the criptogams.
FILICES—	
Aspidium Thelypteris	Abundant in one pond on Beach.

The ponds on the Beach are of considerable extent, and greatly resorted to by wild fowl. We observed the following:—Anas Boschas (wild duck), Larus canus (common gull), Larus ridibundus (black headed gull), and Larus argentatus (herring gull.) In the ponds we found very large specimens of Limnea stagnalis (pond marsh snail), and some very curious caddis worms, with great variety of Entomostraca.

EIGHTH MEETING.

Excursion to Dungeness Lighthouse, July 29, 1867.

This was the day fixed upon for the Society's excursion to Dungeness lighthouse; and as the visit had more than once been put off, partly in consequence of the tide not being favourable, and partly in consequence of the steamer "Palmerston" not being available for the purpose--the excursion was looked forward to with much interest by the members of the Society. The weather for the few previous days had been squally and unfavourable--and the consequence was that comparatively few turned out on the pier at Dover, many being afraid to venture on the trip. The day broke unfavourably, but towards noon the clouds dispersed, and the afternoon and evening were all that could be desired.

The steamer "Palmerston" got under weigh about eleven o'clock, and left the harbour with a goodly number of the members on board. Rounding the Admiralty Pier, the vessel proceeded well in shore by Folkestone, Hythe, and Sandgate. *En route*, Mr. Mackeson, of Hythe, pointed out the more prominent features of the coast scenery, and explained the geological formation and structure of the different strata. His remarks were listened

to with much interest, and a very interesting conversation among the members was the result. A small party who were afraid to venture by sea took the morning train for Ashford, and posted from thence to the lighthouse. Both routes were very interesting, and were much enjoyed by both the good sailors and the more timid landsmen.

Dungeness was reached by the steamer "Palmerston" about two o'clock, and the process of disembarkation commenced. This was done by small boats, and from the peculiar formation of the beach, was a work of considerable difficulty. All, however, got on *terra firma* with no other mishap, even in the worst cases, than wet feet, and the party then wended their way to the lighthouse. The land party had reached previously, and had been taken over the lighthouse by the officers. The same duty was undertaken a second time with much cheerfulness, and the whole of the intricate and beautiful machinery pointed out by which the electric light is produced. The fog signal was then visited, and its construction explained—the officer in charge stating that it can be heard miles out at sea when the light cannot be seen in foggy weather. The machinery was most obligingly put in motion, and the dull unearthly sound was heard to the best advantage. The remainder of the day was spent by the party in exploring the shore and district, and in the course of their peregrinations many interesting shells and other objects of natural history were picked up by the members. A list of flora of the district was submitted at a previous meeting, but in consequence of the bad weather very few of the best specimens were obtained.

NINTH MEETING.

Canterbury, December 17, 1867.

Reprinted from "Kentish Gazette," December 24, 1867.

On the evening of Tuesday last, a lecture was delivered, under the auspices of the above Society, on "Microscopic Illumination," by the Rev. J. B. Reade, V.P., F.R.S. There was a small attendance; which was all the more to be regretted as the lecture was a rare treat. The chair was occupied by Colonel Cox, the President of the Society, who introduced the lecturer in a few appropriate remarks.

Mr. Reade commenced his lecture with a few general observations on the importance and interest of the subject upon which he was to address the audience, explaining how very much of what was seen in the microscope depended on the way the object was illuminated. It was a subject of a rather abstruse character, and would require at his hands considerable amplification and illustration. He then proceeded to speak first of the necessity of illumination under the microscope, and next of the various methods which had been devised for that purpose up to the present time. Fifty years ago he used Dollond's best microscope

which was fitted with one plain silvered mirror and one condenser as the only means of illumination then supplied; while in the present day, the means of illumination are thonght of as much consequence as the magnifying power — in fact, without the modern improved means for that end the higher powers could not be used with any effect. The problem submitted to the microscopist was "Tell me all about an object too small for me to see with my naked eye or to touch;" and the two things required were amplification and illumination, and the first was useless without the last. This was obtained in various ways. Direct and oblique reflected light for opaque objects, and for transparent ones direct and oblique transmitted light in addition; — the means of obtaining all which were described and illustrated. The first condenser which the lecturer explained and illustrated was known as Wollaston's doublet, which was in use in 1828. Single lenses only had been used in former years, and these had been found to answer to a certain extent; but an improvement took place very shortly after the death of Dr. Wollaston, which inaugurated a new era in microscopic illumination. The lecturer described the lenses in use at this period on the black board, and also showed them all to the audience — he having a rare and costly collection of all sorts of articles required for microscopic illumination. It is impossible without the aid of diagrams to give even a syllabus of the lecture — suffice it to say that those who heard it experienced a rich intellectual treat. The eye doublet of Dr. Wollaston was shown and described at length; and in 1831 Sir David Brewster suggested a considerable improvement by making the focus of the reflector fall upon the object in the plane of non-aberration. A microscope with Wollaston's doublet, and Herschel's lenses was shown, and, as the lecturer remarked, was deemed to be then very superior to any in use. A remarkable advance from the use of single lenses took place about this time (1834), so important, indeed, as to mark a new era in the science of optics, as applied to miscroscopic illumination, by the introduction of Ross's achromatic con-

denser. The lecturer read an extract from a paper read by him before the Royal Society at this time, detailing his own investigations and experiments, and which proved that to him was due the credit of discovering the mode of producing dark ground illumination by oblique transmitted light at a certain definite angle, which he illustrated by diagrams and the microscope. He then adverted to the method pursued by himself, in conjunction with Dr. Carpenter, in obtaining dark ground illumination, and explained with much minuteness the way in which his experiments were conducted, and the success which attended them. The labours of Mr. Ross and Mr. Shadbolt were then referred to—particularly the spot lens of the former, which was an achromatic condenser, with a small spot to stop out the central rays of light, and admit only those beyond the angle of vision—and the paraboloid of the latter—which was shown and explained by the lecturer. The condensers of Smith, and Beck, and Gillet were next passed under review, and shown both in use and on the black-board. The lecturer then referred to, and explained the construction of a magnificent microscope which was presented to him by his late parishioners at Stone. After he had it in his possession some time, he thought on a mode by which the condenser might be made more useful, and this led to a great improvement on the solar microscope. The lecturer then described at great length, and with much minuteness, the mode by which the kettledrum condenser (an invention of his own) was used for conveying the rays of light in instruments of high power, by admitting only two pencils of rays at angles of 30, 60, or 90 degrees apart, thus throwing into prominent relief all projections or lines crossing each other at all or either of those angles. He then spoke of the application of polarised light to microscopical illumination, and explained the curious and interesting phenomena of this wonderful discovery. The undulatory theory of Dr. Young accounted in a very satisfactory manner for all these phenomena; and he therefore thought that this theory of light

was the true one as opposed to the corpuscular theory of Newton. This portion of the lecture was of a very abstruse character, but was rendered very simple by the illustrations of the talented lecturer—illustrations which we much regret we cannot reproduce without the aid of diagrams. The reverend gentleman concluded a long and deeply interesting lecture by saying that they must never forget that while they were investigating some of the most sublime truths of science—while men of science were delighted to bring their best skill and power to illuminate these objects—the observers themselves would be greatly benefited by illumination, but not from the terrestrial source; and that the proper frame of mind in which to pursue such studies was best typified by the expression with which he would conclude—"What in me is dark that make Thou light."

A cordial vote of thanks was passed to the lecturer on the motion of the President, seconded by Mr. Dowker, of Stourmouth, and the company then passed a pleasant hour in the examination of the different microscopes which were placed on the tables. The meeting was in every respect a most interesting one, and all departed highly gratified and instructed.

REPORT

OF

THE EAST KENT NATURAL HISTORY SOCIETY,

WITH A

List of Books Belonging to the Library.

&c., &c.

SESSION, 1868.

CANTERBURY:

PRINTED AT THE "KENTISH GAZETTE" OFFICE, HIGH STREET.

REPORT.

The Committee in presenting their Eleventh Annual Report to the Members, have again to congratulate them upon the financial condition of the Society, the balance in hand being £9 13s. 9d.

Since the last Annual Meeting Eight new Members have been elected, while the losses by Resignation, Removal, and Death, have not been such as to affect seriously the numerical strength of the Society.

Among the New Members the Committee have had the pleasure of welcoming a most distinguished naturalist, G. Gulliver, Esq., who has already contributed two valuable papers, and whose future aid will doubtless tend greatly to the efficiency of the Society.

Two Excursions took place during the past Summer, the first to Shottenden Woods, which was very numerously attended; the second to St. Margaret's Bay, which would have met with equal patronage but for the threatening aspect of the weather; those Members who ventured however, were gratified by spending a day of real enjoyment.

Full accounts of the above will be found in the following Report of the Meetings which is nearly twice as voluminous as any previous one, and includes papers by Major Munn, Dr. Mitchinson, Ambrose Poynter, Esq., G. Gulliver, Esq., and W. Ord, Esq., M.D.

The December General Meeting, when a lecture on "Tongues" was delivered by the latter gentleman, was a most interesting and successful one, and was very well attended. The Library has received several valuable additions during the past year, and besides the books and periodicals purchased by the funds of the Society, the following have

been presented by G. Gulliver, Esq., to whom the thanks of the Committee have been tendered, viz , The Works of W. Hewson, edited by the donor; Pamphlets written by him upon Lemnaceæ, and The Raphidian Character of Plants in Relation to systematic Botany, &c., &c. From the Report annexed, it will be seen that the Library is deserving of general and constant resort by the Members, and from the increased number of volumes, an additional bookcase is indispensable.

In conclusion, the Committee are of opinion that the past year has been a prosperous one as far as the Society is concerned, and the Members generally have taken a lively and increased interest in the proceedings. They earnestly advocate the necessity for individual exertion, aud would offer every encouragement to those who are willing to contribute the results of their observations in the great world of Nature. However insignificant these may appear at the time, they frequently prove of value to the Naturalist, and may have a most important bearing on the future of the Science.

By the removal of Mr. J. S. Linford to London, the Committee have lost the services of an energetic Secretary as well as a fellow-worker who has always taken a most lively and active interest in all the affairs of the Society. The increasing importance of the Dover branch, and the arrangement entered upon at the beginning of the year that alternate monthly meetings should be held at Canterbury and that place, has rendered it necessary that a Secretary should be appointed there, and this office has been most efficiently filled by Alex. Bottle, Esq., by whose exertions three excellent meetings have been held at Dover during the year.

LIST OF BOOKS AND PERIODICALS

Belonging to the East Kent Natural History Society.

British Land and Fresh Water Mollusks, 1 vol. (Reeve)
Bryologia Britannica, 1 vol. (Wilson)
Synopsis of British Sea Weeds, 1 vol. (Harvey)
Flora of Surrey, 1 vol. (J. A. Brewer)
Manual of Geology, 1 vol. (Professor Phillips)
Flora of East Kent, 1 vol.
Morris's British Butterflies, 1 vol.
Ramsay's Physical Geography of Great Britain, 1 vol.
Dallas's Animal Kingdom, 1 vol.
Johnstone's British Zoophytes, 2 vols.
A Catalogue of rare Phœnogamous Plants collected in South Kent in 1829.
Memoirs of the Geological Survey of Great Britain, 2 Nos. referring to Sheets 4 and 7.
British Hemiptera Heteroptera, 1 vol., 1865 (Douglas and Scott)
Hand Book of British Flora, 2 vols. (Bentley)
Miscellaneous Botanical Works of Robert Brown, 3 vols.
Recent Memoirs on the Cetaceæ, 1 vol.
Monograph of British Spongidiæ, by Dr. Bowerbank, 1 vol.
Conybeare and Phillips' Geology, 1 vol.
Bell's British Quadrupeds, 1 vol.
Atlas of British Sea Weeds, drawn by Mrs. Gatie from Professor Harvey's Phycologia Britannica, 1 vol.
Couch's Fishes, 4 vols.
Forbes's British Star Fishes, 1 vol.
Owen's Comparative Anatomy, 2 vols.
Kirby's British Bees, 2 vols.
Smith's English Flora, 4 vols.
Ralf's Desmidiæ, 1 vol.
Nitzsch's Pterylography.
* Hooker's Jungermanniæ, 1 vol.
* Smith's Diatomaceæ, 2 vols.
* Works of W. Hewson, F.R.S., 1 vol.
* Parker's Structure and Development of the Shoulder, Girdle and Sternum in the Vertebrata, 1 vol.

Those marked * were added this year.

PAMPHLETS.

British Moths, Nocturni.
" Geometræ.
Memoires pour servir à la connaissance des Crinoides vivants par Michael Sars.
Etudes sur les Affiinites Chimiques par MM. Guldberg et Waage.
Notes on Lemnaceæ and the Raphidian Characters of Plants, by G. Gulliver, Esq., F.R.S.

PERIODICALS.

Natural History Review, vols. 3, 1863, and 4, 1864.
The Zoologist, from 1843 to 1861, and from 1863 to 1868.
N.B.—The Zoologist for 1862 is incomplete.
The Quarterly Journal of Microscopical Science, old series, vols. 7, 1859, and 8, 1860, new series, vols. 1, 1861, to 8, 1868, Vol. 2 excepted.
Magazine of Natural History, third series, vols. 3, 1859, to 8, 1861, and 11, 1863, to 22, 1868.
The Geologist, vols. 2, 1859, 3, 4, 6, and 7, 1864.
The Phytologist, vol. 3, 1859.
The Geological Magazine, vols. 1, 1864, to 5, 1868.
Quarterly Journal of Science, vols. 1, 1864, to 5, 1868.
Quarterly Journal of the Geological Society, vols. 20, 1864, to 24, 1868.
The Natural History Repertory, 1865.

The Librarian regrets to state that in consequence of several Periodicals not having been returned to the Library, nor any entry of them made in the book kept for the purpose in the Society's reading room, he has been unable to have the volumes to which they belong bound.

THE FOLLOWING PERIODICALS

Are taken in by the Society, viz.:

1. The Annals and Magazine of Natural History.
2. Quarterly Journal of Microscopical Science.
3. The Zoologist.
4. The Geological Magazine.
5. Quarterly Journal of the Geological Society.
6. " " of Science.

FINANCIAL STATEMENT, 1868.

RECEIPTS.

	£	s.	d.
Balance in hand, December 31, 1867	14	1	6
Subscriptions received in 1868	22	5	0
Ditto Dover branch	16	5	0
	£52	11	6

EXPENSES.

	£	s.	d.
Rent of room in Precincts	10	0	0
Fire and candles	1	0	0
Expenses at meetings	1	3	6
Mrs. Ward, for printing	9	19	6
Contribution to Library	10	0	0
Subscription to Ray Society	1	1	0
Dr. Ord's Lecture	3	3	0
Postage, &c.	2	16	10
Stationery and sundries	0	15	8
Expenses of Dover branch	2	18	3
Balance in hand	9	13	9
	£52	11	6

SIDNEY HARVEY,
Hon. Treasurer.

Examined and found correct, January 26, 1869—
ALEX. BOTTLE.

List of Officers and Members.

———:o:———

President:

THE RIGHT HON. LORD FITZWALTER, Goodnestone Park.

Vice-Presidents:

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SIR WALTER JAMES, BART., Betshanger.
COLONEL C. J. COX, Fordwich House.
MATTHEW BELL, Esq., Bourne Park.
WM. OXENDEN HAMMOND, Esq., St. Alban's.
REV. F. SCOTT, Sibertswould.
CAPTAIN CROOKES, Dover.
REV. J. MITCHINSON, D.C.L., King's School.
REV. J. B. READE, M.A., F.R.S., Bishopsbourne.
GEO. DOWKER, Esq., F.G.S., Stourmouth House.
COLONEL HORSLEY, St. Stephen's Lodge, Canterbury.
G. GULLIVER, Esq., F.R.S., Clovis Terrace, Canterbury.
H. A. BUTLER-JOHNSTONE, Esq., M.P.

Treasurer and Librarian.

COL. HORSLEY.

Honorary Secretaries:

G. GULLIVER, Esq., F.R.S.
MR. SIDNEY HARVEY, 8, High-street, Canterbury.

Committee:

DR. ASTLEY.
G. FURLEY, Esq.
E. HORSNAILL, Esq.
Capt. KEMP.
H. LEE, Esq.
H. B. MACKESON, Esq.
T. G. PECKHAM, Esq.
Rev. F. ROUCH.
G. RIGDEN, Esq.
J. REID, Esq.
F. SLATER, Esq.
SIBERT SAUNDERS, Esq.

Local Secretaries:

Dover—A. BOTTLE, Esq.
Margate—G. M. PITTOCK, Esq., M.D.

Members.

Alford, Very Rev. Dr.	Dean of Canterbury.
Andrews, A. B., Esq.	Westgate, Canterbury.
Astley, Dr.	Dover.
Bell, M., Esq.	Bourne Park.
Bland, W., Esq.	Hartlip, Sittingbourne.
Bottle, A., Esq.	Dover.
Bliss, Rev. W.	Betshanger, near Deal.
Beer, Miss K.	Parade, Canterbury.
Browne, Miss L.	4, Victoria Place, St. Dunstan's, Canterbury.
Bell, R. J. Esq.	St. Margaret's, Canterbury.
Barton, F. E. Esq.	Liverpool Street, Dover.
Bampton, Rev.	42, Marine Parade, ditto.
Brinckman, Captain, M.P.	
Barnard, Mrs. Philip.	3, St. George's Fields, Canterbury.
Crookes, J. F., Esq.	5, Waterloo Crescent, Dover.
Cox, Col., C. J.	Fordwich House.
Cox, Mrs. C. J.	Ditto.
Claris, P. B., Esq.	Dover.
Court, P., Esq.	Ditto.
Cowell, Mrs. E.	Stour Street, Canterbury.
Castleden, Rev. G.	Christchurch, Ramsgate.
Dowker, G., Esq.	Stourmouth House, Wingham.
Farren, Colonel, C.B.	Colchester.
Fitzwalter, Rt. Hon. Lord.	Goodnestone Park.
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Furley, George, Esq.	Barton Villas, Canterbury.
Forrest, Mrs.	Orchard Place, Canterbury.
Finnis, Steriker, Esq.	Dover.
Furley, W. D., Esq.	1, St. George's Place, Canterbury.

Grayling, Dr.	Sittingbourne.
Giraud, Byng, Esq.	Castle Street, Dover.
Gulliver, G., Esq., F.R.S.	Clovis Terrace, Canterbury.
Hammond, W. O., Esq.	St. Alban's Court.
Hatfield, G. T., Esq.	Hartsdown, Margate.
Harvey, Mr. S.	High Street, Canterbury.
Horsley, Colonel	St. Stephen's Lodge, Canterbury.
Hambrook, Mr. J. B.	Strond Street, Dover.
Hilton, Captain	Nackington House.
Hanvey, John, Esq.	Waterworks, Dover.
Haddon, Miss C.	Effingham Crescent, ditto.
Horsnaill, Edward, Esq.	Dover.
James, Sir W., Bart.	Betshanger.
Jones, R. H.,Esq.	Clyde House, Dover.
Johnstone, H. A. Butler, Esq., M.P.	
Kersey, Dr.	Littlebourne.
Kersey, Mrs.	Ditto.
Kemp, Captain	Cavalry Barracks, Canterbury.
Kingsford, Montague, Esq.	Littlebourne.
Knocker, Edward, Esq.	Castle Hill, Dover.
Knocker, Captain	Dover.
Lee, H., Esq., F.L.S., F.G.S.	The Waldrons, Croydon.
Mummery, Mr. W. P.	Strond Street, Dover.
Makeson, H. B., Esq.	High Street, Hythe.
Mitchinson, Rev. Dr.	King's School, Canterbury.
Munn, Major	Churchill House, Dover.
Matthias, Mrs.	Carlton Place, St. Dunstan's, Canterbury.
Neame, Miss C.	Orchard Place, Canterbury.
Neame, E., Esq.	Selling.
Neame, Mrs. E.	Ditto.
Parker, R. D., Esq.	Barham.

Payn, W. H., Esq.	St. Martin's Hill, Dover.
Plumptre, C. J., Esq.	Fredville.
Plummer, E., Esq.	The Firs, Canterbury.
Puckle, Rev. J.	St. Mary's, Dover.
Poynter, A., Esq.	3, Marine Place, ditto.
Peckham, T. G., Esq.	Hall Place, Harbledown.
Powell, Mrs.	4, Dane John Grove, Canterbury.
Reid, Jas., Esq.	Bridge Street, ditto.
Rigden, G., Esq.	Burgate Street, ditto.
Rouch, Rev. F.	Precincts, ditto.
Reade, Rev. J. B.	Bishopsbourne.
Scott, Rev. F.	Sibertswould.
Saunders, Mr. Sibert	Whitstable.
Slater, F., Esq.	Chislett.
Spice, C., Esq.	Strond Street, Dover.
Solomon, — Esq.	Little Kenfield.
Smith, Miss J.	Dane John, Canterbury.
Smith, J. G., Esq.	Effingham Lawn, Dover.
Sankey, Herbert, Esq.	Burgate Street, Canterbury.
Stilwell, James, Esq.	Victoria Park, Dover.
Tuckey, C., Esq., M.D.	St. Dunstan's, Canterbury.
Taylor, Mrs., A.	North Street, Herne Bay.
Thorpe, J. C., Esq.	5, Claremont Place, Dover.
Thomson, R. E., Esq.	Kenfield House, Petham.
Walker, Mrs.	St. George's Place, Canterbury.
Ward, Miss	High Street, Canterbury.
Weston, L., Esq.	Waterloo Crescent, Dover.
Wray, Miss	Barton Fields, Canterbury.
Warman, Mr. W.	St. Peter's Street, Canterbury.
Winch, A., Esq.	Norman Street, Dover.

Honorary and Corresponding Members.

Bates, H. W., Esq.	London.
Boycott, J., Esq., M.D.	London.

Kemp, Dr. William	Fort Nelson, New Zealand.
Linford, Mr. J. S.	London.
Sandilands, —, Esq.	Cannings Down, Queensland, Australia.
Saunders, J., Esq.	Reigate.
Whitaker, W., Esq.	Geological Museum, Jermyn Street London.

Associates.

Baker, Mr.	Cattle Market, Sandwich.
Coppen, Mr. E.	Sibertswould.
Else, Mr. R.	Burgate Lane, Canterbury.
Gordon, Mr. W. C.	Museum, Dover.
Gutteridge, Mr.	Faversham.
Kennett, Mr. W.	Fordwich.
Parren, Mr. W.	Canterbury.
Prebble, Mr. J. G.	Ramsgate.
Young, Mr.	Sittingbourne.

EAST KENT
NATURAL HISTORY SOCIETY.

:o:

TITLE & OBJECTS OF THE SOCIETY.

:o:

The objects of the East Kent Natural History Society shall be the Collection and Diffusion of Practical and Theoretical Knowledge respecting Natural History, in all its Branches, both in relation to the particular District and the General Science.

Rules and Regulations.

MEMBERSHIP.

1. The Society shall consist of Ordinary, Honorary, and Corresponding Members, and of Associates.

2. Every candidate for admission into the Society as an Ordinary Member, must be proposed in writing by two Members, and the election shall be by ballot, taken at any meeting of the Committee, or at a General Meeting—one black ball in five to exclude.

3. The Annual Subscriptions, to be paid by Ordinary Members, shall be Ten Shillings; the Subscriptions shall become due on the 1st of January in each year, and shall be paid in advance for the current year.

Any Member neglecting to pay his Subscription for three months after it is due, shall be applied to by the Secretary, and if the Subscription remain unpaid for three months after such application, he shall cease to be a Member of the Society.

4. The Committee shall have power to admit, without ballot, on the nomination of two Members, any Lady who shall be desirous of becoming an Ordinary Member, and her subscription shall be Five Shillings.

