



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### **Usage guidelines**

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

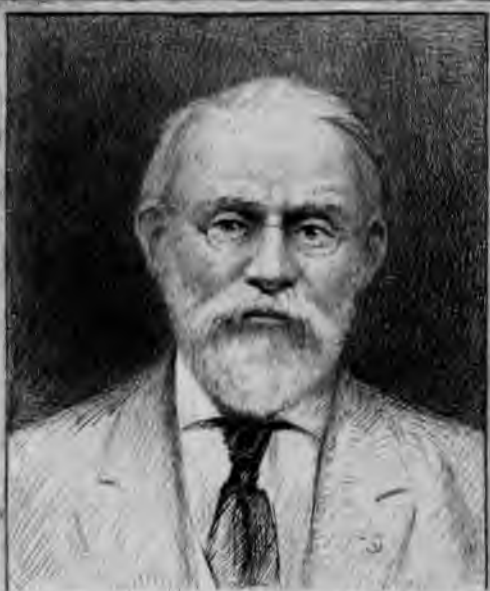
We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### **About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

B 1,071,450



SILAS WRIGHT DUNNING  
BEQUEST  
UNIVERSITY OF MICHIGAN  
GENERAL LIBRARY

QH  
1  
.N83





SILAS WRIGHT DUNNING  
BEQUEST  
UNIVERSITY OF MICHIGAN  
GENERAL LIBRARY



TRANSACTIONS  
OF THE  
NORFOLK & NORWICH  
NATURALISTS' SOCIETY.

[EDITED BY W. A. NICHOLSON, Hon. Sec.]

**The Norfolk and Norwich Naturalists' Society**  
has for its objects:—

1. The Practical Study of Natural Science.
2. The protection, by its influence with landowners and others, of indigenous species requiring protection, and the circulation of information which may dispel prejudices leading to their destruction.
3. The discouragement of the practice of destroying the rarer species of birds that occasionally visit the County, and of exterminating rare plants in their native localities.
4. The record of facts and traditions connected with the habits, distribution, and former abundance or otherwise of animals and plants which have become extinct in the County; and the use of all legitimate means to prevent the extermination of existing species, more especially those known to be diminishing in numbers.
5. The publication of Papers on Natural History, contributed to the Society, especially such as relate to the County of Norfolk.
6. The facilitating a friendly intercourse between local Naturalists, by means of Meetings for the reading and discussion of papers and for the exhibition of specimens, supplemented by Field-meetings and Excursions, with a view to extend the study of Natural Science on a sound and systematic basis.

TRANSACTIONS  
OF THE  
NORFOLK AND NORWICH  
NATURALISTS' SOCIETY.

VOL. VI.

1894—95 to 1898—99.

Norwich:  
PRINTED BY FLETCHER AND SON, LTD.  
1899.



Dunning  
Hunt  
1-19-37  
33209

## CONTENTS.

### ALPHABETICAL LIST OF CONTRIBUTORS.

AMVOT T. E., 113  
BARRETT C. G., 533  
BARRINGTON F., 552  
BENNETT ARTHUR, 457  
BIRD M. C. H., 117  
BOILEAU SIR F. G. M., 231  
BRIDGMAN J. B., 114  
BURRELL W. H., 449  
BUTLER E. A., 414, 416  
CATON-HAIGH G. H., 492  
CHRISTY MILLER, 204  
CLARKE W. G., 23, 300, 463, 552  
DRESSER H. E., 280  
EDWARDS JAMES, 515, 528  
ELDBED E. J. H., 360  
EMERSON P. H., 227  
FEILDEN H. W., 47, 161, 168, 245  
FOWLER W. WARDE, 444  
GELDART H. D., 47, 119, 161, 168, 452  
GURNEY J. H., 67, 102, 154, 240, 255, 365, 421, 429  
GURNEY AND SOUTHWELL, 501  
HARMER S. F., 363, 489  
HARRIS G. H., 269, 402, 481  
HARTING J. E., 248  
HOTBLACK J. T., 15, 229  
LOWE JOHN, 416, 418, 495  
MAYFIELD A., 185  
MOTTRAM JAMES, 201, 214  
NEWTON PROF. ALFRED, 158  
NICHOLSON W. A., 108, 224, 413, 553  
PALMER F. D., 71, 112  
PATTERSON A., 114, 190, 225, 291, 405, 484  
PETCH T., 61  
PLOWRIGHT C. B., 1, 106, 113, 439  
PLOWRIGHT C. T. M., 114, 228  
PRESTON A. W., 88, 95, 99, 190, 273, 331, 393, 473  
REID CLEMENT, 328  
SOUTHWELL T., 58, 84, 197, 207, 262, 296, 352, 385, 387, 390, 409, 417,  
418, 469, 493, 501  
SPELMAN W. W., 551  
SUTTON FRANCIS, 440  
THOULESS H. J., 419  
TUCK JULIAN G., 109  
TUCK W. H., 86, 111, 227, 328, 419, 555  
WALTER J. H., 350  
WATSON C. S., 53, 147  
WHEELER E. G., 416