5. Any persons distinguished for their researches in Natural History, for their liberality to the Society, or for their connection with similar Societies may, on the recommendation of the Committee, be elected Honorary or Corresponding Members of this Society, provided they do not reside within the district: such Honorary and Corresponding Members shall not be subjected to any of the expenses of the Society, and shall have no vote in its affairs.

6. In order to encourage the study of Natural History among individuals of the class of mechanics, &c., residing in the district, the Committee shall have power to admit individuals of that class as Associates, provided they shall first communicate some information or observation on Natural History, exhibit such specimens or present them to the Local Museums, as shall by their merits satisfy the Committee. Such Associates shall enjoy the privileges of Honorary Members.

MANAGEMENT, AND BUSINESS MEETINGS.

7. The affairs of the Society shall be conducted by a Committee of Management, which shall consist of a President, Vice-Presidents, a Treasurer, and an Honorary Secretary, and not less than six Members, who shall all be chosen at the Annual Meeting. Three Members of such Committee shall form a quorum. The Meetings shall be held on the same day as the February and November General Meetings, and at such other times as the Secretary may deem necessary.

8. An Annual Meeting shall be held on the last Tuesday in January

in each year, at Canterbury, for the purpose of electing the Officers for the current year, receiving the Annual Statement of Accounts, and Report of the Committee, and conducting the general affairs of the Society.

9. Special General Meetings may be summoned by the Committee, or by the Secretary, on the requisition (in writing) of any six Members of the Society, the specific purposes of the Meeting being stated in the notice, which shall be sent to each member not less than one week before the time of such Meeting.

10. All questions discussed at the Meetings shall be decided by a majority of votes; and if upon any question the votes shall be equal, the Chairman of the Meeting shall have the second or casting vote.

11. In the event of any vacancy occurring in the Officers or Committee, between the Annual Meetings, the same shall be filled up by the Committee.

12. In order to facilitate the objects of the Society, the Committee shall be empowered to appoint any member a Local Secretary for the town or district he may reside in. Such Local Secretary shall be *ex-officio* a Member of the Committee.

SCIENTIFIC MEETINGS AND EXCURSIONS.

13. Two Meetings shall be held in Canterbury yearly, during the first and last quarters for the purpose of reading Papers, exhibiting Specimens Lectures, &c. Each Member to have the right of introducing a Visitor at these Meetings.

14. Two Excursions will be appointed to take place yearly, during the Summer, for the purpose of investigating the natural objects of interest in some district in East Kent; the arrangements for these Excursions to be made at a Committee Meeting to be held in the first week of each of the Summer Quarters.

15. A Minute of the Proceedings of all Meetings shall be entered by the Secretary in a Book kept for that purpose.

16. The Secretary to give seven days' notice of such Meetings and Excursions to every Member, stating the time and place of Meeting, &c.

LOCAL MEETINGS.

17. To promote still further the objects and interests of the Society, Local Secretaries and Members are invited to organize Meetings or Excursions in their districts; and to give notice of the same to the General, and all the Local Secretaries, stating the time and place of Meeting, and what particular subjects are to be brought forward.

COLLECTIONS OF SPECIMENS.

18. The Society shall endeavour to make a Collection of Objects of Natural History, both with a view of forming a Museum and distribution of Duplicate Specimens, according to Regulations to be adopted by the Committee.

LIBRARY.

19. Only Books and Periodicals connected with Natural History are to be purchased by the funds of the Society, and the number and particular books of this class to be purchased shall be determined by the Committee.

20. All the Books and Periodicals shall be kept in some convenient place, so that Members may be able to refer to them, or take them out, under such regulations as the Committee from time to time may think proper to make.

21. Members are also invited to lend Books for the use of the Library, reserving to themselves the full right of ownership; such Books to be under the care of the Committee, and not allowed to be taken out of the Library.

FIRST MEETING.

Dover, January 11, 1868.

REPRINTED FROM THE "KENTISH GAZETTE."

It has been arranged that in future meetings of this scientific association are to be held alternately in Canterbury and Dover. It will be recollected that a very successful reunion took place here a few years since at the Town Hall; but then it was open to the public. On the present occasion it was at first considered that the fitting locale would be the reading-room attached to the museum, but on second consideration it was thought advisable to hold the *séance* at the spacious assembly room of Mr. Licence, Marine Library, Marine Parade. The hall was kept at a nice temperature, and was speedily filled (about five o'clock) by a select party

of savants, M.D.'s, amateur naturalists from Canterbury and Dover, with a fair sprinkling of ladies.

Among those present we noticed Colonel Horsley, President; Capt. Kemp; Col. Cox and family; Major Munn; Rev. F. Scott, Sibertswould; R. E. Thomson, Esq.; Rev. J. Bampton; Dr. Astley; A. Poynter, Esq., and Mrs. Poynter; W. Hussey, Esq.; Rev. W. E. Light and family; F Barton, Esq.; P. B. Claris, Esq.; J. F. Crookes, Esq., and family; T. Lewis, Esq.; Henry Payn, Esq.; Mr. L. Weston and family; Mr. W. P. Mummery; Mr. J. B. Hambrook; Mr. Winch; Mr. and Mrs. C. Spice; J. C. Thorpe, Esq.; Mr. Alexander Bottle; Mr. Knocker and family; and Mr. Horsnaill.

The following were the exhibitors:—Major Munn, paper on Raising Queen Bees; Mr. Gordon, Hanging Wasp's Nest; J. F. Crookes, Esq., Binocular Microscope (by Baker), shewing Living Cheese Mites, Young Oysters, Feathers of Birds, &c.; P. B. Claris, Esq., Microscope (by Baker), shewing Ovaries of Queen Bee, and other interesting dissections; Mr. Horsnaill, Microscope (by Crouch), shewing Jaws and Proboscis of Bee, also numerous other parts, dissected under the direction of Major Munn; Mr. Hambrook, Microscope, shewing Tongues of Bee and Cat, &c.; Mr. W. P. Mummery, Binocular Microscope (by Stewart), shewing Bowerbankia, Sertularia, Eye, with the hexagonal facets; Mr. Alexander Bottle, Microscope (by Smith and Beck), shewing Sting of Bee with Poison Bag, Jaws and Tongue of Bee, Jaws and Tongue of Humble Bee, Parasite of Bee, and Sting of Wasp.

The display of instruments and specimens was an instructive exemplification of the Horatian maxim that what enters the mind through the visual organ makes a deeper impression than that communicated by the auricular tympanum. In saying this, we mean no disparagement to the painstaking and eloquent Major Munn, who, after a few introductory remarks from the President of the Society, Colonel Horsley, proceeded to read the following

paper on the subject of raising queen bees from Ligurian stocks :—

The experiments of Huber would almost seem conclusive "that the bees have the power of converting the worms of the worker bee into queen bees," and subsequent experiments have gone so far as to procure queen bees by operating on worms, not chosen by the bees themselves, but selected by the experimentalists or naturalists. And I can, from personal, constant watchings, now for a period of a quarter of a century or more, speak most positively on the subject as an established fact. Still, I find, on my return to England, and placed once more on the list of members of your Kent Natural History Society, that there are still some moot points raised in the bee-culturing world, and this in the face of the evidences of such men as my lamented old friend, Dr. Bevan, the author of the "Honey Bee," of Hereford; and the distinguished writer and naturalist, Sir William Jardine, Bart. On this occasion, I venture to give a few of my own observations, not that Huber, Bevan, or Jardine require any confirmation, or that my notes are of sufficient value to supply any deficiency in their evidences, or refute any errors which the more recent book-making bee-masters, or hive-building impostors in natural history are constantly putting forth before the bee-masters and the public; but I offer them, with all due deference, in the hope that this Society and especially the more scientific members of it, will join those purely out of door naturalists and zealous observers heartily, and test again and again their experiments suggested by Schirach exactly 100 years ago, and set at rest any question that may arise; as the more numerous the experiments and greater the diversity of experimentalists, the more clearly is each alleged fact established. The results be uniformly the same, as Sir William Jardine has observed in his beautiful work on the entomology of the honey bee, and with the same feelings uppermost in my thoughts I commend to my brother workers, in this most interesting field of enquiry, to

get aided by those members who have the advantages of possessing such magnificent microscopes as I see before me this day in Dover. I shall take only the history of the Queen bee, as the bulk of every swarm consists only of two kinds of bees, the workers and the drones, the latter (the males) are only raised during part of the year, bred in May and killed in August or July, and as Butler describes him: "He spendeth his time in gluttony and idleness," and this "lazy yawning drone" is killed before the winter by the workers, to save their stores of honey and pollen; but his history I leave for another question. The Queen bee and the worker bee being one and the same, except to make the head of the family or swarm; a selected egg of the worker is raised to royalty, and has been thus named Queen, as the fertile bee and worker, when sterile and undeveloped are employed in the work and labour of love, in storing and collecting the honey and pollen, constructing cells of the combs, watching and warming the broad cells, feeding and rearing the young bees, &c. But the fact that startles the imagination is, that the Queen and the worker being raised from the same kind of egg, should materially alter in form and structure; but so it has been established. And the only part of the bee that does not undergo that great change are the eyes, which are of the composite construction, as called by entomologists, and consist of a vast collection of small hexagonal lenses (how far they effect the form of the hexagonal cells bees build is a question!) There may be 30 or 300, I forget which, but the microscopes will show us to-day, disposed with exquisite regularity, each lense being itself a telescope through which the bee spies out its point of attack, and which attack, fortunately, the bee master is able from experience to avoid, by gently moving out of the line of flight, which flight commonly (when not directed towards any purpose) is always at an angle of forty-five from the starting line of the hive. Now let us compare then the two bees, although both raised from the same kind of

egg: when the eggs of bees, which are of a lengthened oval shape, and bluish in colour and slightly curved, are deposited and made to adhere at the bottom of each of the cells, they remain four days before they are hatched. The Queen egg is always laid in a cell made at the edge of the comb, and worker eggs always in the centre of the comb. The former plan is followed to avoid feeding the worker brood or larva with the Queen-making jelly (a compound of "farina and honey"), and the latter to obtain the necessary warmth of the parallel combs, filled with other brood, and which the bees, by clustering at the bases of the combs, prevent being ventilated, and more certainly to retain the required warmth of the 70 deg. Fahrenheit. With the fewer number of the worker bees, the queen is raised in a corner-shaped cell; the worker in one truly hexagonal, and supported on all sides by other cells. The Queen receives more pungent and nourishing food, quantities of which are left in a yellow paste at the bottom of the queen cell, whilst the worker has no food to spare, and is "pent up" in its six-sided narrow cell. The Queen takes about sixteen days to arrive at maturity; the worker takes twenty-one days for the same. Weather, however, makes a difference in all these Nature's processes, and great care and accuracy of observation is necessary in attempting to note the facts, and the temperature has much to do with rearing a perfect Queen, although there is always the five days' difference between the Queen and the worker perfected bee. Before this the Queen and worker larva have been sealed in their respective cells, and have spun their cocoons, and have gone into that sleep which is to raise them up in a perfect condition. The Queen spins an incomplete cocoon —that silken shroud that envelopes the larva—the size of large cell preventing her completing it; the worker spins a complete cocoon, and the cells which originally had been built up round by the bees, and then chased by their mandibles into the true hexagonal shape, leaving only the angles supporting the six juncture pins of the adjoining cell on

the same side, and the three bases of the opposite side of the partition wall of the combs, which wax the bees had economized for building up the edges of such hexagonal cell, making it look to be rounded by this addition, and giving a ridge to commence closing in either the honey when stored, or brood, when about to be transformed. This cocoon, however, makes the cell take back its first round appearance, and, indeed, being attached to the sides and angles of the cells, after forming the cradle of successive swarms becomes so filled and round as to be small and useless. On the issue of the perfect Queen, and the after consequences of her raising a large colony of worker-bees, in number, according to Schirach, from 70,000 to 80,000 eggs in one season, and also the question of the drone I must leave for another occasion, and merely observe that workers, or amazons, as they have been called, which are less developed females, also frequently lay drone or male eggs, but none else; and the Queen bee, if she delayed beyond the twenty-first day, would also lay none but drone eggs, like the worker or amazon, all her life after, and this worker we have seen is twenty-one days old before she becomes a perfect bee, and the Queen bee partakes of the same influences. Thus far we have traced the life of the worker-bee and her sister, the elected Queen-bee, from the egg-shell and the earlier maturity of the latter, caused by the warmth and space of cell and better feeding, giving her the advantages of commencing the perfect state five days before her humble amazon worker sister. There is also still a difference as to the result of these consequences, whereas the Queen-bee is perfected forty-six to forty-eight hours, or two days, after her issue from the hive, and establishes her right to reign and colonize it fully, she commences to give her sister bees the duty of watching over and raising the brood from the eggs. She has commenced laying in the worker cells (these are all female eggs) up to a certain period of her existence, when she commences laying a few hundreds of male eggs. This wonderful discovery of a doctrine of Schirach's has long

established the practice of the early formation of artificial swarms, and it is building upon this theory that Professor Thury, of Geneva, has brought forth fruits, and results which have been laid before the Royal Agricultural Society of England, and makes one part of the question so simple and comprehensible. Huber has added in his earlier writings, " Experiments and theory therefore concur in demonstrating that the larvæ of a bee may become a queen or worker, according to circumstances." A female always appears, whether possessing the physical qualities of maternity as the fecundity of queens, or the conservative properties displayed by the workers in regard for the young. This partition of industry and courage on the one hand, and of prodigious fecundity on the other; this partition, originating from the mysterious rearing of the larvæ, is amongst the finest subjects for contemplation which natural history affords; and let us accord what we can of one of the most curious discoveries which has embellished science, to the great penetration and perseverance of Schirach. As we have so many beautiful and perfect instruments brought here to-day, I will appeal to their penetration and definition, and turn to the actual anatomy of the queen bee and compare the visible effects on the various parts of the bee when transformed into a perfect Queen. I must not omit a passing tribute of regret to the memory of a Kentishman, who was curator at Canterbury Museum, Mr. Newman, one of the most pains-taking and correct naturalists of his day, and a great loss to the scientific entomological world, although he has left us some of his works in his grammar; yet the entomological societies required such a perfect depictor of insects. Madamoiselle Jurine, although she died early in life, still had assisted Huber in dissecting and comparing the external organization of the bee. I have said that the eyes are the only parts that do not undergo any very material change; a very casual examination will prove this; but I wish to revert to the hexagonal lenses of the eye, and to examine

this question more minutely another time; when speaking on the three stemmata found on the crown of the head, and supposed to be eyes to enable the bee to see in the depths of the dark cells in the midst of combs, and I trust you will all be enabled to examine for yourselves these external differences of structure. I must here beg to thank Mr. Horsnaill for his kind assistance in refreshing my memory of the anatomy of the bee, and with his very useful microscope I hope he will able to show you what his own steady hand and clear young eyes have done to prove many points that may be still considered moot points in the anatomy of insects ; and I believe I shall be able to show you that the proboscis of the honey bee is a hollow tube, through which the honey is sucked or pumped up, and which I have examined, and stated as a fact, as I have seen the colored sugar, &c., pass up into the œsophagus, &c., although I have seen so many statements made in bee books that contradict this, and add that the proboscis is solid and not tubular. It is, then, with this view, as we are, so often led away by arguments which take things for granted after the examination has proceeded so far, that I now beg this Society to enter into a quiet and thorough examination of the entire history of the honey bee, and give a stamp to it and an authority as a body, not anxious to be new discoverers, but as confirming if possible all that is true and exact, that has been stated by those enquirers who have gone before ; and I believe this would tend to check the great impositions put upon anxious and innocent enquirers into the truth of this mystery of nature, and at any rate remove from the field the " book-making " and " bee-hive selling " impostors of the day. Having alluded to the hexagonal form of the cells and that the facet of the eyes (which are also hexagonal), might have something to do with the form, the bee ultimately chases, or chisels out, the first roundly formed brood and honey cells, whilst that wonderful instinct of economy of material, also seems to direct their workings of the interior of the cells. I

must not forget to mention one fact, that the queen cells proper are always round within, and fixed at an angle of some twenty or twenty-five degrees, below the given horizontal line. This places the head of the Pupa Queen downwards for a time, and the worker cells are formed at an angle of some fifteen or twenty degrees above the line, and thus raises the head of the worker-pupa upwards; the cell, when used for storing honey also keeps the honey from flowing out, until it is filled and sealed up. When a young bee quits its pupa cell, it becomes the "Imago," or perfect insect, and we at once see the body, which has become distinct in three chief divisions of the head, thorax, and abdomen, which was not the case when we had to examine it in the worm or larvæ state and was being fed and raised in the cells. And in the comparison between the parts of the perfect Queen bee, and the worker bee, her sister, we find the alterations in the strength of the jaws, the length of the proboscis, and the longer curved string of the Queen bee, depriving her of secreting the wax, and obliterating the pollen baskets on her thighs and the hooklets of the two pair of wings, these wings placed further apart and elongating the body, or abdomen, and the tone of the whole Queen bee of a richer rufus colour than that of the worker bee; but let us bring one or two more points of difference to the test of the powerful microscopes now placed before you; you will find the mouth of the bee is the same, the upper jaws, however, are stronger in appearance in the Queen bee, to enable her to tear open any rival Queen bee cells, the only (murderous) work she has been permitted to do, whilst dispatching the victim of her hatred by her sting, the worker bee's jaws being used for the purpose of paring down waxen walls, and to assist in building the combs, and these jaws are called mandibles, and move horizontally; the lower jaws or maxillæ, which includes the proboscis, they open vertically. The lingula, although from its position has been named the

tongue, is, strictly speaking, formed from a prolongation of the lower jaw, this is used for suction ; but the proboscis is stated by all writers to be solid, and that the honey is licked, or swept up, by this instrument; all my experiments prove to my mind, as far as I dare trust my lenses and eyes, that it forms the canal for the fluid, nectar or honey, to be passed through successive valves, by pumping or suction into the pharynx or canal, situated at its root, and through that it is conveyed to the honey bag. I trust the more accurate workers with the microscopes will set this question at rest by examining the proboscis and dissect it transversely and more carefully. This wonderful apparatus, however, is much shorter in the queen bee, who never helps herself to the food through it, but receives it from the worker bees, even at the moment of starvation. The whole of this complex machinery rests on a pedicle which admits of its being drawn in or elongated to enter the calix of the flower. I beg you to examine the statement in the "Book of the Entomology of Bees," page 35, Naturalist's Library. There are also the three stemma on the head ; these are identical in the queen and worker bee, and are situated and set in a triangle above and between the "Antenæ." Having drawn your attention to the parts that differ in the head of the bee, it remains for me to mention the thorax or centre of the body. The head is attached by a pedicle, and has the passages leading to the sucking stomach, and œsophagus, &c., and the thorax contains the centre motive powers, the muscles of the legs and wings. The great differences in these having been already alluded to, I shall merely mention the external appearance of the spiracles or stigmata through which the wings force the air and enable the bees to ventilate, and produce that vibrating hum so frequently heard in a hive, and that particular rushing of sound, when suddenly alarmed by concussion, &c., and we pass on to the third part of the insect formation, viz., the abdomen. In the Queen, it contains the developed ovarum, consisting

of ten branches, and formed by longitudinal tubes, numbering about one hundred or more and containing seventeen or twenty eggs in each tube, and terminating in the one oviduct, the two stomachs, the small intestine, the venom bag, and last the long bent sting, peculiar to the Queen bee. All these parts are inclosed within the six scaly rings of unequal breadth, and these external walls or scales constructed so as to contract or expand, and perform all the duties of circulation and secretion; and in the worker bee enables it to digest the honey, and secrete the wax in the wax pockets, as shown in the specimens exhibited here (but these are undeveloped in the Queen bee), the discharge of the venom from the poison bag into the grooves of the barbed strings, which are shorter and stronger in the worker bee. The worker bees have the power of regurgitating the honey into the cells, through the œsophagus from the sucking stomach, which is like the true crop of the pigeon. Thus as briefly as possible I have called your attention to the queen and worker bee, the females of the hive. And I only wish I could impress upon all, that if the true history of these queens, be learned by all bee-keepers, before they bought those costly hives, and swarms of Ligurians, and books made to order, they would not be so frequently disappointed of their hopes of establishing an apiary, and their honey harvest, or find the deserted hives and dead bees in the early cold spring of this country. The truth is also, as Sir W. Jardine observes—"The writers on bees, like writers on many other subjects, especially in natural history, are fond of classing acts and proceedings of their little favourites under certain and fixed uniform rules, from which they are supposed never to deviate, whereas daily experience may convince us, that bees, like human beings, are often the slaves of circumstances, and their instinct is sometimes at fault," and it is with this experience, and the feeling that properly to study the natural history of the honey bees they should be kept and examined in hives, as much ap-

proaching their natural habits as possible, and in which they can be gently examined without alarm, that I originally constructed and patented in France my "bar-frame hives," which you see before you, and which hives I sent a few years afterwards to Dr. Bevan for his use, and the acknowledgment of the safe arrival of which I have here in a letter, dated in 1843. If I am not taking up too much of the time of this meeting before going into the question of the Ligurian bees, I will tell you the titles of a few books that it may be as well to consult on bee matters. Huber should be your first study, and your endeavour to refute all his experiments. There was an edition translated by Sir J. G. Dalyell, of Edinburgh, 1841. In 1832 there was an attempt to introduce the "ventilation system" with collateral hives, &c., dedicated highly and sold also highly, but I need hardly add the question of ventilation not being understood by the writer, Mr. Nutt, it turned out a book-making imposition. Dr. E. Bevan, in 1838, made the best and simplest compilation of bee history, assisted by the experiments of Mr. R. Golden, and often confirmed by Dr. Dunbar. In 1842 the Rev. W. C. Catton gave the bee world a work called "My bee book," beautifully illustrated, and written, as the able "Reviewer" in the Quarterly said (in after years) in the purest Saxon, and the humblest spirit. We all know the history of the secretary of the Bishop of New Zealand (Selwyn), and his zeal in transporting bees to the Colonies, as well as his wonders in the bee world whilst at Christ Church, Oxford. Mr. John Milton, to whom I am indebted for the first copy I ever saw of Wildmann's book on bees, made a small compiled list of bee books when publishing his own bee history, and showed a list extending from 1529, besides the ancient authors, until 300 stood on the shelves for inspection; and it is perfectly wonderful to see the number of impostors and copyists who have followed every device to foist upon the public their various hives and bee books; and even Sir W. Jardine's excellent volume on the

"Entomology of Bees," in 1852, has not checked this piracy and pillage by the great impostors of the day, either in America or England; but I have not time beyond remarking that when that accomplished and amusing naturalist, Dr. Buckland commenced his lectures on the acclimatization of all useful birds, beasts, and fishes, I heard him introduce the subject of the Ligurian bee. Professor Owen was in the chair, and M. Tugmuor was brought forward to speak on the subject, but it has escaped my memory when this took place, and I fancy I introduced my hive to the notice of the Apiarian Society, which had a very short lived existence under M. Tugmour's supervision, when I used to attend as a member of the Entomological Society of London; thus much I can vouch for, that in July, 1859, Mr. G. Neighbour, of Regent-street, was the original introducer of the Ligurian or Alp bee, through a German named Herman, and he first sent me three queens, and they were introduced to Mr. Woodbury also through him, in the sheets of the "Cottage Gardener," in 1859, and Mr. Woodbury now supplies, I believe, the Ligurian bees and bee-hives at £5 and £6 each stock; whilst the original introducer, Mr. Neighbour has to deplore the great loss of some sixty stocks of bees. Mr. Pettitt, however, not dealing in such costly bee-hives, has been able to secure Ligurian queens, and they may be seen here in Dover.