## LIST OF ILLUSTRATIONS.

	PAGE
FLINT IMPLEMENTS FOUND AT THETFORD .....	29, 31, 32, 34
BRÜNNICH'S GUILLEMOT (TO FACE) .....	109
NEW ZEALAND WHITE-FACED OWL .....	156
TONGUE OF           "           " .....	157
EGG OF               "           " .....	158
MAP SHOWING DISTRIBUTION OF ALPINE SWIFT IN SUMMER (TO FACE) .....	258
PALLAS'S WILLOW WARBLER (TO FACE) .....	280
PLAN OF FELTWELL DECOY (TO FACE) .....	352
CUCKOOS AND YOUNG WAGTAILS (TO FACE) .....	374
YOUNG CUCKOO EJECTING TITLARK FROM NEST .....	378
NEST OF BEARDED TIT (TO FACE) .....	434
MAP SHOWING DISTRIBUTION OF BEARDED TIT (TO FACE) .....	438
<i>DIACHÆA SUBSESSILIS</i> (TO FACE) .....	449
PLASMODIUM CREEPING ON GLASS (TO FACE) .....	450
"FLINT JACK" (TO FACE) .....	463
SPURIOUS FLINT IMPLEMENTS .....	465



## ALPHABETICAL LIST OF SUBJECTS.

- Aculeate Hymenoptera of a Suffolk Village, 36  
 Aculeate Hymenoptera at Tostock, 36, 111, 227, 328, 419, 554  
 Additions to the Norwich Castle Museum, 84, 197, 296, 390, 469  
 Addresses, Presidential, 1, 120, 231, 331, 421  
 Albatross in Cambridgeshire, 414  
 Amyot T. E., Obituary Notice of, 124  
 Animals (Vertebrate) found in the Neighbourhood of Thetford, 300  
 Arctic Regions, On the Distribution of Flowering Plants in, 125  
 Auk, Little, Recent Abundance of in Norfolk, 67  
 Barwell H. G., Obituary Notice of, 426  
 Bearded Titmouse, 429  
 Ben Nevis, Vertebrate and Plant Life on, 245  
 Biographical Notices—"Flint Jack," 463  
 Biological Station, Proposal for in Norfolk, 108  
 Birds, Notes on the, of the Valley of the Somme, 444  
 Birds, On the Tendency in to resemble each other, 240  
 Birkbeck Henry, Obituary Notice of, 4  
 Black Variety of the Water Vole, 114  
 Black-winged Stilt at Wolferton, 228  
 Borrer William, Obituary Notice of, 427  
 Boulter and Youell, 81  
 Brännich's Guillemot in Cambridgeshire, 109  
 Bustard, Exhibition of a Norfolk, 385  
 Castle Museum, some Additions to, 84, 197, 296, 390, 469  
 Coleoptera, List of, in West Suffolk, 111  
 Colman J. J., Obituary Notice of, 425  
 Contribution to the Flora of Kolguev, 168  
 Contribution to the Flora of Russian Lapland, 161  
 Cremer T. W., Obituary Notice of, 5  
 Cuckoo, The Economy of the, 365  
 Decoy, Feltwell, 352  
 Development of Protective Instinct in Fishes, 440  
 Diverson Thomas, 72  
 Dowell E. W., Obituary Notice of, 124  
 Downes John Dawson, 72  
 Du Port J. M., Obituary Notice of, 426  
 Early Record of the occurrence of the Narwhal in Norfolk, 204  
 Early Notice of Spoonbill Breeding in Norfolk, 158  
 East Coast, High Tide on, 224  
 Eel, Further Notes on the Reproduction of, 262  
 Exhibition of a Norfolk Bustard, 385  
 Fauna and Flora of Norfolk—  
     Mammalia, 493  
     Fishes, 495  
     Birds, 501  
     Coleoptera, 515  
     Hemiptera, 528  
     Lepidoptera, 533

- Feltwell Decoy, 352  
 Fishes, Development of Protective Instinct in, 440  
 "Flint Jack," His Life-History, 463  
 Flora of Great Yarmouth District, 137  
 Flora of Kolguev, Contribution to, 168  
 Flora of Russian Lapland, Contribution to, 161  
 Foreign Animals Living in British Parks, Notes on, 360  
 Frere Frederick, 82  
 Fresh-water Biological Station in Norfolk, proposal for, 108  
 Frost, Great, of 1894—5, Notes on, 95  
 Fulmar Petrel at Holme, 228  
 Fungi, Poisonous (*Agaricus phalloides*), 1  
 Further Notes on Hawking in Norfolk, 248  
  
 Gale of March 1895, Notes on, 99  
 Gätke Herr, Obituary Notices of, 233  
 Girdlestone C. S., 76  
 Glasspoole Capt., 78  
 Glasspoole Hampden, 78  
 Grampuses, Young, on the Norfolk Coast, 58  
 Great Frost of 1894—5, Notes on, 95  
 Gull, Mediterranean Herring, occurrence of, 417  
  
 Halo, Solar, 118  
 Hawking in Norfolk, Some further Notes on, 248  
 Herring Fishery in 1894, 53  
   "  "  1895, 147  
   "  "  1896, 269  
   "  "  1897, 402  
   "  "  1898, 481  
 Herrings, Some questions about, 15  
 High Tide on East Coast, 224  
 Honey Buzzard in Suffolk, 416  
  
 Ichneumon (*Pezomachus corruptor*), bred from Beetle, 114  
 Instinct in Fishes, Development of Protective, 440  
 Kitton Frederic, Obituary Notice of, 122  
 Kitton Frederic, Memoir of, 201  
 Kolguev, Contribution to the Flora of, 168  
  
 Land and Fresh-water Mollusca of West Norfolk, 61  
 Lean William, Extracts from a Lecture by, 102  
*Leucochroa candidissima* in the Riviera, 418  
 Lilford Lord, Obituary Notice of, 232  
 List of the Aculeate Hymenoptera of a Suffolk Village, 36  
 Little Auk, Recent Abundance of in Norfolk, 67  
 Lowestoft, Migration Notes from, 227  
 Lucia, —, 82  
 Lucas C. J., Obituary Notice of, 234  
  
 Mann T. J., Obituary Notice of, 331  
 Manning C. R., Obituary Notice of, 426  
 Marked Woodcocks, 416  
 Marsham Robert, Extract from Norwich Mercury 1777, 552  
 May-day Customs at Lynn, 106  
 Mediterranean Herring Gull, occurrence of, 417  
 Meteorological Notes for 1894, 88  
   "  "  1895, 190  
   "  "  1896, 278  
   "  "  1897, 393  
   "  "  1898, 478  
 Microscopical Society, Norfolk and Norwich, 214  
 Migration Notes from Lowestoft, 227  
 Migration of Ring Ouzel, 416  
 Mildew of Wheat, 9  
 Miller Stephen, 81  
 Mimicry in *Psyche bombycella*, 418  
 Miscellaneous Notes and Observations, 106, 224, 328, 415, 552  
 Mistletoe, its Hosts and Distribution in Great Britain, 453  
 Mollusca. Land and Freshwater of West Norfolk, 61  
 Mollusca of Norfolk, 185  
 Mulberry Tree, A Transplanted, 112  
*Mus rattus* at Yarmouth, 487, 229  
 Mycetozoa, 449  
  
 Narwhal, Early record of the occurrence of, in Norfolk, 204  
 Neolithic Man in Thetford District, 23  
 Newton, Sir Edward, Obituary Notice of, 331

- Newton Sir Edward, Memoir of, 409  
 New Zealand White-faced Owl, 154  
 Niphargus (Well-shrimp), near Norwich, 489  
 Norfolk, Hawking in, Some further Notes on, 248  
 Norfolk and Norwich Microscopical Society, 214  
 Norfolk, Mollusca of, 185  
 Norwich Mercury 1777, Extract from, relating to Robert Marsham, 552  
 Norwich Museum, Additions to, 84, 197, 296, 390, 469  
 Norfolk, Wild Birds Protection Acts of 1880 to 1894, 207, 413  
 Note on *Paradoxocarpus carinatus*, 328  
 Note on Paraselena seen at Lynn, 439  
 Notes on Pallas's and some other rare European Warblers, 280  
 Notes on Some Foreign Animals living in British Parks, 360  
 Notes on the Birds of the Valley of the Somme, 444  
 Notes on a Small Collection of Spitzbergen Plants, 47  
 Notes on the Herring Fishery, 53, 147, 269, 402, 481  
 Notes Meteorological, 88, 190, 273, 393, 473  
 Notes on the Great Frost of 1894—5, 95  
 Notes on the Great Gale of March 1895, 99  
 Notes and Observations, Miscellaneous, 106, 224, 328, 415, 552  
 Notes, Marine, &c., from Yarmouth, 114, 225, 291, 405, 484  
 Notes on *Rallus aquaticus*, 117  
 Notes, Further on the Re-production of the Common Eel, 262  
 Obituary Notices, T. E. Amyot, 124  
 " " H. G. Barwell, 426  
 " " Henry Birkbeck, 4  
 " " W. Borrer, 427  
 " " J. J. Colman, 425  
 " " T. W. Cremer, 5  
 " " E. W. Dowell, 124  
 " " J. M. Du Port, 426  
 " " Herr Gätke, 233  
 " " F. Kitton, 122, 201  
 " " Lord Lilford, 232  
 " " C. J. Lucas, 234  
 Obituary Notices, T. J. Mann, 3  
 " " C. R. Manning, 426  
 " " Sir E. Newton, 331  
 " " H. Seebohm, 122  
 " " C. Stacy Watson, 232  
 Occurrence of the Mediterranean Herring Gull, 417  
 Occurrence of the Ruff in Winter, 551  
 Old-time Yarmouth Naturalists, 71  
 On the Distribution of Flowering Plants in the Arctic regions, 125  
 On the Tendency in Birds to resemble each other, 240  
 On the Ornithology of Switzerland, 255  
 On the Recording of Phenological Phenomena, 336  
 Ostrich Farm, Visit to an Egyptian, 359  
 On some Bones of a Pelican from the Cambridgeshire Fens, 363  
 Overend John G., 82  
 Owl, New Zealand White-faced, 154  
*Pæciloscytus vulneratus* at Yarmouth, 419  
 Paget Charles J., 74  
 Pallas's and some other rare European Warblers, Notes on, 280  
*Paradoxocarpus carinatus*, Note on, 328  
 Paraselena, seen at Lynn, Note on, 439  
 Pelican, On some Bones of a, from the Cambridgeshire Fens, 363  
*Pezomachus corruptor*, 114  
 Phenological Phenomena, On the recording of, 336  
 Plant (and Vertebrate) Life on Ben Nevis, 245  
 Poisonous Fungi (*Agaricus phalloides*), 1  
 Presidential Addresses, 1, 120, 231, 331, 421  
 Preston Ed. S., 83  
 Proposal for a Fresh-water Biological Station in Norfolk, 108  
*Psyche bombycella*, Mimicry in, 418  
 Radde's Bush Warbler in Lincolnshire, 492  
*Rallus aquaticus*, Notes on, 117  
 Recent Abundance of the Little Auk in Norfolk, 67  
 Re-production of the Common Eel, Further Notes on, 262