I must also point to the Rev. J. Scott, of Shepherdswell, who is sitting at my side, as one who was able to import himself a Ligurian Queen bee from Italy. He will, however, explain to you what has been the history and fate of these Ligurian Stocks, as I have been absent these last few years abroad, visiting the country itself, and the people where these bees come from, and if history be correct, and these bees partake of the character of the inhabitants, as reported by the older historians, "that the Ligurians were a race of robbers," and were a great annoyance, as they formed bands of short armed soldiers, and harassed the

Roman troops, and at one time gave them only a road way along the Mediterranean sea to pass from Italy to Gaul; I trust these bees then will belie their name and not filch the honey from our poor honest brown bee and their hives, although I cannot see how the Ligurians can collect more from a given quantity of flowers and a shorter summer's work. You will find a collection of these Ligurian bees and queens in the room, and also a novel interesting collection of bees sent to me to exhibit from Mr. F. Smith, of the British Museum. The honey bee of Canaan and the Egyptian bee, with stingless bees of Brazil, are in the case, and with the humble-bee of our country, you will see the splendid large wood boring bees of the East, and parts of Europe (I have seen the violet coloured bee in Geneva), and with a collection also of the ichneumon. I must turn now to describe the mode of forming Queen bees from the Ligurian Stocks.

Dr. Bevan begins his chapter on bee boxes thus:—"There has been some difference of opinion as to the most suitable dimensions of bee boxes," and upon this I cannot do better than observe that all bee book makers and bee-hive sellers have traded for the last thirty years on that question, and one of the greatest failures we have had, and that has deluded the poor bee keepers most has been Mr. Nutt's system of ventilation of collateral hives, I need hardly add to those who know the Natural History of the Bee, the reason being simply from the habits of the bees, as they can at any moment prevent any contrivances of man to carry this out effectually, as they merely cluster at the edge of the parallel combs, and no air can enter thus by attempting this foolish plan to prevent swarming! the bees are made to keep within the hives and issue only the first fine warm day, when they dare leave the brood, &c. I will just read an extract from a Professor "Hammett," who has made a report on the hives exhibited at Paris the last year, he is a professor of some bee knowledge, when I inform you that Mr. Pettitt, of Dover, who gained a medal

at Paris for his collection of hives, and upon whose hives this professor turns his wit, he says (referring to my bar-framed hive), this is said to approach nearest to the natural habitat of the honey bee. Why many of you have seen wild bees, they form no nest, they swarm into narrow trees, or clefts of rocks, and this box cannot be much like a natural habitat, but a lady's work box, at least that is the kind of criticism these professors use, and I think their ignorance is so self evident that I need only show you that this "bar-framed hive," being a box within a box, has a space all round it, which keeps up the interior atmosphere to an equable condition, and also, is always dry and clean from the dead bees being shot off the inclined alighting board. I will not, like the American writer, give you the 69 reasons or requirements for a perfect "bee-hive, or bee-box," which M. Langstroth claims as his invention, which exist in the bar-frame, as you can judge for yourselves by looking at the one before you. I had the vanity, when a young man, to take out the patent only in France, and after that period, 1843, it became known more generally in Germany and America, although I had used the hive, with the assistance of some other friends, some years before that time, and I am glad to find that after all the invention is thus traced to an Englishman; and the bar-frame hive was first constructed, and the term given, by myself, although I regret to find some of the writers in the bee hive articles have attempted to appropriate to themselves the first introduction, through their American cousins and cousin Germans; indeed I have some of the correspondence by me, which proves that in the American courts that an attempt to patent my bar-frame hive was frustrated by the proofs the court had, that I had invented and used that kind of hive before, but the amusing part of this book of the American divine stops not at hives and bars, but actually takes poor Hood's puns and ludicrous wood cut, and introduces the unfortunate beering as well (a man buffetting of course with an angry swarm of bees.) I believe I have

traced, however, the identity of my "bar-frame hive" only in a very early "frame maker," viz., Samson, who, doubtless, must have taken the honey from the carcase (dried in the eastern climate, and perhaps showing its ribs), which would at once suggest the bars of a hive, although it would be difficult to prove that Samson took ribs and all with the comb to give to his father and mother, and afterwards gave the Philistines that puzzling riddle, "Out of the eater came forth meat," and in the same manner it seems necessary that the "bar-frame hive" should be explained to some of those learned editors of bee books and bee articles in publications; or they may give the credit to the Americans and Germans. I therefore challenge these gentlemen to produce any book or pamphlet in which a "bar and frame" has been mentioned as having been used before the publication of my pamphlet and the introduction of my patent in Paris. Mr. John Milton (not the poet), Marylebone-street, first noticed this bar-frame hive in 1843. The advantages of the "patent bar and frame hive" consist in affording perfect protection from wet in the open air, retaining an equal temperature within the hive, both in summer and winter. The bees can be fed without exposure to the cold from above. It also provides cool store room for the honey, perfect inspection of the whole hive at any moment, an easy method of taking the honey without destroying the bees, &c., &c. I believe I gave Mr. Pettitt this invention at the Royal Agricultural Association meeting, in 1851, or before, and in 1860 the Agricultural magazine reporting on the various hives exhibited by Mr. Pettitt, adds the "bar-frame hive" is fitted up with a mathematical correctness, that every comb is constructed in a bar-frame, by which each can be viewed by the use of an observation frame, made with glass sides, and every comb can be brought to view in perfect safety, each one, as it were, worked on a hinge, and when lifted into the observation frame can be taken away without a single bee escaping; and the queen bee easily removed into the drawing-room for observation, and again

returned to the hive. Any of the combs, when filled with honey, can be taken away and an empty bar-frame exchanged at any time for the full one. The "bar-hive" of Taylor, and the "leaf-hive" of Huber, must give way to Major Munn's invention. Thus much for "bar-frame hive." I can only mention that the common bar hive or Grecian hive, consisted merely of sticks at the top, to permit the removal of the honey comb, but the sides of the combs were always fastened to the sides of the hive, and there was the necessity of keeping the sides free, by passing a blunt knife down each of the combs to move them. Mr. Golding, of Hunten, and Dr. Dunbar had much improved these hives and bars, and you will find a long account of the distance these bars were to be put apart, and how the bees were requested to build their combs to the exact dimensions, until the apiarians began to quarrel as to the distances of the centres of these bars being placed either one inch and five-eights or one 1-inch and 1-fourth; but Mr. Golding being a practical bee-master, soon pointed out the necessity of guide combs on each bar, and even then the difficulty was not removed, as the disposition of the bees is to construct brood combs of one uniform thickness, while the stores for the honey being always at the top, the combs were elongated to two or three inches. Hence all the difficulty of adjusting the distances, except by having, as I originally constructed my hexagonal frames, on a bar, sliding laterally in the rim of the outer case or box. You see before you one of the hives that gained the medal at the last Paris Exhibition, and it is much to the credit of Mr. Pettitt that he has striven hard to reduce the cost of these hives, by much simpler work, and certainly the hives cannot be called costly, when £2 will buy the best Dr. Cumming's hexagonal hives, or the Rev Scott's improved Grecian hive, or the bar and frame-hive. The most foolish attempt at an innovation on the bar-frame hive is one called a "compound frame bar." It is a short bar dropping between one of my frames with the top

cut off, and having the two sides of the bar left to left by the improvement made by the Rev. Scott, but I need hardly point out the folly of such a make, when the combs come tumbling out, with this short bar, and breaking away the comb from the sides. The original long bar and frame which I used had a bevelled slip let in if required for removal from any experimental hive; but I have never seen the utility of this shifting top bar, and gave it up and returned to the solid frame, which you now see, made with zinc hooping for economy and lightness, but which, whilst it enables me to fix in the combs for experiments with greater ease, I fear loses the advantages of the double wood frame for warmth for the bees, in the winter, &c. For a description of many of these hives I can only advise you to expend a shilling upon one of Mr. Pettitt's small books, which, with the wood cuts, will give you a better idea of the hives than any description. Suppose you had two hexagonal boxes made, the one to fit within the other, and a space left between of half-an-inch all round, and that the width between the sides of the hexagon was about a foot inside measure of the inner box, neither box to have a top or bottom, and the larger box 18 inches deep, whilst the smaller and inner one was only 6 inches deep, and also, you took the outer or larger hexagonal box, and cut it asunder, and fixed on four legs like cross bars at the two open ends, which should, however, now have semi-hexagonal pieces nailed on to close them, and at the bottom angle a passage was made to admit the bees: this opening should extend the whole length of the box, 18 inches, as thus the bottom board forms an angle for the dead bees to fall off; the upper half has hinges and forms the lid of the bar-frame hive: this of course made and arranged to work the observatory frame on, &c.; the smaller hexagonal box, 6 in. deep, must be cut in six pieces, this again cut in halves you have 12 semi-hexagonal frames, these 12 are placed on 12 bars, which bars are fourteen inches long, so that they can be rested

on the sides of the larger box, in the slits or not as you see in these hives, so that an 18-inch box will have within it arranged these 12 frames half an inch apart (except the last one, which is only used as a solid division frame, and has no half measure on the end), the top bars have slips of zinc to run into them ; when, therefore, these twelve frames are put into these slits, and the frames crossed with the zinc one and a quarter slips, you have a box with semi-hexagonal sides, and an entrance at the bottom of the box. I am obliged to use the term semi-hexagonal as it is merely a hexagon cut in halves, &c., and giving any other description or the exact measurement would occupy too much space; into this bar frame hive then any swarm can be introduced, either from above by removing the zinc slides and jerking the bees in, or making them ascend by the bottom entrance. If, therefore, the question of the raising of the queen bee be really understood, it only remains for me to show how these frames can be divided and subdivided to make the required number of stocks from a single stock of Ligurian. I shall, however, only caution you by stating that there are great hazards of raising really fertile queen bees in this our uncertain climate, and were the slightest delay in the queen bee becoming a perfect insect it would produce nothing but disappointment in having nothing but drone brood ; but in the three months, about 15 or 16 days being permitted to intervene, six queens might be raised. Abroad, in Italy, this is more certainly performed, and the practice is usual ; but here we have to strengthen each swarm with the brown bees of the country, and for which purpose you would have to be prepared with six or seven distinct stocks, from whence you could remove the brown queens and introduce the Ligurians. These, again, can be strengthened by worker bees, taken from the stocks which the cottagers would destroy, and which you can secure by paying them a shilling a stock, and giving them all the honey and wax. To enter into the full details will occupy me longer than the half-hour I am given. I must, therefore, leave you to fol-

low these very short observations I have made, and at once proceed to examine the beautiful microscopes now before you.

The speaker was followed by the Rev. Mr. Scott, of Shepherdswell, who, among other things, observed that the Egyptian bee was the true bee of Palestine, and that the Ligurian, a most troublesome customer, would be a most welcome naturalized citizen if it were not for his irritable propensities.

The company then proceeded eagerly to examine the contents of the slides, and certainly the revelations were of the most gratifying description. The magnifying power of some of the microscopes was astonishing, and excited intense satisfaction. Mites of huge dimensions, oyster-spat with transparent tiny shells, parasitic dwellers on the sea-weed, the antennæ of beetles, the stings and poison-bags of wasps and bees, foraminifers and entozoa, zoophytes and wings of butterflies, ova and ovaries, "the womb of nature and its grave," each spoke after its own peculiar fashion the wondrous works of the Supreme. Among so many exhibitors it would be invidious to single out any, but each merits his due share of praise for ministering to two or three hours' innocent and elevating recreation.

SECOND MEETING.

Canterbury, March 10, 1868.

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On Tuesday evening, the Rev. Dr. Mitchinson delivered the second part of his lecture on "Siluria," to the East Kent Natural History Society, in the Museum Room, Canterbury. The President (Col. Horsley) occupied the chair, and a numerous company of the members and friends were present, including Colonel and Mrs. Cox and party, Colonel Farren, Dr. and Mrs. Kersey, Dr. Welch, Mr. and Mrs. Rigden, J. Pilbrow, Esq., F.S.A., and Miss Pilbrow, Dr. Grayling, Mrs. Linford, Miss Smith, Mrs. Barnard, F. Slater, Esq., W. P. Mummery, Esq., Byng Giraud, Esq., Mr. A. Bottle, &c., &c.

The lecturer began by regretting that such a long interval should have occurred between the two portions of his address. He had, however, in the meanw hile, had the opportunity of visiting one of the most interesting spots geologically (as illustrative of the former part of his lecture), in the British Isles — the west coast of Sutherlandshire. There he had seen the only

British representative of the oldest known stratified rocks, the Laurentians of Canada. In Sutherland, they take the form of a highly crystalline granitoid gneiss, forming a range of low rolling hills and headlands along the sea coast, and dipping manifestly under the very picturesque detached mountains, which tower some miles inland. These mountains, Coulmore, Canisp, Suilvein and Cunaig, are mainly composed of a vast thickness of chocolate coloured sandstone and conglomerate, entirely unfossiliferous so far as present observation goes, reposing unconformably on the gneiss already described. The caps, however, and eastern flanks of these mountains (for their escarpment is to the west) consist of stratified quartzite, also resting unconformably upon the russet sandstone series. This quartzite, which is simply sandstone altered by igneous action, again dips under a considerable thickness of limestone, little if at all altered, and exhibiting all the peculiar features of limestone districts generally, viz., the surface split up into a kind of pavement, the streams disappearing down "swallows" and flowing through underground channels, and the propensity which the mountain limestone always has to form bold escarpments and caverns. This again is seen to dip beneath another stratum of quartz rock, similar to the other. It is the limestone which really gives the key to the position. Unfossiliferous as it generally is, it has in one place, near Duirness on the north coast, yielded to the researches of a local geologist, Mr. Peach, a number of fossils, which have without hesitation been referred to the Lower Silurian period, and in particular, to a low stage in that period, the lower part of the Llandeilo formation, which formed the main subject of the former lecture. This being established, we recognize in the underlying quartz rock, the Lingula Flags, or "Zone Primordiale" of Barrande, and in the unconformable chocolate sandstones and conglomerates beneath, we have the Cambrian system (the Longmynd or Bottom rocks of Sir R. Murchison), and in the (still unconformable)

gneiss upon which these rest, we are forced to recognise the most ancient of all sedimentary deposits, the venerable Laurentians. From this digression, intended by the lecturer to recall in a more vivid form to the minds of his audience the chief points treated of on the former occasion, he passed on to the business more immediately in hand, the members of the Silurian System which overlie the Llandeilo flags and caradoc standstone. There is now recognised an intermediate formation between the Lower and Upper Silurians, being alike unconformable to both, but being intermediate, as containing certain fossils common to both. This is called the Llandovery Series, consisting of an upper and a lower, so called from the little town in Carmarthenshire, where it is most developed. Of this the characteristic fossil is the Pentamerus, a Brachiopod Mollusk, very similar in form to the Terebratula of the chalk and oolite. The upper Silurian system is divided into two well-defined groups called respectively (in ascending order) the Wenlock and the Ludlow formations. These are severally subdivided—the Wenlock, into Denbigh grits and slates, Woolhope limestone, Wenlock shale, and Wenlock limestone; the Ludlow into lower Ludlow, Aymestry limestone, and upper Ludlow. The lecturer then proceeded to exhibit and describe some of the more characteristic fossils, in particular the Halysites and Favosites, the Chain, and Honey-comb corals, of the Wenlock limestone; the Homalonotus, a Trilobite, characteristic of the upper and middle Silurians, and the various genera of Cephalopods—the Lituites, the Phragmoceras, and the Orthoceras—structurally alike, differing only or chiefly in their amount of curvature or straightness. After entering with some minuteness into the conchological structure of the Orthoceras, and its relation to the economy of the animal, he proceeded to describe the "bone-bed," a mass of the *debris* of fish—teeth, spines, scales, bones, and *incerta fragmenta*, which forms the uppermost zone of Siluria, and immediately underlies the

Old Red Sandstone. This led him to some concluding remarks on the succession of life, traceable, *as far as we know at present*,—for on this he laid great stress, remarking that any such generatizations are simply provisional, and may be upset by a single adverse fact if brought to light in the process of research—in the Silurian and earlier systems. First a lowly organized foraminifer—a mere speck of *Sarcode*, not flesh, in a calcarous sheath, the *Eozoon Canadense* of the North American Laurentians; then the zoophyte of the lower Cambrians, the *Oldhamia*, together with a few scanty traces of worm tracks; then in the "zone primordiale," a larger number of creatures, representing sparsely the three lower sub-kingdoms; then in the lower and upper Silurians, an abundant supply of representatives of these lower sub-kingdoms, Radiata, Mollusca, and Articulata; and, lastly, at the very close of the Silurian epoch appear vestiges of the lowest member of the Vertebrate sub-kingdom, fish.

At the close of this very interesting lecture, a vote of thanks was accorded to Dr. Mitchinson by the President, who took the opportunity of remarking that the lecturer's kindness in thus coming forward to exhibit the results of his holiday excursions was an example worthy of being followed by other members of the Society. He concluded by expressing the hope (in which all present joined) that they might before long have the pleasure of hearing from him a further discourse on the same subject.

Several fossils and specimens were displayed by Dr. Mitchinson, which were minutely examined by the company; also microscopes by the President and Mr. S. Harvey.

THIRD MEETING.

Dover, April 14, 1868.

On Tuesday afternoon a meeting in connection with this society was held at the Assembly Room, Marine Library, Dover, when a paper on "Conchology was read by Ambrose Poynter, Esq.

Colonel Horsley occupied the chair and briefly introduced Mr. Poynter, but before that gentleman began,

J. F. Crookes, Esq., as one of the vice-presidents, expressed a desire on the part of the Society that everybody present should consider themselves *pro tem* as members of the Society, and ask for any information they required, which he had no doubt would be willingly accorded by Mr. Poynter or any member of the Society. He wished to ask Colonel Cox, who, he believed, was President of the Society at the time when Mr. Buckland gave his lecture, to inform them of the present position of the Stour Fishery Association. They wished to make their Society practical as well as theoretical, but in the report of the above Association presented by Mr. Buckland, the East Kent Natural

History Society was not mentioned. He should like to ask Colonel Cox what had been done in the matter?

Colonel Cox said the object they had always in view was to carry out in the best possible manner the preservation of everything that related to Natural History in this county. He then referred to the River Stour, and the very large area of water that had been made available for the production of fish for the table, &c., and added that they had invited Mr. Buckland down to Canterbury to give them a lecture upon the possibility of stocking the river with salmon, when it was thought that the Stour might be made a profitable stream, and from that lecture emanated the Stour Fishery Association. The Society distinctly originated the idea of stocking the river with salmon, Mr. Buckland being a paid lecturer; and it ought to go forth to the public that such was the case, so that their Society might have its due. As regards the Stour Fishery Association, their Society had nothing to do with carrying out its details—all they looked for as naturalists, was to the river cultivated. After a few remarks as to the success which had attended the Stour Fishery Association, he concluded by saying that he agreed with Mr. Crookes that as the Society was instrumental in instituting that Association, having paid Mr. Buckland to lecture at Canterbury for that definite purpose, that fact should be made generally known.

The Chairman was also of opinion that they ought to give public notice of it, that the Society might have the credit it deserved.

Mr. Poynter then read a very interesting paper on "Conchology."

Conchology is a wide subject for a lecture in a small way. Unless it is to be understood in a sense so confined as to strip it of all interest, it must branch into collateral questions, which cannot be entirely overlooked, even in the most fragmentary discourse.

Nothing could be less interesting than a description of empty shells, without some allusion to the animals of which

they formed a part, and whose form, structure, and habits, have tended to impress upon them the variety which they present, or to those fossil remains which unite the living world with the earliest records of creation, among which, from the endurance of their materials and the stability of their forms, shells are the most abundant and the most perfect, and as the fossil shells are, in a very large proportion, extinct species of living genera, they form one continuous series, and are now so treated by naturalists. The animals to which these shells belong are the molluscs, which constitute one of the four sub-kingdoms of the animal kingdom of natural history, placed by Professor Owen the third in the scale according to their organization. They are called the molluscs, or soft-bodied animals, because they are altogether soft and pulpy, without any hard or bony structure whatsoever, in contradistinction, (1st) to the Vertebrata, or vertebrated animals ; – those namely which are constructed with an internal vertebrated or jointed skeleton, such as men, geese, rattlesnakes and whitings, for although there is some dissimilarity in these four classes, which these animals typify, they all agree in the essential structure of a vertebrated backbone, which brings them all into one category. (2nd.) To the Articulata, or articulated animals, constructed with a sort of external skeleton, articulated or jointed, such as the Crustaceans, (Crabs and Lobsters for example,) which need only be named to explain at once what is meant by an articulated animal ; Spiders, which form a class by themselves ; Insects, Worms and Barnacles —in all of which this structure is to be traced, although sometimes obscurely. These constitute the 1st and 2nd sub-kingdoms ; the 4th is that of the Radiata or, radiated animals, so called, because their parts and organs radiate from a centre, of which the star-fishes are the type. The radiata include the Zoophytes, Polyps, and others of the lowest animal organizations, and the Infusoria,—microscopic Animalculæ, which swarm in the sea, and which are more particularly mentioned, because they contribute much to the

food of the molluscs, especially those which are fixed to the rocks like the oysters, which depend for their sustenance upon what the sea conveys into their shells. In common with all the rest of the animal kingdom, the sub-kingdom of the molluscs, is divided into classes, orders, sections, families, genera and species, and it is hardly necessary to remind you that by assigning to every member of the animal kingdom, from the largest to the most minute, and from the highest to the lowest organization, its place in each of these divisions, the naturalist is able to describe every one by the peculiarities which characterize it, and which distinguish it from every other one. Although the molluscs have no hard or bony structure, a very large proportion of them have their soft bodies protected by external shells. Those which are thus enclosed, are called testaceous or shelly molluscs, those without external shells are called naked molluscs. The snail will be the most familiar type of the one, and the slug of the other. A snail may be called a slug in a shell, and a slug a snail without a shell. The sub-kingdom of the molluscs is divided into six classes, two of which are altogether testaceous, three partly testaceous and partly not, and one without any shell whatever. The first is that of the Cephalopoda, or, as we may term it, the head-footed, so-called because their organs of motion are situated round their heads. This class consists of both naked and testaceous molluscs, the cuttle fish being the type of the one group, and the nautilus that of the other. Of the cuttle fishes, applying that term generally to the whole group, there are four living families, consisting of numerous genera, and amounting in the whole to about 200 species, distributed in all parts of the world. Of the testaceous Cephalopoda there are only two living genera, the nautilus and the argonaut, or paper nautilus, or, to speak more correctly, only the nautilus, the argonaut being exceptional; the species of both together do not amount to a dozen, but the testaceous cephalopoda are the beings of an

ancient world. Among the extinct fossil Cephalopoda we shall find one family only allied to the cuttle fishes, namely, the belemnitidæ, consisting of about 100 species; but of the testaceous cephalopoda, the shells or casts of about 1200 species are found in the primary and secondary sedimentary rocks. This argument if taken alone, may not be conclusive, since the extinct species are distributed in succession throughout these immense geological periods; but it must be coupled with the fact that not only the species of these testaceans are extinct, but also the genera and the families. Some 900 species belong to the extinct family of the ammonitidæ, and between 500 and 600 to the one genus ammonites, a fossil form, familiar to every one, and the whole of this great group, with the single exception of the nautilus, has been extinct ever since the formation of the chalk; at the most half-a-dozen species of the nautilus are in the land of the living, to illustrate the tale of their ancient relatives. The Cephalopoda constitute the most important and interesting chapter in the history of the molluscs, but it is not to the present purpose to enlarge upon it.

The second class is that of the Gasteropoda, or stomach-footed, so called because they crawl upon a broad foot placed under their bodies; whoever has seen a snail in motion will at once comprehend this structure. As I shall speak of the Gasteropoda more in detail, we will pass on to the third class, called the Pteropoda or wing-footed—in plain English they are furnished with fins. This is a group of small animals, and they differ from all the other molluscs, inasmuch as they inhabit the wide ocean, where they swim by means of their fins in shoals miles in extent; one species, the Clio Borealis, inhabits the Arctic Ocean in such masses as to form a staple article of food to the whale. The Pteropoda are partly testaceous and partly not, and some of those which have shells are only partially covered by them, leaving the fins free to act.

Here are a few of the Pteropoda, shown on a scale large

enough to be visible. How large you will judge, since the shell, which I hold between my finger and thumb, the Hyalea Tridentata is the original of the first of these five diagrams; these shells are not often seen in collections.

The fourth class is that of the Brachiopoda, or arm-footed, so called from a pair of fringed arms by which they are supposed to agitate the water and draw within their shells the Infusoria and the particles which serve them for food. The three former classes which have been described are univalves, that is to say the shells are in one piece, the shell of the snail for example; but Brachiopoda are bi-valves, that is to say they consist of two shells opening with a hinge. The Brachiopoda, like the testaceous Cephalopoda, may be considered rather as the inhabitants of a former than of the present world, for while there are 70 living species belonging to this class, 1,000 are found fossil; this, as it has been already remarked, would not of itself be conclusive were it not also that the extinct genera are twice as many as the recent, and that some whole families have been extinct ever since the Primary Geological Period. The Brachiopoda are small, ranging from the size of a pea to that of a common cockle, which some of them very much resemble; but there is one feature by which the Brachiopoda of this form may be distinguished: The Brachiopoda live attached to the rocks by a fleshy pedicle, and there is a hole in the lower shell through which this attachment passes; this gives to some of the shells very much the form of an antique lamp with the hole for the wick, and hence the Brachiopoda have been called lamp shells by the older naturalists. The forms of these shells will be best understood by these diagrams, on an enlarged scale, and here is a specimen of a living species of another form, the Lingula, with the pedicle attached to it.

The fifth class is that of the Conchifera; this includes, with the exception of the Brachiopoda, the whole immense group of bi-valve molluscs, some of which are well known otherwise than as mere objects of natural history, such as

cockles, mussels, scallops, and, above all, our excellent friend the oyster.

The sixth and last class is that of the Tunicata, a sort of sea slugs, to which, as they have no shells, we have nothing to say. The shells of the testaceous molluscs are for the most part of such capacity that the animals can be entirely contained within them, and of such solidity that they are rather their habitations than their clothing. The bodies of the Gasteropoda are exceedingly retractile, so that although they are attached to the shell by their hinder parts, the bulk of the body can be protruded beyond the aperture, and withdrawn to some depth within it, when the animal re-enters. In some species there is a horny or shelly plate called the Operculum, attached to that part of the animal which is last drawn in, fitting the mouth of the shell, and closing it up, whereby the seclusion and protection of the mollusc becomes complete. Every one who has eaten a periwinkle, or seen one eaten, knows the circular scale which must be picked off, before the animal can be drawn out, after the most approved method by means of a pin, and this is the Operculum. In some large species of the genus Turbo, the Operculum is a solid calcareous stopper. As the molluscs grow and increase in bulk, so does the shell advance in capacity, differing in this respect from the crustaceans, the lobster for instance, which casts its shell during its growth, and is again clothed with a new one, but the shell of the mollusc does not grow in the same sense as that in which the animal grows; the animal constructs it, though not in the same sense in which the bee constructs its comb, since the action on the part of the mollusc is functional and involuntary. The body of the mollusc is covered by an integument called the pallium or mantle, and by this organ the material is secreted, which forms the shell. When a snail is taking his walks abroad, you will observe that the shell rests altogether on the back of the animal, so that every part of the aperture is in contact with the mantle,

and as long as the mollusc is advancing toward its full growth, the mantle continues to deposit fresh materials round the aperture, so that the shell grows with it, and hence the striated structure, which, in some shells, is very strongly marked, though obliterated in others. The mantle deposits not only the substantial materials of the shell, but also the epidermis, or outer coating, together with the colours, patterns, and polished enamel with which many of them are ornamented, and the internal lining which is sometimes iridescent, as in the Haliotis, sometimes pearly and lustrous, also the pearls which are accidents formed within the shells of the pearl oysters and mussels. These functions of the mantle are exercised more energetically on one side than on the other, and hence the complicated forms of the shells. It is obvious that if the minute shelly cup pointed or rounded, which covers the mollusc in the first stage of its existence, were added to equally and uniformly round its edge, the growth of the shell would be straightforward, and the result would be a simple cone more acute or obause according as the spread of the mollusc were more or less rapid. This is precisely what happens in the case of the Orthoceras, one of the extinct Cephalopoda, which is a very long cone, and of the common Limpet, which is a very short one. Now, if we suppose the additions of the shelly material to be made on one side of the aperture more rapidly than on the other, that side of the cone will grow longer than the other, if at the same time the aperture is kept square with the axis of the cone, the result will be a curved form like the Toxoceras, another of the extinct Cephalopoda, and such is the Dentalium, a Gasteropod. If the addition of the material to one side of the aperture is so rapid that one side of the shell overtakes the other, the shell will be coiled as in the case of the Ammonite, which is a cone precisely analogous to the Orthoceras and Toxoceras rolled up. The structure of the Nautilus is the same, but less conspicuously so than in the Ammonite, and this is the character of all the testaceous Cephalopoda. Here you will

see that the progress of the shell has always been forward in the direction of the axis with which the aperture is symmetrical. For the Gasterpoda the case is different, with some exceptions, such as we have seen in the Limpet and Dentalium—the deposition of material by the mantle, that is transverse in a sidelong direction to the axis of the shell, and the result is a spiral form, the mouth of the shell opening sideways, and, as a general rule, on the right side, as it is regarded in front. This is the general character of the Gasteropoda, in most of which the spiral form is obvious, in some less obvious and in some very obscure. Here is the terebra for example, forming a regular spire, the whorls increasing in size with the growth of the mollusc from the point to the base, where the aperture is situated. The whorls turn round a column formed in the centre, so that the section of a shell of this structure is exactly like a turret stair with a solid newel, and the animal which formed and inhabited it would be shaped like a cork-screw. Here is a diagram, shewing a section of such a shell to a large scale. Here we may follow clearly the formation of the shell, if we suppose it to be still further developed by rapid additions to the outer, and slow additions to the inner lip. It is obvious that the termination of the column forming the inner lip will be advanced, and that the outer lip will be carried round it, and another whorl will be formed in this shell, the form of which is the type of a great many genera, all of small size, the Terebra being the largest. The growth of the molluscs has been gradual, and every whorl which has accompanied it bears the same proportion to the whorl above it, but this is not always the case. In the Triton for example, the same form is seen to a certain extent from the apex of the shell, after which the body of the mollusc takes a sudden development, accompanied by the last whorl, called therefore the body whorl, which is out of all proportion to the whorls above it. In some of the Volutes again, as in the Voluta Neptuni, the spire, although distinctly developed, forms

a very insignificant portion of the shell, which is all body whorl, and this is the case with a great number of shells which assume a globose form, in which, however, the initial spire is small and very little raised, as in the species of Paludina (for instance), and the most common snails. In such shells as Nerita of which an elarged diagram is here given, the spiral form becomes more obscure. But this is not so obvious, because the axis of the shell is in the direction of the shorter, and the mouth in the larger measurement, contrary to the other shells we have been looking at. In the Cypræa the spiral form becomes exceedingly obscure; no one would take a Cypræa for a spiral shell, but it is so nevertheless. Here is a young Cypræa showing the spiral apex, a wide aperture, and sharp lip, which is afterwards thickened as it approaches the inner lip, while the spire is buried so as to become scarcely discernible in the mass of the shell. I will now call your attention to these seams on the back of the Triton. The deposition of the shell by the mantle is not continuous; it would appear that after a certain time the power of the animal becomes exhausted, an interval of rest follows, after which another portion of shell is secreted, and then another rest, and so on. These seams mark the intervals of rest, and the spaces between them are the portions of the shell formed at each period of activity. Some molluscs, whenever an interval of activity is completed, form a mouth to the shell exactly like the final aperture; and in many cases, where the mouth of the shell is thickened and reflected, the seams are marked accordingly, each having been in its turn the mouth of the shell. In the Murex imperalis, for instance, the mouth is thickened, denticulated, and knobby, and this same formation, the knobs included, is repeated in every seam on the back of the shell. But the case of the successive formations of the complete mouth is most remarkably shown in the Murex Inflatus: the luxuriant and beautiful foliations of the aperature have been repeated at the termination of

every period of activity, and remain like a grove of spines on the back of the shell. In the Terebra and other shells where the lip is thin there is nothing to mark the successive periods of growth, and in others, though the lip may be thickened and marginated, it does not appear to be thus developed until the shell is complete ; in some species of Cassis, for example, though the lip is greatly thickened, the back is smooth. In the Pteroceras there is no appearance of the remarkable horns which garnish the aperture until the shell has attained its full growth. In many cases after the animal and the shell have attained th eir full development the action of the mantle still continues to add fresh materials, and old shells are often extensively solid and massive.

Nothing has yet been said of the division of the classes into orders and sections, nor will it be necessary to say more than as the forms of the shells may be affected. Naturalists group the molluscs in accordance with the structure of the animals, making very little account of the shells. Hence it arises that even in one and the same genus the shells often exhibit the greatest dissimilarity in form and magnitude, as may be observed by inspecting the two groups on the table of the Murex, the typical genus of the family of the Muricidæ, and the Volute, the typical genus of the Volutidæ. Nevertheless there are family likenessess, as will be noted presently. On the other hand, there are shells closely resembling one another, though the animals are entirely distinct. The Siphonaria, for example, which is a land shell, is so like a Limpet, that it requires a close inspection of the interior markings to distinguish them. The animal structure is referable principally to the breathing organs : these divide the molluscs into two great groups—the Branchiata, those which breathe water by means of branchiæ or gills, like fishes, and the Pulmonifera, those which breathe air by means of lungs, like Christians, and the rest of the land animals. Some varieties in the structure and position of the gills divide the

water breathing molluscs into several orders and sections, which it will be foreign to the present purpose even to enumerate; but the first order, including all the marine molluscs, is divided into two sections, animals which draw the water to their gills through a syphon or tube, called the Siphonostomata, or syphon-mouthed, and those which have no such syphon, called Holostomata, or entire mouthed. In those which have no syphons, the outer lip of the mouth is rounded and passes uninterruptedly from the body of the shell to the inner lip, where, as in the syphonated molluscs, the front of the mouth is interrupted by a notch, through which the syphon passes, as in the Volute. This notch frequently opens into a tube more or less prolonged, called the canal, as may be seen in the Triton, the greatest development of the canal being in the Muricidæ generally, and most of all in the Murex Hanstellum. In the Strombus, the typical genus of the Strombidæ, there is both a canal and a notch, through which the head of the animal passes. In those species of Strombus which have a smooth lip, this notch is very sharply cut. There are six families of syphonated molluscs. The first is that of the Strombidæ, which are generally characterized by a great development of the outer lip, but in no recent shell is it so great as in the extinct species of the Genus Rostellaria. The 2nd family is that of the Muricidæ, which, as I have already said, are marked by the great development of the canal and also the exuberance of spines and foliations. The 3rd family are the Buccinidæ, of which the Buccinum is the typical genus. The species Buccinum undatum is our common Whelk. The beautiful Harp Shells and Olives belong to this family. The 4th are the Conidæ, the typical genus of which the Cone is with few exceptions constant to the form, from which it takes its name. The 5th are the Volutes, which, through all the varieties of their form, may be known by the strong spiral fluting on the front of the inner lip. The 6th are the Cypræadæ, the typical genus, the Cypræa or Cowrie is per-

haps the most constant of all genera to the typical form. It is to be remarked that all these syphonated shells are carniverous. The Strombus and other large molluses are, in the Tropics, the scavengers of the sea shore. Those with entire mouths, on the contrary, are generally vegetable feeders. Thus whenever you meet with a shell with a canal or a notched mouth, you may be sure it is a Marine Shell and belongs to a carnivorous family. There are 15 families of Marine Holostomata or entire mouthed Univalves, but as this discourse is of shells in general and none in particular, it would simply be tedious to enumerate them. Except some species of Turbo, and certain Tropical Limpets, which spread out to the size of a cheese-plate, none of them are large shells. All the land molluscs are of the order Pulmonifera, or air breathers, and their shells entire-mouthed: there are four families of land shells, the most important and extensive of which are the Helicidæ, the typical genus being the Helix or snail, comprising about 1,200 species, world-wide in their distribution. According to the best authority, Turton's British shells, edited by Dr. Gray, there are 72 species of this family in Great Britain, 28 of which belong to the Genus Helix, or snail proper. Many of the shells belonging to the Genus Pupa, Clausilia, Cylindrella, and Balea, a group of small pointed shells, less known than the snails, from being generally smaller, more retired in their habits, and more local in their distribution. Nor are the several species of shells to be found everywhere, their local distribution being influenced by soil and vegetation, and some are scarce. The Helix Aspersa, the common brown snail, is universal. The Helix Hortensis is also very generally spread. There are several varieties of this species, among which is the beautiful black and yellow banded snail, as powerful in its colouring, if not so lively, as many tropical shells. The largest British species is the Helix Pomatia, or Roman snail, so called because it is said to have been introduced by the Romans as an article of food, it is,

in fact, the edible snail seen in the markets of Italy and the South of France, it is found on the chalk soil about Dorking, and Leatherhead, but I do not know that it is to be met with in this part of the country. The smallest British species is the helix pygma, not larger than a grain of mustard seed. Another minute species is the Helix Pispida, a hairy snail, is to be met with about the Shakespear Cliff. The Helix Pomatia is far exceeded in magnitude by the snails of the tropics, though none of them are of large size, but two other genera of this family, the Bulimus and Achatina, become large shells, especially some African species of Achatina. Here is one from Zanzibar, which from its size and solidity would not readily be taken for a snail, but such it is and there are larger specimens in the British Museum. The snails have no Operculum, but they make a temporary enclosure for themselves during the winter, when they are torpid. The common brown snail fills the aperture of its shell with a glutinous substance. The Helix Pomatia forms a calcareous plate. Another family of land shells, the Cyclostomidæ, are operculated. There is one species of Cyclostoma the typical genus of this family in Great Britain, it inhabits chalky soils, and I mention it here because it is to be found on the East Cliff. I am afraid I have already broken bounds beyond the time usually allotted to these little discourses, and must say but very few words about the Conchifera. The shell of the Conchifera is formed in the same manner as that of the Gasteropoda, that is to say by secretion from the mantle of the animal, but the action is more simple, being in a direction forward from the original shell of the infant mollusc, which finally becomes the apex of the adult shell, and called the Umbo, nevertheless, as in the Gasteropoda, the action of the mantle is more energetic in one part than in another ; hence, as a general rule, the Umbo, is not in the middle of the shell of which a greater part is behind the Umbo, than in front of it, as may be conspicuously seen in the Tapes. Moreover,

though the general form of the shells is more simple, the depositions of the mantle are as luxuriant in spires, rays, ribs, and frills, as in the Gasteropoda, as may be seen in the Spondylus, the Pectens, clams, and many others, and perhaps above all the Hammer Oyster. The two shells of the bi-valves are commonly called upper and lower, but this definition only holds good with such shells as are fixed like the oysters. The shells of those which are free are called by naturalists right and left. When the bi-valves are at rest they lie on the left valve, and in one species—the Pecten Pleuronectes —the left valve is without colour, like the under side of the flat fishes. To know which is the right, and which is the left valve of a shell, place it on its lower edge, with the Umbo forward, and you have the two shells in their proper position. When the molluscs betake themselves to locomotion, they rise on their edges, and move forward on a foot, or what serves as a foot. The common Cockle can do more than this, for by means of a fold in its foot, it can leap with some agility ; and the Pectens, swim after a fashion by clapping their shells together. The hinge of the bivalve shells is not a hinge in the mechanical sense, it is only a strong ligament, which opens the shell by its elasticity, and the muscular action of the animal is exerted, not to open the shell, but to close it ; and hence, when the animal is dead, the shell always gapes open. The shells are steadied in their places by denticulations adjoining the hinge, but there is no articulation. The ligament is sometimes external and sometimes internal : when external it is situated behind the Umbo. The Tridacna is a genus of the family of Chamidæ or Clams, and the species called Tridacna Gigas is the largest of all the molluscs, far exceeding in size and solidity the largest of the bi-valves. These magnificent shells are sometimes used in the churches abroad as holy water basins. There is a pair in the church of St. Sulpice in Paris, and another in the church of St. Eustache.

Ladies and gentlemen,—Imperfect as this notice has been, I wish it may answer in any degree the only purpose such notices can answer, which is not so much to afford information as to be an index to those who would seek it. For further information I would recommend an inspection of the collection of shells in our museum. It is neither extensive nor valuable, but it has the advantage of being arranged. I wish I could refer you to our sea-shores for examples, but this locality is not rich in shells.

FOURTH MEETING.

Excursion to Shottendane Woods,

Thursday, May 28, 1868.

On Thursday, the East Kent Natural History Society made their first excursion for the year under their president, Col. Horsley, to Shottendane-woods. The day was everything that could be desired. Between fifty and sixty members assembled under the shade of the beeches in the middle walk —Colonel Horsley and party, Colonel Cox and party, Mr. Peckham and party, Capt. Kemp and party, Dr. Grayling and party, Major Munn and party, Mr. J. Neame and party, Mr. Bottle and party, and Mr. Mummery and party. However lovely the woods may be for a pic-nic or a summer's ramble they are not rich in either insects or plants. The geological structure is, however, very interesting, showing a very remarkable section of the tertiary deposit. This, the Society have before examined and reported upon, but few insects or plants were collected ; nothing new. After a most delightful walk and rustic entertainment the Society returned towards home.

Some little disappointment was created by the exact site of the Beeches not being understood from the circular, members from Dover coming by the 12 train had no one to guide them from Selling Station, they arrived at these beeches and remained there a considerable time—the place of rendezvous was in the middle walk.

FIFTH MEETING.

Canterbury, June 9, 1868.

A meeting of this Society, was held on Tuesday, in the lecture-room of the Museum, Guildhall-street, Colonel Horsley in the chair. A very interesting lecture was delivered on the "Red Corpuscles of the Blood of Vertebrates," by George Gulliver, Esq., F.R.S., late Professor of Anatomy to the College of Surgeons and Surgeon in the Blues. The lecture was profusely illustrated by a magnificent set of coloured Diagrams, representing the corpuscles magnified 8000 diameters, and all drawn to one and the same scale, from the most remarkable examples of those corpuscles throughout the vertebrate sub-kingdom.

The President having introduced the lecturer in a few appropriate remarks,

Mr. Gulliver rose and said,—No wonder that we should think of the blood in this county, where the illustrious discoverer of the circulation of that fluid was born; and in this city, where he received his scholastic education. His discovery was published in 1619, and he died in 1657.

But we are now to treat of a very important part of the blood which was unknown to Harvey. Marcellus Malpighi, an eminent Italian anatomist, whose name is steryotyped, as it were, into the records of zootomy and phytotomy, discovered the red corpuscles of the blood in 1673, sixteen years after Harvey's death, and William Molyneux first saw them circulating within their vessels in the

Water-newt in 1683, twenty-six years after the death of Harvey. And thus the circulation of the blood was first discovered by an Englishman who never saw that circulation, and first seen by another of our countrymen upwards of half a century after that discovery.

Independently of the leading fact of the circulation, Harvey's observations on the properties of the blood, and on the development of the vertebrate embryo, were so important and in advance of the knowledge of his time, as to be alone sufficient to vindicate the high character of British physiology at that period. But, as with other great men, his reputation rests almost entirely on his one greatest work, which thus eclipses his very valuable, but comparatively, smaller labours; just as his illustrious contemporary, Milton, is known rather by his wonderful epic than by those beautiful pieces which could only be called "minor" among his own works.

And now Harvey seems to be almost forgotten. We see little of his name even in the most comprehensive systems of animal physiology, either in this country or on the Continent. So apt are we to be ungrateful, forgetting the Creator in the Creation. And yet, besides his great discoveries, he was the first physiologist that gave a systematic demonstration of the truth of the declaration of the inspired writer of the Pentateuch—that "The Blood is the Life." Nothing at the time could be more exact and convincing, or even now more beautiful, than the series of observations and experiments by which Harvey finally established this great truth on a scientific basis. And now, like all immutable truth, once plainly displayed and proved, it is ours evermore.

The whole tenor of our observations on the corpuscles of the blood is a very remarkable accumulation of evidence in support of Harvey's doctrine. These corpuscles are truly living organisms, and have functions to perform of the very first importance in the vegetative or organic life of the animal; one and the same function in the same and each

class, as we might infer when we perceive how alike they are in form and structure in that class, as you see displayed in the diagrams before you. But, when we show the identity thus in Man and other Mammalia, let it not be supposed that we are only adding another fact to the number of late raked up to degrade the human species.

Indeed, it has recently become a common objection to anatomical pursuits, that they tend to lead to views calculated at once to outrage our common faith and our common sense. The objection is of so little weight that it can never permanently support itself, simply because such doctrines are not founded on the truth; that is to say, as our law wisely words it, "The whole truth, and nothing but the truth." It is a very old and sage proverb that "a lie stands on one leg, and the truth on two;" and every casuist well knows that more error is propagated in the shape of mere literal or half truths, than by point blank misstatements, as may be seen well illustrated in Fielding's prose epic, "Tom Jones," by Coleridge, in that excellent series of essays called the "Friend," and more recently by Tennyson in some lines specially on the subject. I said, as to the anatomical facts and doctrine, "raked up," because in the very same shape they were rife and vulgar about half a century since, having been imported into England, chiefly from the Continental Encyclopædists, and known here under the name of materialism; and this, because it attempted to reduce our judgment of man's nature, simply to a question of material structure—of mere brute anatomy—and thus to confine the evidence to nothing but a half truth. It seems amazing that sincere and conscientious philosophers—as I believe they are—should descend thus to reproduce a mass of stale, flat, and unprofitable facts and doctrine, as if they were fresh and new discoveries! And still more remarkable is it that those philosophers, in attempting thus to degrade mankind, should not perceive that they are only dealing with a half truth.

Even granting its literal accuracy in all respects—which

I do not—we must perceive that no correct judgment of such questions can be hoped for without a due consideration of the entire evidence, in the light of the full and comprehensive truth; and this includes the moral or psychological nature of man, as well as his mere structural or physical form. Thus considered in the light of the whole truth and nothing but the truth, we cannot avoid the conclusion that man is separated from the highest ape, as from all other brutes, by a gulf so utterly impassible, that any attempt to bridge it over by anatomical facts and speculations must ever be simply preposterous.

In short, without questioning the sincerity, or truthfulness so far as it goes, of those philosophers who confine their researches to this kind of materialism, we may certainly conclude, as to "Man's position in Creation," or "Man's place in Nature," that it is exactly where he has always found himself, and where his Maker put him, Lord of Creation—"with those thoughts that wander through eternity,"—at the head of all animated creatures, and elevated above the highest of them to an immeasurable extent. Nor shall we be led to any other opinion by the demonstration, now to be given, of the identity in structure between the red corpuscles of man and those of other mammalia.

And so we may go on our way, rejoicing that a right pursuit of anatomical science will certainly lead us to "look through nature up to nature's God," and as surely never afford the slightest proof that it is now, or ever was, any part of His design to develope an ape or any other beast into a man.