- Ring Ouzel, Migration of, 416  
 Rising Robert, 79  
 Ruff, occurrence of, in Winter, 551  
 Root Tubercles, 553  
 Russian Lapland, Contribution to  
 Flora of, 164  
  
*Scorpana dactyloptera* (correction  
 of an error), 115  
 Seebohm Henry, Obituary Notice  
 of, 122  
*Senecio paludosus* and *S. palustris*  
 in East Anglia, 457  
 Smith John, 81  
 Solar Halo, 113  
 Some Additions to the Norwich  
 Castle Museum, 84  
 Some Questions about Herrings, 15  
 Somme, Birds of the Valley of the,  
 444  
 Spitzbergen Plants, Notes on a  
 Small Collection of, 47  
 Spoonbill Breeding in Norfolk,  
 Early Notice, 158  
 Stilt Plover at Wolferton, 228  
 Swan-pit, The St. Helen's, 387  
 Switzerland, On the Ornithology of,  
 255  
  
 Tawny Pipit in Norfolk, 418  
 Teasdel Henry J., 82  
 The Economy of the Cuckoo, 365  
 The St. Helen's Swan-pit, 387  
 Thetford, A List of the Vertebrate  
 Animals found in the Neighbour-  
 hood of, 300  
 Titmouse, Bearded, 421  
  
 Tomlinson Joseph, 83  
 Turner Dawson, 71, 76  
  
 Vertebrate Animals found in the  
 Neighbourhood of Thetford, 300  
 Vertebrate and Plant Life on Ben  
 Nevis, 245  
 Visit to an Egyptian Ostrich Farm,  
 350  
  
 Water-hen's Nest built with Pea-  
 cocks' feathers, 552  
 Water Vole, Black Variety of, 114  
 Watson C. Stacy, Obituary Notice  
 of, 232  
 Well-shrimp (*Niphargus*), near  
 Norwich, 489  
 Wheat Mildew, 9  
 White-beaked Dolphin, 117  
 Wigg Lilly, 73  
 Wild Birds Protection Acts of 1880  
 to 1894, as applied to Norfolk, 2-7  
 Wild Birds Protection in Norfolk,  
 413  
 Winfarthing Oak, 113  
 Woodcocks, Marked, 416  
  
 Yarmouth District, Flora of, 137  
 Yarmouth, *Mus rattus* at, 229  
 Yarmouth, Marine and other Notes  
 from, 114, 225, 291, 405, 484  
 Yarmouth Naturalists, On Old-  
 time, 71  
 Young Grampuses on Norfolk Coast,  
 58  
 Youell and Boulter, 81

*Lists of Officers and Members, Statement of Accounts, and Catalogues of  
 Publications received, to be bound at the end of Volume.*

TRANSACTIONS  
OF THE  
Norfolk and Norwich  
NATURALISTS' SOCIETY;

*Presented to the Members for*

1894—95.

VOL. VI.—PART I.

Norwich:  
PRINTED BY FLETCHER AND SON.  
1895.



# Horfolk and Norwich Naturalists' Society.

## OFFICERS FOR 1894—95.

### President.

MR. C. B. PLOWRIGHT, M.D.

### Ex-President.

MR. T. SOUTHWELL, F.Z.S.

### Vice-Presidents.

THE RIGHT HON. THE EARL OF LEICESTER, K.G.  
THE RIGHT HON. THE EARL OF KIMBERLEY, K.G.  
THE RIGHT HON. THE LORD WALSHINGHAM, F.R.S.  
THE RIGHT HON. THE LORD AMHERST OF HACKNEY.  
SIR FRANCIS G. M. BOILEAU, BART., F.Z.S., F.S.A.  
MICHAEL BEVERLEY, M.D. COL. FEILDEN, C.M.Z.S.  
HERBERT D. GELDART. JOHN HENRY GURNEY, F.I.S.  
JOHN B BRIDGMAN, F.I.S. F. W. HARMER, F.G.S.  
T. SOUTHWELL, F.Z.S.

### Treasurer.

MR. H. D. GELDART.

### Hon. Secretary.

MR. W. A. NICHOLSON.

### Committee.

MR. G. C. EATON. REV. J. A. LAURENCE. MR. A. PATTERSON.  
MR. H. R. EVERETT. MR. J. H. WALTER. MR. E. J. H. ELDER.  
MR. C. F. HINDE. REV. C. J. LUCAS. MR. J. MOTTRAM.  
MR. G. C. DAVIES. MR. F. DANBY PALMER. MR. J. T. HOTBLACK.

### Journal Committee.

THE RIGHT HON. THE LORD LILFORD.  
MR. W. H. BIDWELL. PROFESSOR NEWTON.  
MR. JAMES REEVE. MR. A. W. PRESTON.

### Excursion Committee.

MR. C. BUSSEY. MR. J. T. HOTBLACK.  
MR. E. CORDER. MR. A. PATTERSON.  
MR. F. DIX. MR. A. W. PRESTON.

### Auditor.

MR. S. W. UTTING.

---

### Harmonth Section.

REV. C. J. LUCAS, *Chairman.* MR. F. DANBY PALMER, *Treasurer.*  
MR. ARTHUR PATTERSON, *Hon. Sec.*

## LIST OF MEMBERS. 1894—95.

\* Members who have compounded for their subscriptions are marked with an asterisk.

- A**
- \*Ames Victor  
Bolton Studios, Falham Road, S.W.  
Amherst Right Hon. Lord, F.Z.S., V.P.  
Diddington Hall
- Amyot T. E., F.R.C.S.      Diss  
Anderson Major J. A.      Ditham  
Aplin P. C.      Bodicote, Banbury  
Aplin Oliver V.      Hoxham  
Atmore E. A.      Lynn
- B**
- Backhouse James, Jun., West Bank, York  
Baker W. E.      Tilney All Saints  
Balls F.      Thorpe St. Andrew, Norwich  
Balls J. E.      Castle Meadow, Norwich  
Barclay Francis H.      Leyton, Essex  
Barclay H. G., F.R.G.S.      Colney Hall  
\*Barclay E.      High Lee, Hoddesdon  
Barlee Rev. W., M.A.      Cringleford Hall  
Barnard Miss A.  
Prince of Wales Road, Norwich  
Barrett C. G., Hon. Mem.  
30 Linden Grove, Nunhead, S.E.  
Barwell H. G.      Surrey Street, Norwich  
\*Becher Major Edward F., R.A., F.Z.S.  
Grosvenor Chambers, Oxford St., W.  
\*Becher Rev. William      Wellow, Notts  
Beckett J. B.  
11 Lancaster Road, Great Yarmouth  
Bennett Arthur, F.L.S.      Croydon  
Beverley M., M.D., V.P.  
Prince of Wales Road, Norwich  
Bidgood John, B.Sc.  
7 Richmond Terrace, Gateshead-on-Tyne  
Bidwell E.      1 Trigg Lane, E.C.  
Bidwell W. H.      Thorpe Road, Norwich  
Bird Rev. M. C. H., M.A., M.B.O.U.  
Brunstead Rectory  
Birkbeck Sir Edward, Bart.  
Horstead Hall  
Birkbeck W.  
Thorpe St. Andrew, Norwich  
Blake Dr. H.      25 Hall Quay, Great Yarmouth  
Blake R.      Bracondale, Norwich  
Bloomfield Rev. E. N., M.A., F.E.S.  
Guestling Rectory, Hastings  
Boardman E. T.      Queen Street, Norwich  
Bolleau Sir F. G. M., Bart., F.Z.S., F.S.A.,  
V.P.      Ketteringham Hall, Wymondham  
Bollingbroke L. G.      The Close, Norwich  
Borrow W., F.Z.S., F.L.S.  
Cowfold, Horsham  
Bourke H. E. M.      Princes' Street, Norwich  
Bridgman J. B., F.L.S., V.P.  
St. Giles Street, Norwich  
Brittain Henry, St. Faith's Lane, Norwich
- Brock Ernest Vanden, Hon. Mem.  
123 Rue de Terre Neuve, Brussels  
Brown Rev. J. L.      Chapel Field Grove, Norwich  
Bulwer W. D. E.      Quebec House, East Dereham  
Burlingham D. Othin      Lynn  
Burn Rev. W. Pelham, M.A.  
The Chantry, Norwich  
Burnard G. B.      Worstead  
Barton S. H., M.B.  
St. Giles Street, Norwich  
Bussey C.      St. Martin-at-Palace, Norwich  
Butcher H. F.      Chester Place, Norwich  
Butler Colonel  
Brettenham Park, Bideston, Suffolk  
Buxton A. F.      50 Cornhill, E.C.  
Buxton C. Louis      Bolwick Hall, Norwich  
Buxton E. G.      Catton Hall, Norwich  
Buxton Geoffrey P., F.Z.S.  
Dunston Hall, Norwich  
Buxton H. E.      Great Yarmouth  
Buxton H. G.      Catton Hall, Norwich  
Buxton S. G., F.Z.S.  
Catton Hall, Norwich  
\*Buxton Sir T. F., Bart., F.Z.S.  
Warlies, Waltham Abbey
- C**
- Candler C.      Harleston  
Candler G.      Lenton  
Candler Henry  
War Office, Pall Mall, London, S.W.  
Carter W.      Free Library, Great Yarmouth  
Chase E. W.      2 Edgbaston Road, Birmingham  
Christy Miller, F.L.S.  
Pryors, Broomfield, Chelmsford  
Clarke W. G.      Thetford  
\*Clifton The Right Hon. Lord  
Dampton Park, Ramsgate  
Clowes J. E., Hall Quay, Great Yarmouth  
\*Cocks A. H., M.A., F.Z.S.  
Thames Bank, Great Marlow, Bucks  
Collett Professor Robert, Hon. Mem.  
The University, Christiania, Norway  
Colman J. J.      Carrow House, Norwich  
Colman Russell J.      Bracondale, Norwich  
Combe E. H. H.      Gorleston, Great Yarmouth  
Connop E. M.      Rollesby Hall  
Cooke G. F.      Thorpe, Norwich  
Cooke M. C., Hon. Mem.  
146 Junction Road, Upper Holloway  
Cordeaux John      Great Cotes, Lincoln  
Corlier O.      Brundall  
Corder Edward      London Street, Norwich  
Cordwell W.      Harleston  
Cresswell George      Lynn  
Cresswell Rev. S. F., D.D., F.R.A.S.,  
F.R.G.S.      Northrepps Rectory