After a description of the three well-known chief proximate constituents of the blood, of which the red corpuscles form such a remarkable part, the lecturer remarked that it is usual in these inquiries to describe first the structure and then the function. But as the practical British mind ever meets one at the threshold with the question, "What's the the use of 'em," we will mention this briefly now, and point

out the evidence in the sequel. The red corpuscles, then, vivify the blood, and through it the animal frame, and this mainly by the immediate agency of those corpuscles as carriers of oxygen, received from the atmosphere in their passage through the capillary vessels of the lungs, being, thus, most essential to the process of respiration and the production of animal heat; so that without these red corpuscles we should be instantly suffocated, and, in short, could neither move nor breathe nor have our being.

A comparative view of the size, form, and intimate structure of the red corpuscles throughout the vertebrate sub-kingdom was given by the aid of the illustrative diagrams. The smallest red corpuscles were discovered by the lecturer about twenty years since in the Musk-deer; and the largest among Mammalia in the great Anteater, the Capybara, and the Whale, excepting the Elephant, in which Mandl has previously discovered their like largeness. Of Birds, the smallest red corpuscles are found in the little Finches and Humming birds; the largest in such big species as the Ostrich. In scaly Reptiles the corpuscles are much smaller than in the naked batrachians or Amphibia, and in some of these last the largest red corpuscles yet known are found. In Fishes the largest corpuscles occur in the Sharks and Rays; the smallest in the osseous subdivision, in which a singular form, pointed at both ends, is presented in the corpuscles of the Pike. As a rule, in the oviparous vertebrates the corpuscles are more or less oval, flattened discs, and somewhat biconvex from slight projection of the nucleus; but in the Lamprey they are mostly circular; and many of this round shape, still discoid, occur among the majority of the oval discs in the blood of osseous fishes, as may be seen in Gasterosteus, Mugil, Belone, &c. Indeed, all the oval corpuscles, whether of the camels or oviparous vertebrates, are apt to become rounded or globular from the action of incipient putrifaction and of pure water, and retain their oval shape in weak saline solutions. So, too, with the red corpuscle of mammalia, which is liable also to many variations

of shape from osmosis, irregular contractions or puckering, and granulation; but the regular form of the red corpuscle in this class, including man, is a circular biconcave disc; excepting the camels, all of which have oval discs, but these still in size and structure are quite mammalian. Some orders of mammalia, as the Ruminants, are characterized by the smallness of their red corpuscles; and other orders, as the Edentates, by the comparative largeness of those discs.

The size of the red corpuscles is not a question merely of curiosity, by no means unimportant, as is too often supposed or ignorantly asserted, but is connected with the rest of the organization of the animal, especially with the perfection of the lungs and their function, in direct relation to which the largest proportion of surface is afforded by those corpuscles in subordination to their office as carriers of oxygen. This extension of their aggregate surface is provided by their relative abundance and small size; by which minuteness the sum of the surface of a given quantity of them is vastly increased, just as the surface of an ounce of lead would be greater divided into small shot than into bullets. Given, therefore, the proportionate quantity of blood and of the amount and size of the red corpuscles of different species, the comparative degrees of heat in such species might, ceteris paribus, be inferred. Of the numerous proofs, by the researches of John Davy, Christison and others, that it is by the red corpuscles that the oxygen is carried to vivify the system, the most remarkable one is that of Brown—Sequard, almost like a miracle of the middle ages. Into the blood vessels of a dead and stark limb, on all parts of which the galvanic stimulus was quite powerless, he injected red corpuscles charged with oxygen, after which operation the muscles and fingers relaxed, so far by an actual revivification, and became obedient or sensible to galvanism.

As to structure, the Mammalian corpuscle consists mainly of a matter soluble in water, and of a thin membranous base which must by no means be confounded with a nu-

cleus. In oviparous vertebrates, on the contrary, besides the colouring and the membranous parts, the red corpuscle has a most distinct nucleus. And this very remarkable difference of structure is the most fundamental one between the Mammalia and oviparous vertebrates. Thus the lecturer distinguishes these two great sections as *Pyrenæmata* and *Apyrenæmata*, and declares that the shortest, most fundamental and universal single diagnostic character of Mammalia is *Vertebrates with non-nucleated red corpuscles of the blood.*. There are two orders of facts in such inquiries, differing much in their value, judged by their siguificance, under the light of our still limited knowledge; the one set of facts minor, incidental, and isolated; the other large, constant, and central, and worth hundreds of the former as comprehending them all. Of these former, examples are such as occur in the curious deviations in the shape of the red corpuscles of the camels and certain fishes; of the latter facts, which appear with the dignity of central phenomena, that of the constant difference of structure between the Pyrenæmatous and Apyrenæmatous red corpuscles is an important exemplification. The whole of "this vexed question of a nucleus" affords a very curious and interesting chapter in physiological history; but the facts, often mistaken, denied, asserted, and confused, are now proved and placed at the service of systematic zoology.

And thus we have shown that the red corpuscles are so important, and so intimately related to the rest of the organization, as to form an essential and fundamental part of the anatomy of every species of the vertebrate sub-kingdom, never, consequently, to be disregarded in their description and classification, and these corpuscles affording, indeed, by their structure, at once the most certain and central difference between the two great divisions of that sub-kingdom. Whenever an aberration of the size of the red corpuscles occurs in a species—*e. g.* Cercoleptes, Basaris, Hyrax—that species will certainly prove an aberrant one in other parts of its organization; as shown too by their magnitude

or reptilian character in that paradoxical creature, the Lepidosiren, or Mud-fish, of Western Africa. No anatomist now, after examining simply the red corpuscles of the Whale and Ornithorhynchus, could for a moment think of degrading the one to a fish, or the other to a bird; nor, observing the great similarity of these corpuscles in birds, fail to perceive in this single fact an exponent of the remarkable uniformity of the general organization of this class.

In conclusion, we are led back to the grand declaration of our illustrious countryman, Harvey; that the blood is the primogenial part of the body, where the Lares and Penates of Life are enshrined—the immediate and chief seat of the vegetative faculties of the animal—the first part to live and the last to die of this our wondrous microcosm. I may add, too, as the child is more worthy than the cradle, so is the blood more worthy than the parts that merely contain or defend it, and that the Red Corpuscles have now been proved to occupy a most eminent place in the organic functions of the vertebrate animal.

And yet as to these researches we are often still pestered about "cui bono?" more "analogies" and "homologies?" wider "generalizations?" As if the uninquiring mind can expect to see the good of anything beyond its own knowledge; as if the study of difference, now so sadly neglected in anatomy, as Lord Bacon, too, complained was the case in his time, were not as important and more difficult than that of resemblance; and as if, of late years, in the present state of science, "knowing only in part," we have not had some rather too sweeping generalizations—a sort of new Age of Reason:—

"No end, in wand'ring mazes lost:
* * * * * *
Vain wisdom all, and false philosophy."

SIXTH MEETING.

Canterbury, October 20, 1868.

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The usual monthly meeting of the above Society was held in the Library of the Working Men's Institute, Canterbury, on Tuesday evening last, when G. Gulliver, Esq., F.R.S., delivered a very interesting and instructive lecture on "Cell-biography, in relation to Systematic Botany." Colonel Horsley presided, and there were also present Colonel Cox and family, Rev. W. Blissard, J S. Lipscomb, G. Rigden, A. B. Andrews and S. Harvey, Esqrs., and many lady friends and patrons.

The Chairman congratulated the Society upon the acquisition of Dr. Gulliver as a member, and expressed the gratitude they must feel at that gentleman's kindness in coming forward to instruct them on the present occasion. He concluded by introducing to the meeting

Mr. Gulliver, who, after the applause which greeted his appearance had subsided, said:—Ladies and gentlemen, —Responding to the request of our respected president, I proceed to offer a few observations, to be followe l by some simple practical demonstrations, in order to show how

easily and pleasantly an important branch of phytology might be cultivated by many of our members, and even by ladies, whose taste may incline to this science. Indeed, it seems to me that, instead of rambling among the miscellaneous wonders of the microscope, every possessor of that instrument should endeavour to employ it in some of the many methods likely to be at once useful and instructive, and that pointing out any path to this end, how to pursue it and find the subjects, are among the legitimate objects of this society. There are, moreover, certain chains of scientific inquiry which can only be completely followed and the missing links cleared by the co-operation of a large number of independent observers, and without which we are never likely to acquire sufficient materials for an accurate and conclusive judgment. And this is eminently the case as regards the subject to which I have now to solicit you attention.

A long pursuit of minute anatomy has led me to the belief that the next great step towards a truly natural system of classification of the products of organized nature will be in this direction. In the anatomy of animals, the observations of John Quekett, Alexander Nasmyth, Mr. Tomes, and Professor Beale, are to this effect; years have rolled away since I proved the immense importance of a certain part of this branch of knowledge in systematic zoology; and my subsequent researches have shown a like value of the same line of inquiry in systematic botany.

And in this point of view we come to the Cell-biography of Plants, on which subject it is now proposed to give an account of the results of some of my own researches, and of the means by which those results were obtained; so that any botanist, even with the most slender information of phytotomy, may easily ascertain the value of the leading phenomena. To me, they appear quite sufficient to prove that, until the cell-life of plants has been more carefully studied, and the facts generally realized by botanists, we shall never arrive at a full and satisfactory knowledge

of botanical science. Those learned men will all grant that the most fundamental and universal elementary organ of vegetables is a cell; and that the entire life of a plant is the sum of the life of its constituent cells. How then can we avoid the conviction that the organs of this life must possess a correlative importance in taxonomy? And how is the investigation of this subject to be prosecuted without a careful attention to the phenomena of this life? Surely we shall never be able to comprehend and realize the mysterious plans of Nature, and those infinite details by which she has marked, for our interpretation, the true affinities and contrasts of the members of her system in the vegetable kingdom, unless we use every diligence in our attempts to read her own characters. And how are we to do this without a recognition of the phenomena of the cell-life as part and parcel of the natural history of every plant? And though we have this evening to treat of a very small fragment of this great argument, it is a portion which has been strangely overlooked; and this chiefly from a lamentable neglect by systematists, admirable as their labours have generally been, of the cell-biography of species. This neglect is the more remarkable, as the cell-characters are not only eminently natural, but in some instances, to be shown presently, afford the most fundamental and universal single diagnostic between allied orders, and even lower subdivisions.

Good use, no doubt, has long since been made of the intimate structure, including cells, of course, for the great or primary divisions of the vegetable kingdom, such as Cellulares and Vasculares, in systematic works. But let any one refer to those works for the diagnostic characters of some of our most familiar British plants, such as members of the orders Onagraceæ, Galiaceæ, and Balsaminaceæ, or the species of the genera Ranunculus, Lotus, Juncus, Hymenophyllum, and many others, when he will not find a single hint of the cell-diagnostics by which, as will be shown this evening, these orders or species may be at once distinguished from

their allies. You are left to the recognized and orthodox characters; and as these, for ordinal purposes, are commonly founded on the flowers and fruit, to the chance of finding such parts present for your purpose; while the fact of remarkably natural characteristics in such cases being really afforded by that inmost structure, to be noticed immediately, never seems to have been dreamt of by the author of any Flora or other systematic book, native or foreign.

Let us turn then a little from such books to the book of Nature—for she is ever true and delightful, and, as one of her own poets sings, "Never did betray the heart that loved her"—when we shall find that she has stamped a cell-character on certain orders by which they may at any season, at any period of growth, even in the seed-leaves, and in truth from the cradle to the grave of the species, be plainly distinguished from the nearest allied orders. And this simply by remarkable cells abounding in raphides; the raphides being beautiful needle-like crystals, composed either of phosphate or oxalate of lime; yet not mere crystals, as they form part and parcel of a delicate organism — the raphis-cell. This cell will be found so diffused throughout the frame of the plant that a mere fragment of that plant will be sufficient for the diagnosis. Again, certain closely allied species in some lower flowering plants may be distinguished in like manner; and several high Exogens and some Endogens may be known by their pollen-grains, epidermoid and other cells, and certain Ferns by the tissue-cells of their fronds and spore-cases. Indeed, the extent, distinctness, and value of such truly natural characters are probably far greater than we suppose; and, as the subject is new, it seems proper to specify the means by which it was investigated.

Adopting, then, Lord Bacon's recommendation to review our knowledge and transplant it into the minds of others as it grew in our own, let us see how the importance of cell-characters as diagnostic of orders or species became evident to me. During many years I had been

making dissections under the microscope, and notes of the the results, of every plant collected in my rural excursions. These researches were undertaken mainly for the purpose of comparing the intimate structure of plants and animals; and the discovery of the value of this structure in systematic botany was quite an incidental and unexpected result.

My own observations had not been long prosecuted when several examples were found that seemed to justify the truth of Schleiden's remark as to how little hope there is, without a study of the fundamental principles of development, of much further aid to systematic botany from mere anatomy. But, when a large mass of my notes has been collated, it plainly appeared that the mature structure and function of the plant-cells would be far more useful in this way than was supposed by the eminent German botanist. Thus, for example, no single instance of any species belonging to the orders Onagraceæ, Galiaceæ, and Balsaminaceæ was without a note of the presence of raphidian cells. And, conversely, a single order, *e.g.*, Hydrocharidaceæ, in which these cells were never seen at all, would be surrounded by its allied orders in which raphidian cells always appeared abundantly. The cells of the pollen, epidermis, pith, and of many tissues of various other orders of plants, were also found to give constant and diagnostic characters. Thus it was that this subject forced itself on my attention; and, afterwards, numberless experimental trials satisfied me that the raphidian form of cell-life is, in particular, an essential and intrinsic, a distinct and truly characteristic, phenomenon throughout the life of the plants exhibiting it, and withal clearly a sure and constant result of that life; while the same character is as certainly wanting in the species of allied orders. These raphidian cells were proved to be present in the ovule, in the seed-leaves, and thenceforth throughout the succeeding leaves and a large part of the intertexture of the frame of the species of several orders, some of which have been just specified.

And, independently of the interest of the subject in abstract botanical science, I have often found this cell-character useful practically. Thus, in little accidental embarrassments or disarrangements of the garden and seed-frame, I have been able very easily, and with surprising certainty and novelty, to pick out, simply by this diagnostic, all the seedlings of exotic Onagraceæ, now so generally cultivated and admired, from seedlings of other orders; and seedlings of Mesembryaceæ, which had been sown in pots, and got into perplexing confusion with other pots of seedling Crassulaceæ—both orders of succulent flowering plants—were as surely and quickly distinguished in like manner. This kind of practical diagnosis also proved equally good and convenient in plants at every period of their existence, and even shapeless fragments of their dead and rotting stems were thus plainly distinguishable. For example, a reserve bed, in which had been planted, and intended for removal when required, a Willow-herb, various Evening Primroses, Phloxes, Campions, and Rockets, had got into troublesome confusion, when nothing was easier than to pick out all the Onagraceæ solely by this raphidian character in the roots, subterranean buds, and dead and rotten leaves or stems, and at a time before growth had revived in the winter and early spring. Only there was an abundance of raphidian cells, beautifully marked in the tissue of the root and undergrown stems of another plant in that bed, and certainly neither a Willow-herb, an Evening Primrose, nor any other 'Onagrad.' Here then was a puzzle; some perplexing exception? Not at all. For after it had been put into a pot, and grown there for further observation, this questionable plant turned out to be a fine specimen of Woodruff, a species belonging to that very order, Galiaceæ, which I had already shown to be characterised by these raphidian cells. Thus plants may be known by their inmost structure; and for that reason by characters most eminently natural, but which use of them is yet either unknown to, or neglected by, all systematic writers; since in their works you will look in vain

for these diagnostics, or, indeed, for any other that would be available in such cases.

Other similarly instructive examples might be indefinitely multiplied, but it is better to indicate the way by which they may be easily found and realised; to show how a fertile field, hitherto left barren, may be cultivated with such pleasure and profit as to afford a source of rational amusement and information to persons in the country; to point out another and refined addition to rural pursuits, and one by which a reasonable hope may be entertained, even by inexperienced and unskilful observers, of enlarging the bounds of botanical science.

And this is not the only value of such pursuits. In themselves they afford a precious reward. They beguile the dull routine of professional and other employments, take us out of what Milton too truly called "the troubled sea of noises and hoarse disputes," cherish gentle thoughts and calm desires, and multiply and refine our enjoyments; thus endearing many a rural walk with delightful associations of

. . . . "Each lane, and every alley green,
Dingle or bushy dell, ...
And every bosky bourn from side to side."

Such studies, too, may soften affliction; they must convey meek and touching lessons of the means of happiness so bountifully spread around us, and of how cheaply some of our best pleasures may be purchased. But, above all, while thus teaching us to look for the good and the beautiful in surrounding objects, and helping us to the true riches of contentment and thankfulness—those large and best possessions—incline our minds to the grateful habit of "looking through nature up to nature's God."

Another recommendation of the study of this department of cell-biography is that the subjects are ever at hand. And hence, in reply to frequent questions about collections and preparations, I have constantly referred to Nature's own collection, always at our disposal, and the very best after all; and there, with certainty, we may find

many treasures, and employment of idle time, then not idly spent. In fact, the chief purpose of the present observations is to show how she invites us gratuitously, how the visit may be paid with little trouble and much profit, and how even this lowly study of the cell-life of plants may be made at once subservient to science and to some of our best enjoyments.

To this end we have only to compare the cells of the many plants ever greeting us in our country rambles, and for which purpose an achromatic object-glass of half an inch focal length will suffice. The form and contents of the cells may be best seen in fine sections, made in various directions, of the stems, leaves, roots, and other parts; but as such preparations require practice and skill, they may be dispensed with generally, and another way employed, rough and ready, yet likely to be rewarded with interesting and useful results, provided the pursuit be steadily continued. Thus we have simply to dissect with needles, or scrape or mash with a penknife, a fragment of the plant-tissue in a drop of water on the glass object-plate, and place it, either covered or not with a thinner bit of glass, under the microscope, when many of the vegetable cells will appear with their form and contents perfect, and more injured or broken, with their contents, yet recognizable and characteristic, escaped into the water. You will perceive that this kind of examination is far more easy than the process required for the display of the anatomy of the seed, and some other ordinal characters, while the character we are searching for is determinable at once and at all times, quite independently of the flowers or fruit. For example, if the problem be to distinguish, even if by a mere fragment of the species, whether a Rush belong to this or that division of the genus, we have only to look at the pith-cells, which form a very beautiful stellate or radiate tissue in one group of the genus, and a tissue of oval cells in the other, as may be well seen by comparing the actinenchyma of the pith of the common Juncus

conglomeratus, with the ovenchyma of the pith of Juncus bufonius. The constant difference of size in the cells is remarkable sometimes when their form and contents remain the same. If you examine them in Hymenophyllum Wilsoni and H. Tunbridgense, you will perceive this difference at once, and very likely then dissent from the views of those eminent botanists who regard these two pretty ferns as but one species. To the same effect is the uniformly smaller size of the pollen-cells in Lotus major than in L. corniculatus. By the singular largeness and roughness of the same cells in Ranunculus arvensis, this species is distinguished from its nearest allies, and other curious cell-differences, either of form or size, occur in different sections of this genus, and indeed of many other genera.

But still more striking examples occur as regards either the presence or absence of raphidian cells. Thus, *e.g.*, if the question be to discriminate between a Balsam, Bedstraw, or Willow-herb—species belonging to the orders Balsaminaceæ, Onagraceæ and Galiaceæ—and any of the plants in the alliances of those orders, mere shapeless fragments of the leaves or stems, or other parts, without the slightest aid from the recognized characters in systematic books, would, as already explained, be quite sufficient for the purpose.

Of the validity of this character numberless examples might be added; one more will suffice now. Having proved the facts as regards several orders in our own Flora, I extended the inquiry to all the exotic plants available, and never could find any exception to the character of Onagraceæ, *e.g.*, as a raphis-bearing order; when at length an apparent exception turned up in Montinia. However, on subsequent inquiry this genus, though placed by Lindley and other eminent botanists in the order Onagraceæ, proved to be no member of it, but rather to belong to the Saxifrages, with which its cell-structure better agrees; and thus a seeming exception became an excellent proof of the rule.

But in this inquiry we must take care not to confound raphides with crystal prisms, sphæraphides, and other crystals. There will be endless confusion else. Their distinctive characters are given, with far more details than can be entertained at present, in the memoirs contributed by me to the *Annals of Natural History*, the *Microscopical Journal*, and *Seemann's Journal of Botany*, from 1861 to 1866, and epitomized in the *Popular Science Review* for 1865-8. And I must beg to warn you against the very maze of errors on this and other points of the subject occurring in all the books on the Microscope with which I am acquainted; for in this department of phytotomy confusion has been led round from compiler to compiler in most admired disorder.

The question will arise of the use of raphides and other plant-crystals; it has never been answered. But we have now proved one use of them in systematic botany, including the fact that nature has regularly established in certain plants a laboratory and storehouse of these crystalline calcareous salts; while we all know how valuable they are as manure, and can now perceive how curiously and carefully the excess of them, more than has been expended in the economy of the plant, is soon and periodically restored to the parent soil, so that there may be no unnecessary loss of a fertilizing matter. Hence we see a good reason why the rotted leaves and other parts of such vegetables—*e.g.* the Willow-herbs, Fuchias, and Duckweeds—as abound in raphides, should be carefully husbanded by the gardener for his composts. These crystals are surely also useful, if not necessary, as part of the food of many animals, and sometimes as medicine for man. The commonest Duckweed abounds in raphidian cells and starch-granules; and I have found it, presenting its true cell-characters, in the stomachs of water-fowl and water-rats. Thus even this abject and despised weed is plainly useful in the economy of nature, and we could hardly imagine a better adjunct to the aliment of the young growing animal than the

phosphate of lime and starch. Besides, any physician would testify to the medical properties of sarsaparilla in certain diseases of the bones ; and this plant too, like the other Dictyogens, abounds so in raphides of phosphate of lime, in an organic form, that I have suggested a plentiful course of it in those sad cases in which this salt is morbidly deficient, as in the Rickets of children. Such facts are among the practical applications of the subject.

Finally, simple and plain evidence has now been adduced of the novelty and importance of the cell-biography plants ; and we may conclude that, without a discriminative recognition of this subject, both in its physiological bearings, and as presenting intrinsic and essential characters in systematic botany, no fair and complete history can ever be written of the Vegetable Kingdom.

Valuable microscopes were lent for the occasion by Colonel Horsley, Colonel Cox, and Mr. Harvey. The lecturer showed the method of making the preparations or dissections, of the choice of plants and suitable parts, and of the easiest means of subjecting them to microscopic examination ; and so the subjects under discussion were thus amply and practically illustrated. Colonel Horsley exhibited the crystal prisms subjected to polarized light, while the raphides, sphæraphides, and other objects were under view with the other microscopes. At the conclusion of the meeting, a vote of thanks to Mr. Gulliver, for his agreeable and instructive lecture and demonstrations, was proposed by Colonel Horsley, seconded by Mr. Dowker, and cordially carried.

LECTURE

Delivered at St. George's Hall, Canterbury, on Tuesday, December 8th, 1868, by

WILLIAM M. ORD, Esq., M.B., &c.,

OF LONDON,

On "Tongues."