Crook Dr. A.  
 Prince of Wales Road, Norwich  
 Cross J. M. Mile Road, Norwich  
 Crowfoot W. M. M.B. Beccles  
 \*Crowley P., F.Z.S., F.L.S.  
 Waddon House, Croydon

## D

Davey G. Horningtoft  
 Davies G. C. Town Close Road, Norwich  
 Day Rev. A. G., M.A.  
 Great Melton Rectory, Wymondham  
 Digby A. Fakenham  
 Dix Francis Essex Street, Norwich  
 Dix Miss E. L. Essex Street, Norwich  
 Dowell Rev. E. W., B.A., Dunton Rectory  
 Dowson E. T., F.E. Met. Soc. Geldeston  
 \*Dresser H. E., F.Z.S., F.L.S.  
 Toplyffe Grange, Farnborough  
 Duckett Dr. C.  
 St. George's Terrace, Great Yarmouth  
 Du Port Rev. J. M., M.A., Denver Rectory

## E

Eade Sir Peter, M.D.  
 St. Giles Street, Norwich  
 Eaton George C.  
 Cleveland House, Eaton, Norwich  
 Edwards J., *Hon. Mem.*  
 Colesborne, Gloucestershire  
 Eldred E. J. H. Castle Meadow, Norwich  
 Emerson P. H., B.A., M.B.  
 North Cliff Lodge, Lowestoft  
 Evens W., F.R.S.E.  
 9 St. Andrew's Square, Edinburgh  
 Everett H. R.  
 Prince of Wales Road, Norwich

## F

Falcon Michael Horstead  
 Farn A. B., Mount Nod, Greenhithe, Kent  
 \*Feilden Col. H. W., V.P., F.G.S., C.M.Z.S.  
 West House, Wells  
 Fitch Rev. H. C. Beeston Regis Rectory  
 Fletcher B. E., Marlingford Hall, Norwich  
 \*Fletcher W. H. B.  
 Chapel Road, Worthing  
 Forrester J. B. Tombland, Norwich  
 Forrester J. S. Tombland, Norwich  
 Fortune Riley Harrogate  
 Foster Charles  
 Thorpe St. Andrew, Norwich  
 Fowler W. Wards, Lincoln College, Oxford  
 Frere H. B. Temple  
 Alexandra Mansions, Norwich  
 Fryer Herbert F. Chutteris

## G

Gabbett Poole  
 Norfolk & Norwich Hospital, Norwich  
 \*Gainsborough The Right Hon. the Earl  
 of Exton Park  
 Gätke H., *Hon. Mem.* Heligoland  
 Geldart H. D., V.P., Treasurer  
 Thorpe Hamlet, Norwich  
 Gerish W. B. Wormley, Herts.  
 Gianfield W. A.  
 St. George's Terrace, Great Yarmouth  
 Goose A. H.  
 Prince of Wales Road, Norwich  
 Griffiths Rev. H. T. Smallburgh Rectory  
 Gunn T. E., F.L.S.  
 St. Giles Street, Norwich

Günther A. C. L. G., M.D., F.R.S.  
 British Museum (Natural History),  
 South Kensington S.W.  
 Gurdon R. T., M.P. Letton Hall  
 \*Gurney Gerard H.  
 Keswick Hall, Norwich  
 \*Gurney J. H., V.P., F.L.S., F.Z.S.  
 Keswick Hall, Norwich  
 Gurney Nigel Sprowston Hall, Norwich  
 Gurney R. H. J. Northrepps Hall  
 Gurney R. Sprowston Hall, Norwich