In this lecture it was proposed to pass in review some few kinds of Tongues, regarding them as performing certain duties and as gifted accordingly. Beginning with the Human Tongue, the gifts of that organ were enumerated. It was found to be possessed, first, of great range of mobility, allowing of change in the shape of the whole mass on the one hand, and of the surface in large or in exceedingly small tracts on the other. This mobility had an evident relation to the complete application of the surface of the Tongue to the irregular surfaces of bodies brought into contact with it, whereby the Tongue might, so to speak, be enabled to take momentary casts of such bodies. Ministering also to the same purpose, the Tongue was found possessed of the properties of softness and suppleness, of a moist surface, and of remarkable elasticity or power of resuming its original form ; second, of the sense of touch ; and third, of the sense of taste. The conditions upon which these endowments depended were found, first, in the arrangement of the muscular fibres of the

Tongue which were found running in all directions, closely interwoven with one another, and attached in large numbers, and often by branched terminations to the inner surface of the skin of the Tongue; and second, in the constitution of its skin or mucous membrane, which was found to be a moist internal skin, presenting numerous minute projections of its surface, called papillæ. Three kinds of papillæ were noticed, namely, very minute projection, called simple papillæ, very long hair like papillæ with comparatively hard surface, and club-shaped or flattened papillæ with very delicate surface, and with a great number of fine bloodvessels in the interior. It was evident that the first two kinds were calculated to act as organs of touch, and the third kind as organs of taste, and this was further indicated by minute differences in their structure, and by their distribution on the surface. A short analysis of the part taken by the senses of touch and taste respectively in regard of substances introduced into the mouth was then made, as follows: touch was used in determining form; touch was used in perceiving the contact of certain stimulating matters, such as capsicum, just as the surface of the eye would be conscious of their presence; touch and taste appeared to be used together in the case of acid substances, &c.; taste was used alone in perceiving simply sapid matters such as bitters and sweets; and smell acted with taste in relation to matters which were odorous as well as sapid. The distribution of the senses of touch and taste on the surface of the Tongue corresponded with the distribution of two important nerves, the fifth a nerve of touch, and the glossopharynged a nerve of taste, though the functions of these two nerves could not be technically separated. Things to be tasted must be soluble, must be moved upon the surface of the Tongue, and must be compressed between the Tongue and the palate. The acuteness of the sense was very remarkable, particularly in the case of purely sapid matters, such as Quinine. The sense might be educated to great refinement, and could be

"dazzled." It was shewn next that as an organ of touch the tip of the Tongue was the most delicate in the body, being twice as discriminating as the tips of the fingers. The duties of the Tongue were then examined. It was found to be:—1. A sort of watch-dog, looking after the cleanliness of the mouth and worrying intruders among the teeth. 2. An inspector of food, reporting upon its wholesomeness, its consistence, its dryness, determining the amount of chewing requisite, and the amount of saliva which certain glands are called upon to supply. 3. It adjusted food between the teeth in chewing. 4. Took an active part in the process of swallowing food. 5. Was the chief organ of articulate speech. With the Human Tongue other Tongues were then compared. Among Mammalia the Tongues of Ruminants and Carnivora were compared, with especial notice of their different modes of drinking, the lapping of the Carnivora being rendered necessary by the wideness of the gape and the projection of the nostrils. The Ant-eater was noticed as having the longest and the Whale as having the shortest tongue among Mammals in proportion to the size of the body. In Birds the Tongue was found to be generally smaller, more compact, harder, and supported by bone. The Tongue was found put to various special uses in particular Birds. The Toucan used it as a rasp (and here Mr. Bates's curious account of the Toucan was quoted); the Humming Bird as a brush to collect honey; in the Raven and many other Birds it was armed with several series of large recurved hooks; the Goose used it as a sieve; the Woodpecker as a barbed spear; and the Parrot wielded a finger-like Tongue with great dexterity, even accomplishing a mimicry of articulate speech by its aid. In Snakes the small size and the forked shape of the Tongue were associated with the swallowing of lumps of food of greater diameter than that of the body. The dart-like use of the long and intricately constructed Tongue of the Chameleon was described. It was shewn how the—at first sight absent—Tongue of the

Crocodile was modified so as to constitute a valve closing the communication between the mouth and the throat, whereby the animal could breathe through its nostrils while drowning its prey. The Tongue of the Frog was last described. In the review of this series of Tongues it was observed that no new structures were added to those observed in the Human Tongue. All were indicated there, and all the structures of the Human Tongue were found in the Tongues of Mammals, though, of course, often curiously modified for special purposes. Yet, though these Tongues were so identical in their conformation their endowments were not the same. The Human Tongue was subservient to the faculty of intelligent articulate speech. No one could dispute that this faculty belonged to Man alone on this earth. The parrot might seem to be an exception, but this exception, if considered carefully, would prove the rule. The parrot mimicked sounds without comprehending them, and never originated them. The parrot was low down in the scale of creation, and joined by no links to man. If the parrot had been near man in organisation, the instance would have been of weight. But none of the animals more allied to man in their organisation had ever formed a language. They had their own collection of sounds, but these were instinctive and always the same for the same purpose in all members of our species. There was in this matter no progress for the animals. The cock crowed and the dog barked with the same tone and meaning to-day as when they issued from the ark. Thinking over the Tongues brought before us the question of our relation with the lower animals. Structurally the same with the animals, even in respect of the most minute points, man had certain mental gifts, possessed by him in his most savage state, which he did not share with the animals. These were, the power of perceiving moral ideas, and the faculty of articulate speech. The first of these might be rendered active by teaching; the second was always active and always changing. The changes undergone within a few years by

the languages spoken by savage tribes in Africa, as quoted by Professor Max Müller, were cited here. Finding man thus capable of, nay, impelled to change and progress, we saw held out for us in Nature hopes of a better future wherein our spiritual part should more and more dominate the bodily, should be purified to clearer seeing, and should become in fashion nearer the Highest. But Tongues could also teach us to look around, to be humble, and to see glory in our fellowship with the animals. As we learned that we were not self-existent, so we came to feel that we were not alone. We saw that we owned something of a common being with creation; we became conscious of a throb within us beating in harmony with the essential life of all breathing things. We were made to see that not only was the rest of creation made for our use in a material way, but that in an immaterial way, as touching our moral being we were but imperfect, shorn of much strength and seeing if this lower creation had not come to our help. This had been said in noble words by a poet ss of our generation—Mrs. Browning:—

"O solemn-beating heart
Of Nature! I have knowledge that thou art
Bound into man's by cords he cannot sever;
And, what time they are slackened by him ever,
So to attest his own supernal part,
Still runneth thy vibration fast and strong
The slackened cord along."

Excursion to St. Margaret's Bay,

August 11, 1868.

The second excursion of the year was to this delightful locality, which the Society had upon two previous season visited under most unfavourable circumstances as regarded the weather. Upon this occasion the early morning was overcast and threatening, but it cleared by ten o'clock, and afforded an agreeable day for out-door research.

The President and his friends arrived in Dover by the London, Chatham, and Dover Railway about 10 a.m., and were met at the Priory Station by the Secretary, Major Munn, Messrs. W. P. Mummery, R. H. Jones, E. Horsnaill, and other Dover members, and at once left for St. Margaret's Bay, arriving there about noon.

As the tide was fast flowing, the party at once proceeded to the rocks beyond the Foreland Cliffs, to the westward of the Bay, and succeeded in capturing and collecting specimens of the Fatherlasher (Cottus gobio), Smooth Blenny (Blennius pholis), Black Goby, Rock Prawn, and Actinia mesembryanthemum. Also, Bowerbankia, Flustra foliacea and other Zoophites; among the Algœ—Plocanium Danza and that beautiful weed Delesserin Sanguinea.

A curious parasite was found on one of the prawns captured, fixed beneath the carapace, which was considerably enlarged. On being dissected out it was found to measure nearly half an inch in length, and must have been a very undesirable travelling companion. The rocks by this time being covered by the flowing tide, the party by adjourned to luncheon under the shadow of the white cliffs.

This indispensable portion of the day's proceedings having been accomplished, the President invited Mr. Horsnaill, of Dover, to make a few remarks upon the specimens procured.

The party then proceeded eastward, and were joined by the Revds. E. C. Lucey, of St. Margaret's-at-Cliffe, and W. H. Astley, of Langdon, and party.

On passing the Coastguard Station the boatmen were overhauling Captain Boxer's rocket apparatus for saving life from shipwreck, which was fully explained by the petty officer in charge, and proved very interesting to the members, who then continued their walk towards Kingsdown. Among the plants observed growing on the beach were Eryngo (or Sea Thistle), Belladonna, Horned Poppy, Papaver glaucium, Coltsfoot and Brassicœ in great profusion. On the cliff Samphire was seen in bloom.

The party next ascended to the village of St. Margaret's and were conducted over the fine old Norman church now in process of restoration, the characteristic features of which were with great courtesy explained by the Rev. E. C. Lucey, and afforded much gratification to the members, who then returned to Dover highly pleased with the day's excursion.

REPORT

OF

THE EAST KENT

NATURAL HISTORY SOCIETY,

WITH A

List of Books Belonging to the Library.

&c., &c.

SESSION, 1869.

CANTERBURY:

PRINTED AT THE "KENTISH GAZETTE" OFFICE, HIGH STREET.

REPORT.

The financial state of the Society continues prosperous. There were 90 members last year and now they number 92.

The members and their friends had two very agreeable and instructive excursions. The *first* was on the second of June, to explore the district between Ashford and Mersham Hatch. The *second* was a dredging and exploring party to Herne Bay and Reculver. Such excursions not only tend to promote sociality among the members, but to familiarize them with the natural history of the neighbourhood.

Two scientific meetings were held at Dover and three at Canterbury, at which were given papers or lectures amounting in number to seven or eight, to wit:—

Mr. Horsnaill, on "A Crustacean of the family Pycnogonidæ, found near Dover."

Major Munn, on "The Hexagonal Cells of Bees and Wasps."

Dr. Mitchinson, on "Volcanic Action (Extinct Volcanoes)".

Mr. Dowker, on "Some Points in the Geology of the Isle of Thanet" (Two Lectures).

Mr. Dowker, on "Marine Hydrozoa with some original observations on Medusæ, enumerating the Zoophytes found at Herne Bay, October, 1869."

Mr. Gulliver, on "The uses of the Red Corpuscles of the Blood in Respiration and the importance and significance of their sizes both in a Taxonomic and Physiological point of

view, with an account of his discoveries of the characters afforded by the blood-discs in *Tragulus*, *Moschus*, and *Orycteropus*."

Mr. Gulliver, on "The Auditory Organs of Molluscs and Insects."

The Sub-Committee appointed to make arrangements for publishing the Papers read, has arranged with the Editor of *Scientific Opinion** to publish in abstract the proceedings of the Society. Accordingly it is requested that every member making a communication will furnish an abstract at the time of reading the Paper, that a duly authentic Report may be published without delay.

The Sub-Committee on the Botany of the District has not been idle, as will appear from the following report of Mr. Reid, the Honorary Secretary of the Committee, and our best thanks are due to that gentleman for the talent and zeal with which he has entertained the subject.

In the department of the Library the following donations have to be noticed :—

"Sketches to a Scale of the Auditory Organs of Molluscs," by Geo. Gulliver, Esq., F.R.S.; from the Author. "On the Muscular Sheath of the Œsophygus of the Aye-Aye, (Chiromys Madagascariensis)," by G. Gulliver, Esq., F.R.S.; from the Author. "On the Fibres of the Crystalline Lens of Petromyzonini," by G. Gulliver, Esq., F.R.S.; from the Author. "The Diatom Prism and the true form of Diatom Markings, the Microscope Prism and the Structure of the Podura Scales," by the Rev. J. B. Reade, F.R.S.; from the Author. "Le Glacier de Boinon" and other Pamphlets, per S. A. Sexe; from the University of Christiana.

The Committee, in returning the cordial thanks of the Society to those Members and others who have aided it by Lectures, Papers, and Donations, entertain the hope that such favours may be continued. And, in order to extend the in-

* The Abstract of the Proceedings of the Society for the year 1869 is published in *Scientific Opinion*, April, 1870.

terest in and usefulness of the Society, the Committee would beg to suggest that regular and set periodical meetings of the Members should be established, when and where any Member may bring the results of his observations to view. Accordingly it is recommended that this question and all the needful arrangements and details, be entertained at a General Meeting of the Members at as early a period as may be convenient.

The primary object of all local Societies of this kind, your Committee believe, should be to investigate the natural history of the neighbourhood; that is to say, the nature and localities of the minerals, vegetables, and animals of the district. And though these are often much illustrated by the production of other regions, still the main fact remains that the composition, structure, economy, and habitats of East Kent specimens are more particularly interesting to this Society. It is probable that regular, frequent, and fixed periodical meetings, when the Members would enjoy every facility of intercommunication on these and kindred subjects, would promote the interests of science and bring the Members of the Society into an agreeable and profitable intercourse.

Report of Sub-Committee on the Flora of East Kent for the year 1869.

At the first meeting of the Committee after the Annual Meeting a Sub-Committee was formed, for the purpose of carrying out the proposed investigation into the Flora of East Kent. The Members are G. Gulliver, Esq., F.R.S., and G. Dowker, Esq., F.G.S., James Reid, Esq., and the Hon. Secretary of the Society, and power was given to them to associate persons willing to co-operate in the undertaking. In April the Sub-Committee met, and a plan of proceeding was defined for obtaining information and encouraging observations on the Botany of the District. Circulars were issued to all persons who were thought likely to aid the inquiry,

and the following persons have intimated their willingness to assist:—Dr. Maxwell T. Masters, London; Dr. J. Mitchinson, Canterbury; J. T. Hillier, Esq., Ramsgate; H. B. Mackeson, Esq., Hythe; W. O. Hammond, Esq., St. Alban's Court; H. Allyett, Esq., Folkestone; Miss Metcalfe, Harbledown; J. Marten, Esq., Ensign; G. Dowker, Esq., Stourmouth; J. Grayling, Esq., Sittingbourne; Mrs. Dean, Wincheap Street; S. Harvey, Esq., Canterbury; J. Reid, Esq., Canterbury. Miss Metcalfe, Mr. Hillier, and Mr. Dowker, have sent very useful monthly returns of their observations, in addition to general information, during the period that the Sub-Committee has been at work. Mrs. Dean, Mr. Allyett, and Mr. Reid, have contributed full lists of plants. Dr. Masters at once put into the hands of the Committee what information he possessed, together with some interesting observations on the nature of the work. J. Britten, Esq., Royal Herbarium, Kew, and H. Trimen, Esq., Botanical Department of the British Museum, hearing incidentally of the inquiry, very promptly and kindly tendered their aid. Several contributions promised have not been received yet. It is desirable they should be sent without delay, that the work may be recommenced with the new season. The Inquiry is fairly initiated, and some valuable records obtained. The Register, as soon as completed, will be laid on the table of the Society's Room for inspection by Members. In the next Session it is proposed to carry on more vigorously the monthly observations of plants, with the identification of Species. Out of these materials matter will be furnished for monthly conversations on the Botany of East Kent. The Plants observed on the Excursion from Ashford to Mersham Hatch form part of the record of the past year.

A grant of £3 was made towards the expenses of the Inquiry, £2 18s. 4d. of which has been expended in the purchase of the various MSS. books, catalogues, and stationery required. Little more than the expenses of postage will be incurred in the next year.

Amongst other matter connected with this subject the

following may be specially noticed. Two plants, either new to or rare in the district, have been found in it and clearly identified :—*Wolffia arrhiza*, *Riccia fluitans*.

The Wolffia, having never before been found in Kent, is now for the first time added to the Flora of this county ; and the discovery of this curious member of the order Lemnaceæ was the more interesting, as it enabled Mr. Gulliver to complete his observations on the distinctive cell-characters of *Wolffia* and *Lemna*, as described and figured by him in Dr. Seemann's Journal of Botany, January, 1869. The *Riccia* is a pretty muscal Cryptogam, and the *Lemna* our lowest and smallest Phanerogam ; and both these diminutive plants will be found novel and interesting for cultivation in vases of fresh water.

LIST OF BOOKS AND PERIODICALS

Belonging to the East Kent Natural History Society.

British Land and Fresh Water Molluscs, 1 vol. (Reeve)
Bryologia Britannica, 1 vol. (Wilson)
Synopsis of British Sea Weeds, 1 vol. (Harvey)
Flora of Surrey, 1 vol. (J. A. Brewer)
Manual of Geology, 1 vol. (Professor Phillips)
Flora of East Kent, 1 vol.
Morris's British Butterflies, 1 vol.
Ramsay's Physical Geography of Great Britain, 1 vol.
Dallas's Animal Kingdom, 1 vol.
Johnstone's British Zoophytes, 2 vols.
A Catalogue of rare Phœnogamous Plants collected in South Kent in 1829.
Memoirs of the Geological Survey of Great Britain, 2 Nos. referring to Sheets 4 and 7.
British Hemiptera, Heteroptera, 1 vol., 1865 (Douglas and Scott)
Hand Book of British Flora, 2 vols. (Bentley)
Miscellaneous Botanical Works of Robert Brown, 3 vols.
Recent Memoirs on the Cetacea, 1 vol.
Monograph of British Spongiadæ, by Dr. Bowerbank, 1 vol.
Conybeare and Phillips' Geology, 1 vol.
Bell's British Quadrupeds, 1 vol.
Atlas of British Sea Weeds, drawn by Mrs. Gatie from Professor Harvey's Phycologia Britannica, 1 vol.
Couch's Fishes, 4 vols.
Forbes's British Star Fishes, 1 vol.
Owen's Comparative Anatomy, 3 vols.
Kirby's British Bees, 2 vols.
Smith's English Flora, 4 vols.
Ralf's Desmidiæ, 1 vol.
Nitzsch's Pterylography.
Hooker's Jungermanniæ, 1 vol.
Smith's Diatomaceæ, 2 vols.
Works of W. Hewson, F.R.S., 1 vol., edited by Gulliver.
Parker's Structure and Development of the Shoulder Girdle and Sternum in the Vertebrata, 1 vol.
*Lyell's Principles of Geology, 10th edition, 2 vols.
*Masters's Vegetable Teratology, 1 vol.

Those marked * were added this year.

PAMPHLETS.

British Moths, Nocturni.
,, Geometræ.
Memoires pour servir à la connaissance des Crinoides vivants par Michael Sars.
Etudes sur les Affinites Chimiques par MM. Guldberg et Waage.
Notes on Lemnaceæ and the Raphidian Characters of Plants, by G. Gulliver, Esq., F.R.S.
Sketches to a scale of the Auditory Organs of Molluscs, by G. Gulliver, Esq., F.R.S.
On the Muscular Sheath of the Œsophagus of the "Aye Aye" (Chiromys Madagascariensis), by G. Gulliver, Esq., F.R.S.
On the Fibres of the Crystalline Lens of the Petromyzonini, by G. Gulliver, Esq., F.R.S.
The Diatom Prism and the true form of Diatom Markings. The Microscopic Prism and the Structure of the Podura Scales, by the Rev. J. B. Reade, F.R.S.
Le Glacier de Boinon, per Mons. S. A. Saxe

PERIODICALS.

Natural History Review, vols. 3 1863, and 4 1864.
The Zoologist, from 1843 to 1861, and from 1863 to 1869.
N.B.—The Zoologist for 1862 is incomplete.
The Quarterly Journal of Microscopical Science, old series, vols. 7, 1859, and 8, 1860, new series, vols. 1, 1861, to 8, 1868, vol. 2 excepted.
Magazine of Natural History, third series, vols. 3, 1859, to 8, 1861, and 11, 1863, to 23, 1869.
The Geologist, vols. 2, 1859, 3, 4, 6, and 7, 1864.
The Phytologist, vol. 3, 1859.
The Geological Magazine, vols. 1, 1864, to 6, 1869.
Quarterly Journal of Science, vols. 1, 1864, to 6, 1869.
Quarterly Journal of the Geological Society, vols. 20, 1864, to 25, 1869.
The Natural History Repertory, 1865.
The Monthly Journal of the Royal Microscopical Society, vol. for 1869

The Librarian regrets to state that in consequence of several Periodicals not having been returned to the Library, nor any entry of them made in the book kept for the purpose in the Society's reading room, he has been unable to have the volumes to which they belong bound.

THE FOLLOWING PERIODICALS

ARE TAKEN IN BY THE SOCIETY, VIZ.:

1. The Annals and Magazine of Natural History.
2. Monthly Journal of the Royal Microscopical Society.
3. The Zoologist.
4. The Geological Magazine.
5. Quarterly Journal of the Geological Society.
6. " " of Science.
7. Science Gossip.

FINANCIAL STATEMENT, 1869.

RECEIPTS.

	£	s.	d.
Balance in hand, December 31st, 1868	9	13	9
Subscriptions received in 1869	28	15	0
Ditto from Dover branch in 1869	14	5	0
	52	13	9

EXPENSES.

	£	s.	d.
Rent of Rooms in Precincts	10	0	0
Fire and Candles in ditto	1	0	0
Mrs. Ward for Printing	11	3	0
Contribution to Library	10	0	0
Subscription to Ray Society	1	1	0
Expenses at Meetings	5	4	4
Book Case and Notice Board	1	1	6
Postage, &c.	1	14	9
Stationery and sundries	0	5	1
Grant to Sub-Committee	3	0	0
Expenses of Dover branch	2	8	10
Balance in hand	5	15	3
	52	13	9

W. H. HORSLEY, Col.,
Treasurer.

Examined and found correct, 3rd March, 1870—
GEORGE RIGDEN.

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EAST KENT
NATURAL HISTORY SOCIETY.

:o:

TITLE & OBJECTS OF THE SOCIETY.

:o:

The objects of the East Kent Natural History Society shall be the Collection and Diffusion of Practical and Theoretical Knowledge respecting Natural History, in all its Branches, both in relation to the particular District and the General Science.

Rules and Regulations.

MEMBERSHIP.

1. The Society shall consist of Ordinary, Honorary, and Corresponding Members, and of Associates.

2. Every candidate for admission into the Society as an Ordinary Member, must be proposed in writing by two Members, and the election shall be by ballot, taken at any meeting of the Committee, or at a General Meeting—one black ball in five to exclude.

3. The Annual Subscriptions, to be paid by Ordinary Members, shall be Ten Shillings; the Subscriptions shall become due on the 1st of January in each year, and shall be paid in advance for the current year.

Any Member neglecting to pay his Subscription for three months after it is due, shall be applied to by the Secretary, and if the Subscription remain unpaid for three months after such application, he shall cease to be a Member of the Society.

4. The Committee shall have power to admit, without ballot, on the nomination of two Members, any Lady who shall be desirous of becoming an Ordinary Member, and her Subscription shall be Five Shillings.

5. Any persons distinguished for their researches in Natural History, for their liberality to the Society, or for their connection with similar Societies may, on the recommendation of the Committee, be elected Honorary or Corresponding Members of this Society, provided they do not reside within the district: such Honorary and Corresponding Members shall not be subjected to any of the expenses of the Society, and shall have no vote in its affairs.

6. In order to encourage the study of Natural History among individuals of the class of mechanics, &c., residing in the district, the Committee shall have power to admit individuals of that class as Associates, provided they shall first communicate some information or observation on Natural History, exhibit such specimens or present them to the Local Museums, as shall by their merits satisfy the Committee. Such Associates shall enjoy the privileges of Honorary Members.

MANAGEMENT, AND BUSINESS MEETINGS.

7. The affairs of the Society shall be conducted by a Committee of Management, which shall consist of a President, Vice-Presidents, a Treasurer, and an Honorary Secretary, and not less than six Members, who shall all be chosen at the Annual Meeting. Three Members of such Committee shall form a quorum. The Meetings shall be held on the same day as the February and November General Meetings, and at such other times as the Secretary may deem necessary.

8. An Annual Meeting shall be held on the last Tuesday in January

in each year, at Canterbury, for the purpose of electing the Officers for the current year, receiving the Annual Statement of Accounts, and Report of the Committee, and co. ˙ucting the general affairs of the Society.

9. Special General Meetings may be summoned by the Committee, or by the Secretary, on the requisition (in writing) of any six Members of the Society, the specific purposes of the Meeting being stated in the notice, which shall be sent to each member not less than one week before the time of such Meeting.

10. All questions discussed at the Meetings shall be decided by a majority of votes; and if upon any question the votes shall be equal, the Chairman of the Meeting shall have the second or casting vote.

11. In the event of any vacancy occurring in the Officers or Committee, between the Annual Meetings, the same shall be filled up by the Committee.

12. In order to facilitate the objects of the Society, the Committee shall be empowered to appoint any member a Local Secretary for the town or district he may reside in. Such Local Secretary shall be *ex-officio* a Member of the Committee.

SCIENTIFIC MEETINGS AND EXCURSIONS.

13. Two Meetings shall be held in Canterbury yearly, during the first and last quarters, for the purpose of reading Papers, exhibiting Specimens, Lectures, &c. Each Member to have the right of introducing a Visitor at these Meetings.

14. Two Excursions will be appointed to take place yearly, during the Summer, for the purpose of investigating the natural objects of interest in some district in East Kent; the arrangements for these Excursions to be made at a Committee Meeting to be held in the first week of each of the Summer Quarters.

15. A Minute of the Proceedings of all Meetings shall be entered by the Secretary in a Book kept for that purpose.

16. The Secretary to give seven days' notice of such Meetings and Excursions to every Member, stating the time and place of Meeting, &c.

LOCAL MEETINGS.

17. To promote still further the objects and interests of the Society, Local Secretaries and Members are invited to organize Meetings or Excursions in their districts; and to give notice of the same to the General, and all the Local Secretaries, stating the time and place of Meeting, and what particular subjects are to be brought forward.

COLLECTIONS OF SPECIMENS.

18. The Society shall endeavour to make a Collection of Objects of Natural History, both with a view of forming a Museum and distribution of Duplicate Specimens, according to Regulations to be adopted by the Committee.

LIBRARY.

19. Only Books and Periodicals connected with Natural History are to be purchased by the funds of the Society, and the number and particular books of this class to be purchased shall be determined by the Committee.

20. All the Books and Periodicals shall be kept in some convenient place, so that Members may be able to refer to them, or take them out, under such regulations as the Committee from time to time may think proper to make.

21. Members are also invited to lend Books for the use of the Library, reserving to themselves the full right of ownership; such Books to be under the care of the Committee, and not allowed to be taken out of the Library.

EXTRACTS

From Papers read by

MAJOR MUNN AND MR. HORSNAILL,

At Dover, on Tuesday, February 9, 1869.

BY MR. HORSNAILL.

"On a Crustacean of the Family Pycnogonidæ found in the locality."

In the course of his interesting essay, Mr. Horsnaill said: —At first sight they might be taken for diminutive specimens of some of the long-legged spider crabs, Inachus or Stenorynchus; to the latter genus especially their gaunt and skeletonlike aspect as they lazily sprawl their eight unwieldy legs over the weeds, gives them a very considerable resemblance. This resemblance is, however, only in external form—for while the crabs, and their congeners the shrimps, prawns, and lobsters, are the most highly organized of the Articulata, and possess a true muscular heart, and a complicated respiratory apparatus; our little friends the pycnogons have neither heart nor lungs, or at any rate no special organs which are entitled to rank as such. * * * As far as my observations have gone, there appear to be two species, at least, common on this coast; one, somewhat larger than the other, is, I believe, identical with that figured by Dr. Carpenter under the name of Ammothea pycnogonoides; and of his woodcut the illustration is an enlarged copy. The other species is, if anything, commoner than the first, and differs in such important particulars that I have no doubt it belongs to a distinct genus—though I have not yet

been able to identify it.† Let us now place a specimen of Ammothea on an excavated slide with a few drops of sea water, and after covering it with a disc of thin glass examine it under the microscope with a power of 30 or 40 diameters. We see the animal to consist of a central thorax, composed of four segments, and presenting a somewhat octagonal figure. Into the first segment is fused, as it were, a spindle-shaped head, which is prolonged nearly to a point, the extremity being furnished with a very small mouth, the orifice of which is triradiate, or trefoil shaped, as shewn in the sketch. Dr. Carpenter states that the orifice of the mouth is armed with cilia—these I have not been able to make out, though no doubt they exist. The head is also provided with a pair of jointed antennæ, and a pair of feet jaws; these latter in the species under consideration seem to be but rudimentary, without claws, and in a position in which they can hardly be of much use to the animal; but in the second species we find that they are very largely developed, so as quite to overhang the head, and are armed with powerful pincers. From each segment of the thorax springs a pair of legs, each composed of nine joints, and terminated by a strong claw, with a smaller one attached to the same joint on its upper side. These claws do not appear to be used as weapons, but are instruments of progression, giving the creature a firm hold on the stems and branches of the seaweeds which it inhabits. The abdomen is reduced to a mere rudiment, and exists in the form of a minute tail terminating the body. In the female there are two false feet, attached to the undersurface of the thorax, and doubled back so as to form a sort of loop; these are used for carrying the spawn. The legs are also armed with strong prominences, which, under a high power, are seen to be continuations of the shell, and from each of which rises a stiff bristle* * *
With respect to the early stages of the development of the pycnogons, I have been able to obtain very little informa-

† I believe this species to belong to the Genus Nymphon, probably N. grossipes.—E.H.

tion. I have frequently during the summer and autumn months had females loaded with spawn, which is carried in two large masses, attached to the under surface of the thorax by the false feet before mentioned. I have also had two or three individuals, covered with what I at first took to be a parasite, but which I now believe to be the creature's larval form, having found the cases of recently hatched spawn, and what I take to be the young on the same specimen. If this be the case, the parent animal carries the eggs about till they are hatched, as is the case in many of the higher crustacea. The larva, if such they be, are curious little creatures, somewhat resembling a cheese-mite with the addition of a pair of very large pincer claws on each side of the head. They are very active; and cling most tenaciously to their parent, by means of their claws and four bristle feet. I have not yet been able to watch their development, and thus verify my suspicions respecting their true character, as hitherto I have found them disappear after a few days' confinement. The mature pycnogons are very tenacious of life, as might be expected from their very low vitality, and they will live a long time in a vessel of seawater. Some of those I have in the room have been kept in a tumbler for nearly two months—and for purposes of observation are better than freshly caught specimens, as they have got rid of much of the coating of diatoms and other extraneous matter which usually covers them. They seem to feed upon decaying animal and vegetable matters, which they find amongst the weeds on which they live. I have sometimes noticed a green colour pervading the stomachs as if from the presence of partially digested algæ and confervæ. In conclusion, I would again recommend these humble creatures to the notice of any amateur microscopist who is in search of instructive objects upon which to employ the powers of his instrument. The great transparency of their shelly covering renders their whole internal organization very apparent, and there are many points in their economy which are well deserving of further elucidation.

BY MAJOR MUNN.

"On the Hexagonal Cells of Bees and Wasps."

Major Munn began by saying—"I need hardly observe that the materials of which the bees construct those beautiful combs, which deserve so much admiration, is wax. This ductile substance is secreted by the bees, and may be seen frequently (especially in a newly swarmed colony of bees) appearing under the rings of the abdomen, and more than half extruded; and these scales are ready to be employed to lay the foundations for combs and the hexagonal cells that form the future homes of the bees and their brood, &c. Bees exhibit a wonderful degree of instinct, and often baffle man's ingenious devices to take a peep into the interior economy of their cells, as they adapt their waxen structures to every change of circumstance, and so frame them as to overcome any artificial obstacle—in building upwards, contrary to their natural mode of procedure—in building laterally, when unable to find a sure foundation for their works, either above or below—in curving their combs, and cells also. But the great question is, "The construction of hexagonal cells by bees." Although attributed to lateral pressure, the "circular theory" is a great fallacy with regard to the cells of the honey bees, or indeed any other bee or wasp. I will not divert your attention by giving a list of names of persons, scientific and otherwise, that still adhere to this circular theory, but proceed at once to lay before you the works of the bees themselves, and leave you to judge whether these examples be not conclusive as to the fallacy of this theory. I may also just recall to your memories that I on a former occasion mentioned the hexagonal lenses of the honey bees' eyes, and merely asked the question, "Has this anything to do with the hexagonal cells?" when I was at once called to order, and told the *circular theory* would solve the whole mystery. I now beg to answer this question. With regard to these hexagonal lenses, let me quote from a popular work on the bee, not that it affects the question

I have put, beyond showing how completely this *circular theory* takes hold of us all, to account for *even eyes*, whilst the hexagonal form of cells (or eyes) is the plan laid down by the Great Architect, and the bees (and the eyes) carry out his designs. "It appears to us questionable whether the normal shape of these lenses is hexagonal or whether this form is not rather a necessity of growth; that is to say, we think they are *normally round*, but assume the *hexagonal* shape during the process of development in consequence of their agglomeration. If this be correct, it applies equally to the compound eyes of all insects." So says the modern naturalist. I cannot do better than at once attack the fallacy of the circular system as applied (by philosophers) to the construction of the hexagonal cells of bees and wasps (as the latter have the same formation of lenses or hexagonal shapes as the honey bee), and I will leave the discovery I made many years ago of the proofs of the queen cells and breeding cells *not being sealed with wax*, but closed with the *silken meshes* of the cocoon spun and formed by the larva or embryo bee, until the latter part of this paper. So perfect is the structure of the hexagonal cells of bees that it satisfies every condition of a refined problem in geometry, and I will just detain you for a moment by stating the strength with which these cells are built. While there is great economy of materials, there are no useless partitions in a honey comb; the transition cells are honey cells; each of the six lateral panels of one cell forms also one of the panels of an adjoining cell; and of the three rhombs which form the pyramidal base of a cell, each contributes one-third towards the formation of the bases of three opposing cells, the bottom or centre of every cell resting against the point of union of three panels that are at the back of it. Besides this there is economy of room, no interstices being left between adjoining cells (which circles would certainly produce). Thus the greatest possible capacity or internal space is secured, consistent with the two former desiderata, and economy of materials and economy of room produce economy of labour, whilst the whole ranges of cells are

constructed and supported in the strongest manner possible, considering the quantity of materials employed, and would resist any lateral or circular pressure, if such force could be brought to bear upon the combs after their construction; and certainly nothing of the kind can be shewn to be the case whilst the bees are at work upon each separate cell. It is useless troubling you with descriptions of these beautiful cells, as a glance at them will satisfy you that such is the fact; and I have here specimens of the drone, worker, transition cells, all hexagonal; and also the larger, exceptionally constructed queen cells, which are built with one object and are peculiar. Now I may just state as a fact that the eight scales produced by the wax-workers from their wax pockets will exactly build up a worker brood cell, and leave the bee sufficient to fortify the edge of the cell with an additional ledge, or border of wax, rough and strong, not as is stated by bee-writers to prevent its bursting from the struggles of the bee-nymph, or from the ingress and egress of the labourers, but to enable the *cocoon* or *silken ventilator* to be attached and worked upon from side to side by the embryo or nymph bee when closing itself in, to pass into its perfect state. And this entrance border is at least three times as thick as the sides of the cell, and thicker at the angles than elsewhere, which prevents *the mouth* of the *cell* from being regularly *hexagonal*, though *the interior* is *perfectly* so. These raised borders of wax form the "stepping stones" for the workers to pass over whilst storing their honey and pollen in those adjoining cells where none of the brood are, and also enable the worker bees to hang on to the combs whilst the circulation of air for the brood is secured, to produce the temperature necessary for their perfection; and this the bees always can do, either by clustering at the bases of the combs and sides, in masses, when the brood combs form the outside range of the combs (but this is seldom done) although the Queen cells are generally advanced at the edges of the combs, for reasons which I may state upon another occasion when attempting to remove some further fallacies of our earlier

bee keepers and bee-book writers who take things for granted. Thus I have given a brief statement of the hexagonal cells as formed by the honey bee. Now let me remark that this hexagonal form of cell has been, and, indeed, is even now generally acknowledged by all philosophers to be the result of the *mechanical laws* which influence the *pressure of cylinders* composed of soft materials. They state that the nests of solitary bees, and the royal cells in a bee hive, are uniformly circular; and the cells in the pith of wood, which are hexagonal in the central parts, are circular towards the circumference, where there is diminished pressure; hence it is inferred that the hexagonal form is produced by the general reaction of the solid parts on each other. Now I must express my surprise at such a theory being held by any naturalist. Indiarubber tubes, peas, or soft balls placed within a space, and equally compressed, we all know do show the hexagonal forms, but that the cells are built in a circular form and then pressed into hexagons is one of those wild imaginations I cannot comprehend * * * * *

I am indebted to the kindness of Mr. Frederick Smith, of the British Museum, who has allowed me to exhibit this Brazilian wasp's nest ("Tatua"), or rather one sheet of it or floor, to prove the cells are hexagonally built on a plane surface; and I may add, to strengthen my position, that Mr. F. Smith read a paper, as President of the Entomological Society in London, and may be found in the transactions of 1864, in which he gives three further convincing proofs of the fallacy of the circular construction, and adds, "combination of labour is deemed essential" by "one philosopher," and "no solitary bee or wasp could construct hexagonal cells." This is refuted by the fact that the queen wasp is a solitary builder in the spring of each year. Another naturalist says, "the hexagonal form of cell may be accounted for simply by the mechanical pressure of the insects against each other during the formation of the cell. In consequence of the instinct that compels them to work with reference to a plane, and of the cylindrical form of the insects' bodies, the cells must be hexagons." This is

disproved by the above statement of the solitary queen wasp, but may I not add ironically, why not prove the body of the bee itself a hexagon? Thus six of the bees pressing against the six sides of the cell, with one jolly bee in a centre cell, would just form the hexagon (from the ductile nature of the wax), although the centre cell bee would come out of pressure like a "brick." Another condition, essential for this circular system, was "the bee or wasp, when the builder must insert its head to form the hexagonal cell." The head of the wasp placed over one of the smaller worker cells, proves to you that could not be done in many cases, and especially in these cells. And lastly, the width of the planes of the hexagon were thus explained: a worker bee was supposed to place itself exactly opposite the centre of one of the planes, and then fixing itself steadily in the proper position, the width of the plane would be the exact distance that the bee cut, or reached with its mandibles when turning its head as upon a pivot. The uniformity of the size of the bees themselves also would appear to add to the completeness of the theory. But, alas! it soon occurs to any casual observer, that the same bees afterwards construct the larger cells of the drones, and the transition cells in the combs. To prove isolated hexagonal cells are built, if you examine the nest of *Icaria guttatipennis*, and also that of *Polistes Tasmaniensis*, you will find many examples. *Vespa Norvegica* I have myself the recollection of seeing in the museum at Bergen as an example of building detached hexagonal cells; showing the hexagonal form does not necessitate the infringement of six adjoining cells for its production, a position that had been laid down as being absolutely necessary by the circular theorists, and which Mr. Smith has, by the examples I have quoted from him, I think completely refuted. The one other curious fact with regard to the honey-bee, is that the workers avail themselves of the compressed wax foundations, which are stamped rhomboids, to raise the hexagons upon for complete cells. A word as to the closing of the nymph bee to allow it to spin its cocoon, when it has no further occasion for

food. "The bees with admirable foresight terminate their cares by sealing up each cell, enclosing the nymph with a woven lid." This is Dr. Lardner's account, approaching somewhat nearer the truth. My old friend Dr. Bevan, in his *Honey Bee*, the best work ever written on the subject leaves the question in a doubtful position, but what he thought the fact when receiving his information. "The form of these royal cells is an oblong spheroid tapering gradually downwards, and having the exterior full of small indentations, somewhat resembling the rustic work of stone buildings. These cells are in depth about an inch, in diameter about the third of an inch, and smoothly polished within. The *mouth* of the cell, which is always at the bottom, remains open till the maggot is ready for transformation, and is then closed like the rest, but with a thicker cover." It is to me a marvel how naturalists, having such assistance as the microscope can now give, should so confidently state these obvious errors, and only proves how apt we are to follow in one another's track and seldom consult nature itself for truth. It is with this sole object I have ventured to come before you to-day with a few rough notes, but founded on facts and close observation, and ask you to pardon my crude statement upon a former lecture which has been put forth more to draw the attention of the members of our Club than to teach or promulgate any new theories of my own or as in any way likely to shake the faith of the philosophers who have written and spoken before us as to the correctness of their circular system when applied to the construction of the hexagonal cells of bees and wasps. However, my proofs are my own observations, and if I am mistaken in my conclusions, I shall be glad to be corrected by any member of the Club. We must therefore conclude (as Reid and Butler have written) that the bees, although they act geometrically, understand neither the rules nor the principles of the art which they practice so skilfully, and that the geometry is not in the bee, but in the Great

Geometrician who made the bee, and made all things in number, weight, and measure.

At the conclusion, a variety of objects illustrative of the above and other subjects of interest, were exhibited by members of the Society under their microscopes.

REPORT

OF

THE EAST KENT

Natural History Society,

WITH A

List of Books belonging to the Library,

&c., &c.

SESSION, 1870.

CANTERBURY:

PRINTED AT THE "KENTISH GAZETTE" OFFICE, HIGH-STREET.

Report for the Year 1870.

Your Committee has to report that the Society, as to members and finances, is in much the same condition as at the end of the preceding year. Though the balance of only 11s. 4d. in the hands of the Treasurer now, against £5 15s. 3d. at the end of the year 1869, might appear as a large deficiency, it is not so in reality; for most of the difference had been added to the permanent capital of the Society, chiefly in the shape of valuable and expensive books to the Library, of which the details will be appended to this Report. And this is a department which your Committee regards as of great importance, since a Library of some of the best books of natural science is absolutely indispensable in carrying out the designs of the Society, especially in a city where no other collection of such books is to be found. It is, therefore, with pleasure that your Committee congratulates the Society on its success in this direction, which is, in fact, a very valuable and prosperous achievement; indeed, on this point alone the Society might well and truly found a claim to the support of all persons in the district who have sufficient intelligence to appreciate the true value of natural science, and to promote it accordingly, as part and parcel of a liberal education.

But your Committee regrets that its efforts have not yet

been equally successful in other directions. Although the City has long had an independent Museum, with a suitable building and funds, there is a sad, and, it is to be hoped, singular want in the district of a taste for, and knowledge of, natural science, which that Museum has utterly failed to supply. And this is the great difficulty under which the East Kent Natural History Society labours at present. Hence, to excite and diffuse an interest in the subject, to spread and popularize a knowledge of it, appears now to be a chief duty of the Society, which, as already mentioned, has the fundamental aid of a Library; and it is hoped that your Society may yet succeed in awaking more attention in the district to the pleasures and advantages afforded by the pursuit of natural science, especially now the great importance of it in national education has been publicly recognized by our great Universities and other learned bodies.

During the year only one excursion took place, as it has been found difficult and expensive to effect such gatherings of the members and their friends. Of Lectures there have been several,—by Dr. Mitchinson, Major Munn, Mr. Dowker, and Mr. Gulliver; and the thanks of the Society are due to all these gentlemen for their services in this respect.

Though your Committee is fully alive to the advantages of lectures by professional persons, the expense is a serious consideration, and a sufficient objection, when estimated in reference to the excellent books which the money would enable the Society to add to its Library. And it should be borne in mind that your Committee, while by no means objecting to such lectures, must in the first place consider the funds of the Society, and how they may be most profitably expended; and that a few detached lectures on detached parts of detached subjects can afford but little knowledge in so wide a field as that of natural science. The real want here seems to be regular and constant instruction, and diffusion of knowledge, by frequent and set meetings for this purpose, when any branch of the extensive subject of natural history may be discussed, and this with the advantages of an easy intercommunication of the members, so that the knowledge of the whole may be at the service of any individual.

Accordingly your Committee has instituted fortnightly evening meetings, to which the members of the Society and their friends (properly introduced) are invited to bring any

specimens of natural history objects, either for the purpose of imparting or acquiring information thereon; when any member can offer either oral or written information, such as short lectures or observations, and formal papers suited to the purpose, besides the explanatory remarks which the occasion is likely to bring forth. Thus this kind of intercourse will be more or less easy and profitable; and, from the trial already made in this way, your Committee is disposed to anticipate good effects from it in future, especially when the design has been more fully carried out under the care of the newly-elected President, and with the valuable aid so liberally afforded by Colonel Cox, Colonel Horsley, Mr. Harvey, Mr. Fullagar, and Mr. Bell, of their microscopes. Whether classes for instruction at Canterbury in one or other branch of natural history might not be formed with advantage may become a question. In the kindred Society at Folkestone such classes have proved useful, and that on botany for ladies, under the care of the Rev. Charles L. Acland, a complete and gratifying success; while the liberal and judicious transfer there of the Town Museum to the Natural History Society is likely, in many points, and especially by promoting the cause of natural science in the district, to shew the utility and true objects of a local Museum.

On the whole subject of Excursions, your Committee ventures to hope that the fortnightly meetings, already explained, will prove further useful, by inducing Members and their friends to make frequent explorations of the district, and lay the results before the Meetings; and this rather prompted by a general increase of interest and zeal among the Members than by any particular attempts at "organizations" of Excursions by the Committee.

Your Committee has already given short reports, such as appear suited as local news, of the evening Meetings, and recommend that similar reports be continued, and steps taken to have them inserted, for the information of Members and others, in the Canterbury and Dover newspapers. And this, it is presumed, might be done by requesting the editor to whom the original manuscript report is sent to forward printed slips of it accordingly.

As regards lady Members, your Committee recommends that they should be eligible to serve on the Committee.

Your Committee has to call attention to the list of

Associates, not one of whom has been in direct communication with the Society for years. Associates of scientific societies are usually persons able and willing to assist the Society and themselves by intercourse with it, but from whom the payment of subscriptions could not be expected. Such Associates the Society will at all times be ready to welcome and encourage most cordially; but it is a question whether a limit ought not to be so far put to them that, in case they cease any intercourse with the Society for two or three years, this fact should cause their names to be removed from the list, any Associate thus removed being still eligible for re-election. Special cases of exemption could easily be dealt with by the Committee.

Committee on the Flora of East Kent.

This Committee has to report that, owing to unusual and unavoidable circumstances, the initiatory steps for renewing the investigations into the Flora of the district could not be taken at the commencement of last year, and consequently the inquiry was checked for the season. The work, however, has not been suspended, the analysis and registry of previous lists of plants, which were considerable, have been going on, and one or two fresh lists have been received. The Committee will shortly renew the inquiry under the plan that has been hitherto so satisfactory.

JAMES REID,
Hon. Sec. of this Committee.

Report of Librarian for 1870.

The funds placed at the disposal of the Librarian during the year 1870 consisted of £10 from the General Fund of the Society, and 6s. balance from 1869.

Of this sum £2 14s. 8d., have been spent in the purchase of new works, viz.:—Haughton's Three Kingdoms of Nature, 1 vol.; Gosse's Marine Zoology, 2 vols.; Bowerbank's British Spongiadæ, vol. 1; Journal of Botany for 1870 (12 Nos.), 1 vol.; £4 16s. 2d. in the purchase of Periodicals; and 19s. 6d. for

binding nine volumes of Periodicals of 1869, leaving a balance in hand of £1 15s. 8d.

The following Works and Pamphlets have been presented to the Society during 1870, viz.:—3rd edition Bevan on the Honey Bee, edited by Major Munn: presented by the editor.

Two Pamphlets presented by G. Dowker, Esq., F.G.S.:—

1. On Structure of a Fern Stem, from the Lower Eocine of Herne Bay: by Mr. Carruthers.
2. On the Chalk of Thanet, Kent, and its connection with the Chalk of East Kent: by Mr. Dowker.

Two Pamphlets presented by their author, G. Gulliver, Esq., F.R.S.:—

1. On the Œsophagus of Sauropsida and other Vertebrata.
2. On the Red Blood-corpuscles of Moschus, Tragulus, and Orycteropus.

No work was received from the Ray Society in 1870, in return for the annual subscription of one guinea paid by the Society.