## H

\*Hackblock W. H. Coltishall  
 Haigh C. H. Caton  
 Grainsby Hall, Gt. Grimsby  
 Haldinsein Alfred  
 Unthank's Road, Norwich  
 Haldinsein W. 35 Hyde Park Gate,  
 Kensington Gore, S.W.  
 Hall H. Woodbridge  
 Hamblen W. W. Wells  
 Hamond A., F.Z.S. Westacre  
 Hamond Charles A.  
 Twyford Hall, East Dereham  
 \*Hamond Commander R. H., R.N.  
 Swaffham  
 Harcourt B. W., St. Giles Street, Norwich  
 Harmer F. W., V.P., F.G.S.  
 Cringleford, Norwich  
 Harmer S. F., B.A., B.Sc.  
 King's College, Cambridge  
 Hurvey E. K. Lowestoft  
 Harvie-Brown J. A., F.E.S.E.  
 Dunipace House, Larbert, N.B.  
 Hastings The Right Hon. Lord  
 Melton Constable  
 Hebbert C. T., F.Z.S. The Rhodron,  
 Hook, Kingston-on-Thames  
 Hector Sir James, M.D., K.C.M.G., F.R.S.  
*Hon. Mem.*  
 New Zealand Institute, Wellington  
 Herring Capt. H. L.  
 Thorpe St. Andrew, Norwich  
 \*Hill Alexander, M.D.  
 Downing College, Cambridge  
 Hinde C. F. Unthank's Road, Norwich  
 Hinde F. C. Thorpe Hamlet, Norwich  
 Hinde G. J., Ph.D., F.G.S., *Hon. Mem.*  
 Avondale Road, Croydon  
 \*Hoare S., M.P.  
 Hooker Sir J. D., M.D., K.C.S.L., C.B.,  
 F.R.S., *Hon. Mem.*  
 The Camp, Sunningdale, Surrey  
 Hotblack G. S.  
 Prince of Wales Road, Norwich  
 Hotblack J. T., Newmarket Road, Norwich  
 Howard R. J., M.B.O.U.  
 Hawkhurst, Blackburn

## I

Irby Colonel, F.L.S., F.Z.S.  
 14 Cornwall Terrace, Regent's Park, N.W.

## J

Jarrold W. T. F.  
 Thorpe St. Andrew, Norwich  
 Jickling Rev. F. Smallburgh Hall  
 Jones Sir Laurence, Bart.  
 Cranmer Hall, Fakenham

## K

Kimberley The Right Hon. the Earl of,  
K.G., V.P.  
Kimberley Hall, Wymondham  
King H. A. Exchange Street, Norwich  
Kitton F., Hon. F.R.M.S., Hon. Mem.  
8 West Kensington Terrace, London, W.  
Knox A. W., M.D. Smallburgh

## L

Langton H.  
11 Marlborough Place, Brighton  
Laurence Rev. J. A. Dilham, Norwich  
Laurence R. Norwich  
Leathes Colonel H. M. Dovercourt  
\*Lee Warner Henry Walsingham Abbey  
Lee Warner Henry Swaffham  
Leicester The Right Hon. the Earl of,  
K.G., V.P. Holkham Hall  
Le Pelley Rev. J. L., M.A. Ringland  
le Strange Hamon, F.Z.S. Hunstanton Hall  
Lilford The Right Hon. Lord, F.L.S., Hon.  
Mem. Lilford House, Oundle  
\*Lindley The Right Hon. the Lord Justice  
East Carlton  
Long F. Wells  
Long J. Dunton  
Lowe John, M.D., Hon. Mem.  
4 Gloucester Place, Portman Square,  
London, W.  
\*Lubbock The Rt. Hon. Sir John, Bart.,  
M.P., D.C.L., F.R.S. High Elms, Hayes, Kent  
Lucas Rev. C. J., M.A., President, Great  
Yarmouth Section  
Burgh House, Great Yarmouth

## M

Macpherson A. H.  
51 Gloucester Place, Hyde Park, W.  
Manby A. R., M.D. East Rudham  
\*Mann T. J.  
Hyde Hall, Sawbridgeworth, Herts  
Manning Rev. C. B., M.A., F.S.A. Diss Rectory  
Marsham Major Marsham Hall  
Mayfield A. 88 Stafford Street, Norwich  
Middleton C. Holkham  
Miller Henry, Jun. Bosmere House,  
Norwich Road, Ipswich  
Monement W. B. Waborne  
Mottram James Bank House, Norwich

## N

Newcome E. C. Feltwell  
Newcome F. d'Arcy Feltwell Hall  
Newton Professor, M.A., F.R.S., Hon.  
Mem. Magdalene College, Cambridge  
Newton Sir Edw., K.C.M.G., C.M.Z.S.,  
F.L.S. Lowestoft  
Newton E. T., F.R.S., Hon. Mem.  
H.M. Geological Survey Office,  
28 Jermyn Street, London  
Nicholson F., F.Z.S. 111 Portland Street, Manchester  
Nicholson W. A., Honorary Secretary  
3 Oxford Street, Norwich  
Nightingale Rev. R. C. Beccamwell Rectory