W. H. HORSLEY, Col.,
Librarian.

FINANCIAL STATEMENT, 1870.

RECEIPTS.	£	s.	d.
Balance in hand 31st December, 1869	5	15	3
Subscriptions received in 1870, including Dover Branch to this date for 1870	23	0	0
	£28	15	3

EXPENSES.	£	s.	d.
Rent of Room in Precincts	10	0	0
Fire and Candles in ditto	1	0	0
Mrs. Ward for Printing	4	10	6
Contribution to Library	10	0	0
Subscription to Ray Society	1	1	0
Postage, Stationery, and Sundries	1	10	9
Ditto by Treasurer	0	1	8
Balance in hand 31st December, 1870	0	11	4
	£28	15	3

W. H. HORSLEY, Col.,
Treasurer.

Examined and found correct, January 28, 1871—
GEORGE RIGDEN.

Canterbury, 28th January, 1871.

LIST OF BOOKS AND PERIODICALS

Belonging to the East Kent Natural History Society.

British Land and Fresh Water Molluscs, 1 vol, (Reeve).
Bryologia Britannica, 1 vol. (Wilson).
Synopsis of British Sea Weeds, 1 vol. (Harvey)
Flora of Surrey, 1 vol. (J. A. Brewer)
Manual of Geology, 1 vol. (Professor Phillips)
Flora of East Kent, 1 vol.
Morris's British Butterflies, 1 vol.
Ramsay's Physical Geography of Great Britain, 1 vol.
Dallas's Animal Kingdom, 1 vol.
Johnstone's British Zoophytes, 2 vols.
A Catalogue of rare Phænogamous Plants collected in South Kent in 1829
Memoirs of the Geological Survey of Great Britain, 2 Nos. referring to Sheets 4 and 7
British Hemiptera, Heteroptera, 1 vol., 1865 (Douglas and Scott)
Handy Book of British Flora, 2 vols. (Bentley)
Miscellaneous Botanical Works of Robert Brown, 3 vols.
Recent Memoirs on the Cetacea, 1 vol.
Monograph of British Spongiadæ, by Dr. Bowerbank, 2 vols.
Conybeare and Phillips' Geology, 1 vol.
Bell's British Quadrupeds, 1 vol.
Atlas of British Sea Weeds, drawn by Mrs. Gatie from Professor Harvey's Phycologia Britannica, 1 vol.
Couch's Fishes, 4 vols.
Forbes's British Star Fishes, 1 vol.
Owen's Comparative Anatomy, 3 vols.
Kirby's British Bees, 2 vols.
Smith's English Flora, 4 vols.
Ralf's Desmidiæ, 1 vol.
Nitzsch's Pterylography.
Hooker's Jungermanniæ, 1 vol.
Smith's Diatomaceæ, 2 vols.
Works of W. Hewson, F.R.S., 1 vol., edited by G. Gulliver, F.R.S.
Parker's Structure and Development of the Shoulder Girdle and Sternum in the Vertebrata, 1 vol.
Lyell's Principles of Geology, 10th edition, 2 vols.
Masters's Vegetable Teratology, 1 vol.
Bevan on the Honey Bee, edited by Major Munn, F.R.H.S., 1 vol.
Gosse's Marine Zoology, 2 vols.
Haughton's Three Kingdom's of Nature, 1 vol.

PAMPHLETS.

British Moths, Nocturni.
„ Geometræ.
Memoirs pour servir á la connaissance des Crinoides vivants, par Michael Sars.
Etudes sur les Affinites Chimiques par MM. Guldberg et Waage.
Notes on Lemnaceæ and the Raphidian Character of Plants, by G. Gulliver, F.R.S.
Shetches to a scale of the Auditory Organs of Molluscs, by G. Gulliver, F.R.S.
On the Muscular Sheath of the Œsophagus of the "Aye Aye" (Chiromys Madagascariensis), by G. Gulliver, F.R.S.
On the Fibres of the Crystalline Lens of the Petromyzonini, by G. Gulliver, F.R.S.
The Diatom Prism and the true form of Diatom Markings. The Microscope Prism and the Structure of the Podura Scales, by the Rev. J. B. Reade, F.R.S.
Le Glacier de Boinon, per Mons. S. A. Saxe.
On a Fern-stem (Osmundites Dowkeri) from the Lower Eocine of Herne Bay, by Mr. Carruthers.
On the Chalk of Thanet and East Kent, by G. Dowker, F.G.S.
On the Œsophogus of Sauropsida and other Vertebrata, by G. Gulliver, F.R.S.
On the Red Corpuscles of the Blood of Moschus, Tragulus, and Orycteropus, by G. Gulliver, F.R.S.

PERIODICALS.

Natural History Review, vol. 3 1863, and vol. 4 1864.
The Zoologist, from 1843 to 1861, and from 1863 to 1869.
N.B.—The Zoologist for 1862 is incomplete.
The Quarterly Journal of Microscopical Science, old series, vol. 7, 1859, and vol. 8, 1860, new series, vol. 1, 1861, to vol. 8, 1868, vol. 2 excepted.
Magazine of Natural History, third series, vol. 3, 1859, to vol. 8, 1861, and vol. 11, 1863, to vol. 23, 1869.
The Geologist, vol. 2, 1859, vols. 3, 4, 6, and 7, 1864.
The Phytologist, vol. 3, 1859.
The Geological Magazine, vol. 1, 1864, to vol. 6, 1869.
Quarterly Journal of Science, vol. 1, 1864, to vol. 6, 1869.
Quarterly Journal of the Geological Society, vol. 20, 1864, to vol. 25, 1869.

The Natural History Repertory, 1865.
The Monthly Journal of the Royal Microscopical Society, 1st vol., 1869.

The Librarian regrets to state that in consequence of several Periodicals not having been returned to the Library, nor any entry of them made in the book kept for the purpose in the Society's reading room, he has been unable to have the volumes to which they belong bound.

THE FOLLOWING PERIODICALS

ARE TAKEN IN BY THE SOCIETY, VIZ.:

1. The Annals and Magazine of Natural History.
2. Monthly Journal of the Royal Microscopical Society.
3. The Zoologist.
4. The Geological Magazine.
5. Quarterly Journal of the Geological Society.
6. Science Gossip.
7. The publications of the Ray Society.
8. Seemann's Journal of Botany.

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———o:o:o———

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Horsley, Colonel	St. Stephen's Lodge, Canterbury.
Hilton, Captain	Nackington House, near Canterbury.
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Kingsford, Montague, Esq.	Ditto.
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Knocker, Captain	Dover.
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Makeson, H. B., Esq.	High Street, Hythe.
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Munn, Major, F.R.H.S.	Churchill house, Dover.
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Neame, Miss C.	Orchard Place, Canterbury.
Neame, E., Esq.	Selling.
Neame, Mrs. E.	Ditto.

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Payn, W. H., Esq.	St. Martin's Hill, Dover.
Plumptre, C. J., Esq.	Fredville, Nonington.
Plummer, E., Esq.	The Firs, Canterbury.
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Peake, Mr. Henry	Dover.
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Rouch, Rev. F.	Precincts, ditto.
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Slater, F., Esq.	Chislet,
Spice, C., Esq.	Strond Street, Dover.
Solomon, — Esq.	Little Kenfield, Canterbury.
Smith, J. G., Esq.	Effingham Lawn, Dover.
Sankey, Herbert, Esq.	Burgate Street, Canterbury.
Stilwell, James, Esq.	Victoria Park, Dover.
Skinner, Mrs.	Canterbury.
Tuckey, C., Esq., M.D.	St. Dunstan's, Canterbury.
Taylor, Mrs. A.	North Street, Herne Bay.
Thomson, R. E., Esq.	Kenfield House, Petham.
Walker, Mrs.	St. George's Place, Canterbury.
Ward, Miss	High Street, Canterbury.
Wray, Miss	Barton Fields, Canterbury.
Winch, A., Esq.	Norman Street, Dover.

Honorary and Corresponding Members.

Bartlett, A. D., Esq.	Zoological Gardens, London.
Bates, H. W., Esq.	London.
Boycott, J., Esq., M.D.	London.

Britten, J., Esq.	Royal Herbarian, Kew.
Kemp, Dr. William	Fort Nelson, New Zealand.
Linford, Mr. J. S.	London.
Masters, Dr. Maxwell T.	London.
Sandilands, —, Esq.	Cannings Down, Queensland, Australia.
Saunders, J., Esq.	Reigate.
Trimen, H., Esq.	Botanical Department, British Museum.
Whitaker, W., Esq.	Geological Museum, Jermyn Street, London,

Associates.

Baker, Mr.	Cattle Market, Sandwich.
Coppen, Mr., E.	Sibertswould.
Else, Mr. R.	Burgate Lane, Canterbury.
Gordon, Mr. W. C.	Museum, Dover.
Gutteridge, Mr.	Faversham.
Kennett, Mr. W.	Fordwich.
Parren, Mr. W.	Canterbury.
Prebble, Mr. J. G.	Ramsgate.
Young, Mr.	Sittingbourne.

East Kent Natural History Society.

TITLE & OBJECTS OF THE SOCIETY.

The objects of the East Kent Natural History Society shall be the Collection and Diffusion of Practical and Theoretical Knowledge respecting Natural History in all its Branches, both in relation to the particular District and the General Science.

RULES & REGULATIONS.

MEMBERSHIP.

1. The Society shall consist of Ordinary, Honorary, and Corresponding Members, and of Associates.

2. Every candidate for admission into the Society as an Ordinary Member, must be proposed in writing by two Members, and the election shall be by ballot, taken at any meeting of the Committee, or at a General Meeting—one black ball in five to exclude.

3. The Annual Subscriptions to be paid by Ordinary Members shall be Ten Shillings; the Subscriptions shall become due on the 1st of January in each year, and shall be paid in advance for the current year. Any Member neglecting to pay his Subscription for three months after it is due, shall be applied to by the Treasurer or Secretary, and if the Subscription remain unpaid for three months after such application, he shall cease to be a Member of the Society,

4. The Committee shall have power to admit, without ballot, on the nomination of two Members, any Lady who shall be desirous of becoming an Ordinary Member, and her Subscription shall be Five Shillings.

5. Any persons distinguished for their researches in Natural History, for their liberality to the Society, or for their connection with similar Societies may, on the recommendation of the Committee, be elected Honorary or Corresponding Members of the Society, provided they do not reside within the district; such Honorary and Corresponding Members shall not be subjected to any of the expenses of the Society, and shall have no vote in its affairs.

6. In order to encourage the study of Natural History among individuals of the class of mechanics, &c., residing in the district, the Committee shall have power to admit individuals of that class as Associates, provided they shall first communicate some information or observation on Natural History, exhibit such specimens or present them to the Local Museums, as shall by their merits satisfy the Committee. Such Associates shall enjoy the privileges of Honorary Members.

MANAGEMENT, AND BUSINESS MEETINGS.

7. The affairs of the Society shall be conducted by a Committee of Management, which shall consist of a President, Vice-Presidents, a Treasurer, and an Honorary Secretary, and not less than six Members, who shall all be chosen at the Annual Meeting. Three Members of such Committee shall form a quorum. The Meetings shall be held on the same day as the February and November General Meetings, and at such other times as the Secretary may deem necessary.

8. An Annual Meeting shall be held on the last Tuesday in

January in each year, at Canterbury, for the purpose of electing the Officers for the current year, receiving the Annual Statement of Accounts, and Report of the Committee, and conducting the general affairs of the Society.

9. Special General Meetings may be summoned by the Committee, or by the Secretary, on the requisition in writing of any six Members of the Society, the specific purposes of the Meeting being stated in the notice, which shall be sent to each member not less than one week before the time of such Meeting.

10. All questions discussed at the Meetings shall be decided by a majority of votes; and if upon any question the votes shall be equal, the Chairman of the Meeting shall have the second or casting vote.

11. In the event of any vacancy occurring in the Officers or Committee, between the Annual Meetings, the same shall be filled up by the Committee.

12. In order to facilitate the objects of the Society, the Committee shall be empowered to appoint any member a Local Secretary for the town or district he may reside in. Such Local Secretary shall be *ex-officio* a Member of the Committee.

SCIENTIFIC MEETINGS AND EXCURSIONS.

13. Two Meetings shall be held in Canterbury yearly, during the first and last quarters, for the purpose of reading papers, exhibiting Specimens, Lectures, &c. Each member to have the right of introducing a Visitor at these Meetings.

14. Two Excursions will be appointed to take place yearly, during the Summer, for the purpose of investigating the natural objects of interest in some district in East Kent; the arrangements for these Excursions to be made at a Committee Meeting to be held in the first week of each of the Summer Quarters

15. A minute of the Proceedings of all Meetings shall be entered by the Secretary in a Book kept for that purpose.

16. The Secretary to give seven days' notice of such Meetings and Excursions to every Member, stating the time and place of Meeting, &c.

LOCAL MEETINGS.

17. To promote still further the objects and interests of the Society, Local Secretaries and Members are invited to organize Meetings or Excursions in their districts; and to give notice of the same to the General, and to all the Local Secretaries, stating the time and place of Meeting, and what particular subjects are to be brought forward.

COLLECTIONS OF SPECIMENS.

18. The Society shall endeavour to make a Collection of Objects of Natural History, both with a view of forming a Museum and distribution of Duplicate Specimens, according to Regulations to be adopted by the Committee.

LIBRARY.

19. Only Books and Periodicals connected with Natural History are to be purchased by the funds of the Society, and the number and particular books of this class to be purchased shall be determined by the Committee.

20. All the Books and Periodicals shall be kept in some convenient place, so that Members may be able to refer to them, or take them out, under such regulations as the Committee from time to time may think proper to make.

21. Members are also invited to lend Books for the use of the Library, reserving to themselves the full right of ownership; such Books to be under the care of the Committee, and not allowed to be taken out of the Library.

OBSERVATIONS

ON

Romney Marsh and Lydd Beach,

WITH AN ACCOUNT OF

A BOTANICAL RAMBLE

FROM

Appledore to Lydd and Dungeness Point,

MADE BY

G. DOWKER, J. REID, & JOHN MARTEN.

READ BEFORE

THE EAST KENT

Natural History Society,

JULY 17, 1867.

WARD, PRINTER, CANTERBURY.

ROMNEY MARSH—ITS PHYSICAL FEATURES.

This large tract of low land has almost all been recovered from the sea during historical times. In Roman times, a harbour existed at the foot of Lympne Hill, and there yet exists the remains of the Roman castrum now termed Stutfall Castle. In A.D. 833, King Egbert granted to the monastery of Lyminge a piece of land at Sandtun, that was bounded on the south by the river Limen (now named Rother), the military canal now occupying nearly its course. Subsequently the Rother shifted its course and flowed out to sea at Romney, this was most likely before the Norman conquest. In those days the Rother flowed from Newenden, round the north side of the Isle of Oxney, by Small Hithe and Reading Street to Appledore, and from this latter place to Romney its course was along the Ree Wall, the present high road. With regard to Dungeness beach, if true as supposed by Mr. Drew, in his memoir on Romney Marsh, that the river at that time took its course between New Romney and Lydd, it follows that all that great mass of shingle forming Dunge beach, which lies to the east of this point, must have collected since the Rother first came to Romney. We have no accurate maps to guide us before the time of Queen Elizabeth, during whose reign a chart was made of the Marsh and Ness. It appears from Mr. Redman's researches, that, at that time, Dungeness point was just three miles from Lydd church, whereas in 1844 it was three miles and seven eights. In the middle of the thirteenth century some destructive storms forced the river to seek a new channel. It then changed its course at Appledore and fell into the sea at Rye, and from that time New Romney decayed as a port.

I will now speak of this Lydd beach. One characteristic of this and all similar beaches, is that it

accumulates above high water mark, and thus drives back the ocean and protects the land. At present the whole of Romney Marsh is below high water mark, so that were it it not for this protection and the Dymchurch wall connecting it with Hythe, the marsh would be subject to constant inundation. The whole of the beach is formed of rounded chalk flints, which must have been derived from the South Downs, washed by the sea. These flints washed out of the cliffs and broken by the waves, are carried by the sea currents directed by the prevailing winds, along the shore, till deposited or checked by counter currents; and thus we may suppose that prevailing south-west winds have accumulated this beach. Now, it is worthy of remark that this beach is accumulated in certain fulls or ridges which correspond with periodical high tides, and as these ridges remain, the beach shows a continuous succession of these, marking the successive changes that have taken place in the shore; and thus we learn that an ancient beach which existed west of Lydd, has been cut off by the waves and deposited towards the east. Between Lydd and the sea, certain breaks occur in the regularity of this beach, which now constitute large fresh water ponds of some acres in extent. The present beach is about eighteen feet above low water mark.

Now, with regard to the geology of the district, I may observe that the Marsh is surrounded on one side by high ground, consisting on the eastward towards Hythe, of the Escarpment of the Lower Green sand, and south westward by the Wealden beds, which I have represented by green and umber in the map here exhibited. The Marsh itself consists of what is termed alluvium, a recent deposit of sand, beach, and Estuary mud, at places at least fifty feet deep. Near Appledore, which is the lowest part of the Marsh, the peaty soil is full of oak stumps, which appear to have grown in the situation they now occupy.

It now remains for me to give an account of the wild plants noticed growing between Appledore Station and Dungeness Point.

The plants observed were as follows, being 103 in number, and they were only those attracting our attention during the ride and walk.

They are arranged in the Natural Orders :—

RANUNCULACEÆ —	
Ranunculus Aquatilis, var. Circinatus	Dike, Denge Marsh, from Beach.
Ditto Flammula	Ponds, Beach.
Ditto Lingua	Ditto, ditto, abundant.
PAPAVERACEÆ —	
Papaver Rhœas	Cultivated ground.
FUMARIACEÆ —	
Fumaria officinalis	Ditto corn fields.
CRUCIFERÆ —	
Teesdalia nudicaulis	Beach sparingly.
Cardamine pratensis	Beach, ponds, double variety.
Nasturtium officinale	Ditches about Lydd.
CARYOHYLLACEÆ —	
Silene maritima	Beach, abundant.
Ditto nutans	Of this rare plant several specimens were found on the beach.
Lychnis diurna	A few specimens.
Ditto flosculi	Beach, ponds, abundant.
Sagina prôcumbens	Beach, near ponds.
Stellaria uliginosa	Beach, ponds.
Cerastium vulgatum	Near Beach ponds.
MALVACEÆ —	
Alhœa officinalis	Plentiful along the roads, near Lydd.
Malva sylvestris	Near Lydd.
GERANIACEÆ —	
Geranium Robertianum	Plentiful all over Beach.
PAPILIONACEÆ	
Sarothamnus scoparius	Particularly procumbent and abundant on the Beach.
Ulex europæus	On the Beach with the same procumbent habit.
Ononis arvensis	Beach.
Medicago denticulata	Beach.
Lotus coniculata	Beach.
Variety Major	Beach Pond.
Vicia Cracca	Roadside, near Lydd, abundant.

ROSACEÆ—	
Prunus spinosus	Beach, densely matted, and procumbent.
Potentilla repens	Between Lydd and Beach.
Do. comarum	This plant, so rare in the South, appears in great profusion in the beach ponds—the only habitat I know in East Kent.
Rubus fructicosa	Procumbent on the beach.
ORNAGRACEÆ—	
Epilobium palustre	Ponds, Beach.
,, tetragonum	Ponds, Beach.
Myriophyllum spicatum	Beach, Ponds.
LYTHRACEÆ—	
Lythrum salicaria	Ditches near beach.
CRASSULACEÆ—	
Sedum anglicum	Beach
UMBELLIFERÆ—	
Hydrocotyle vulgaris	Beach, ponds, abundant.
Conium Maculatum	Near Appledore station
Apium graveolens	Ditches from Appledore to Lydd
Ænanthe fistulosa	Ditto ditto.
,, pimpinelloides	Ditches near Lydd.
Æthusa cynapium	Cultivated ground, Lydd.
Caucalis infesta	Near Light-House, Dungeness.
Chærophyllum temulum	Denge Marsh farm.
Pastinaca Sativæ	Station.
RUBIACEÆ—	
Galium Verum	Between Beach & Lydd.
,, palustre	Ponds and dikes, Beach.
,, uliginosum	Ponds, Beach.
,, saxatile	Beach.
,, Mollugo	Between Beach and Lydd.
VALERIANEÆ—	
Valeriana officinalis	Dike, Lydd.
COMPOSITÆ—	
Helminthia echioides	Road side, Lydd.
Sonchus arventis	Cultivated land.
Arctium lappa	Beach.
Leontodon autumnalis	Beach.
Senecio viscosus	Beach.
Carduus pycnocephalus	Coast guard St. near Light House.

CAMPANULACEÆ—	
Jasione montana	Most abundant on beach.
GENTIANACEÆ—	
Menyanthes trifoliata	Beach ponds.
PRIMULACEÆ—	
Anagallis tenella	Sides of ponds carpeted with its beautiful blooms.
Samolus Valerandi	Sparingly, beach ponds.
CONVOVULACEÆ—	
Convolvulus arvensis	Between Beach and Lydd.
Cuscuta Epithynum	Beach on Ullex Enropens.
BORAGINEÆ—	
Echium vulgare	Beach.
Myosotis palustris	Ponds.
,, arvensis	
Cynoglossum officinale	Beach.
SOLANACEÆ—	
Solanum Dulcamara	Beach.
SCROPHULARINEÆ—	
Veronica scutellaria	Beach ponds.
,, Anagallis	Dikes,
Digitalis purpurea	All over the Beach, abnndant.
Verbascum thapsus	Beach.
LABIATÆ—	
Mentha aquatica	Dike, Denge Marsh.
Teucrium scorodonia	Beach, abundant.
Galeopis Ladanum	Beach abundant.
Prunella vulgaris	Beach.
PLUMBAGINEÆ—	
Armeria maritima	Covering portions of Beach.
POLYGONACEÆ—	
Polygonum amphibium	Ponds, Beach.
Rumex Acetosa	Beach.
,, Acetosella	Ditto.
,, Aquaticus	Dikes, Lydd.
URTICACEÆ—	
Urtica dioica	Beach.
ARMENTACEÆ—	
Salix repens or myrica gale	In Pond on Beach.
TYPHACEÆ—	
Typha angustifolia	Pond Beach.
Sparganium ramosum	Dikes, Denge Marsh.

NAIADEÆ—	
Potamogeton pusillus	Ponds, Beach,
—Heterophyllus	the latter sparingly.
ALISMACEÆ—	
Alisma plantago	Ponds, Beach.
,, Ranunculoides	
Triglochin maritimum	
HYDROCHARIDEÆ—	
Hydrocharis morsus-ranæ	Dikes Marsh
IRIDEÆ—	
Iris pseudacorus	Ponds.
JUNCACEÆ—	
Juncus communis	Around Ponds, Beach.
,, Articulatus	
,, Acutus	
CYPERACEÆ—	
Scirpus Lacustris	Abundant in ponds.
,, Palustris	,, ,,
,, Maritimus	Between Beach and Lydd.
Carex pseudo-cyperas	Ponds.
,, Vulpina	
Eriophorum polystachyum	Beach Ponds.
GRAMINEÆ—	
Anthoxanthum odoratum	Beach, being the first vegetation next the criptogams.
Arrhenatherum avenaceum	
Hordeum maritimun	
FILICES—	
Aspidium Thelypteris	Abundant in one pond on Beach.

The ponds on the Beach are of considerable extent, and greatly resorted to by wild fowl. We observed the following:—Anas Boschas (wild duck), Larus canus (common gull), Larus ridibundus (black headed gull), and Larus argentatus (herring gull.) In the ponds we found very large specimens of Limnea stagnalis (pond marsh snail), and some very curious caddis worms, with great variety of Entomostraca.

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