## O

\*Ogilvie F. M. Sizewell House, Leiston  
Owen Rev. J. R. B. Tofts

## P

Page G. W. Fakenham  
Paget Sir James, Bart., F.R.S., Hon. Mem.  
5 Park Square West, Regent's Park,  
London, S.W.  
Palmer F. Danby, M.S.A.  
Hall Quay, Great Yarmouth  
\*Parkin Thomas, M.A., F.Z.S.  
High Wickham, Hastings  
Parry A. Lound, Lowestoft  
Partridge Rev. W. H., M.A.  
Caston Rectory, Attleborough  
Patterson A., Hon. Sec. Great Yarmouth  
Section 2 Moat Road, Great Yarmouth  
Peake E. 36 Earham Road, Norwich  
Perry Colonel Thorpe St. Andrew, Norwich  
Pigott T. Digby, C.B., F.R.G.S.  
5 Ovington Gardens, S.W.  
Pitts R. E.,  
Copt Hall, Springfield, Chelmsford  
Plowright C. B., M.D., Hon. Mem. Lynn  
Powell P. Brunstead, Stalham  
Power F. D. 299 Cold Harbour Lane, London  
Preston A. W., F.R. Met. Soc. Bradestone  
Purdy R. J. W. Woodgate House, Aylsham  
Pycraft W. University Museum, Oxford

## R

Ray Rev. H. Unthank's Road, Norwich  
Reeve J., Clarence Road, Thorpe, Norwich  
\*Reid Clement F.L.S., F.G.S.  
H.M. Geological Survey Office, London  
\*Reid Capt. Savile G., R.E.  
Thornhaugh, Swanage, Dorset  
\*Ringer Sidney, M.D.  
Cavendish Square, W.  
Ripley Rev. W. N. Earham Hall, Norwich  
Roberts E. T. Castle Meadow, Norwich  
Robinson H. S. St. Giles Plain, Norwich  
\*Rosebery The Right Hon. the Earl of,  
K.G. Berkeley Square, W.  
Royal Microscopical Society, President of  
the, Hon. Mem. 20 Hanover Square, W.  
Ruston A. Harold Chatteris

## S

Saunders Howard, F.L.S., F.Z.S.  
7 Radnor Place, London, W.  
Savill-Onley C. A. O.  
Boxfields, Galleewood, Chelmsford  
Seebohm H., F.L.S., F.Z.S.  
22 Courtfield Gardens,  
South Kensington, London, W.  
Sharman W. Cobholm, Great Yarmouth  
Shiplew W., Jun. Southtown, Great Yarmouth  
Sillis T. W.  
63 York Road, Great Yarmouth  
\*Singh Prince Frederick Duleep  
White's Club, London

Smith W. R. Harleston  
 \*Southwell C. Gurrey Lodge, Childs Hill, N.W.  
 Southwell T., F.Z.S., V.P. 10 The Crescent, Norwich  
 Spelman W. W. Brundall  
 Spurgin E. A. Tipton  
 Sutton Francis, F.C.S. St. Faith's Lane, Norwich

## T

Taylor S. T., M.B. Chingford  
 Thouless H. J., 48 Grove Avenue, Norwich  
 Todd J. T. Chapel Field Gardens, Norwich  
 Tuck Rev. J. G. Tostock Rectory, Bury St. Edmunds  
 Tuck W. H. Tostock House, Bury St. Edmunds  
 Tyler Rev. W. W. Kenninghall

## U

Upcher H. M., F.Z.S. Feltwell  
 Utting S. W. Thorpe, Norwich

## V

Vaughan Matthew Haileybury College

## W

\*Walsingham The Right Hon. Lord.  
 F.R.S., V.P. Merton Hall, Thetford  
 Walter J. H. Old Catton  
 \*Watling E. A. Scratby Hall, Ormesby,  
 Great Yarmouth  
 Watson A. Q. Thetford  
 Watson C. Stacy Caister Road, Great Yarmouth  
 West A. Wymondham  
 Wheeler F. D., M.A., LL.D. St. Giles' Road, Norwich  
 \*Whitaker Joseph, F.Z.S. Rainworth Lodge, Mansfield  
 Whitaker J. A. Blakeney  
 White E. W. St. Giles' Road, Norwich  
 Whitear Miss M. Wortwell  
 Whitty C. E., M.D. Hunstanton  
 Williams C. Prince of Wales Road, Norwich  
 Wilson H. F. Chiswick Mall  
 Winter J. J. Drayton, Norwich  
 Woodward H. B., F.G.S., Hon. Mem. 60 Hamilton Road, Highbury Park,  
 London, N.  
 Wright C. A., Knight of the Crown of  
 Italy, F.L.S., F.Z.S. Kayhaugh House, Kew

## Y

Young John, F.L.S., F.Z.S. 64 Hereford Road, London, W.

## The Treasurer in Account with the Norfolk and Norwich Naturalists' Society, Year ending 26th March, 1896.

	Dr.	£ s. d.	Cr.	£ s. d.
T. Subscriptions:—				
1 for 1891-92		0 5 0		0 5 0
5 " 1892-93		1 10 0		1 10 0
14 " 1893-94		3 10 0		3 10 0
150 " 1894-95		43 0 0		43 0 0
6 " 1895-96		1 10 0		1 10 0
1 " 1896-97		0 5 0		0 5 0
1 " 1897-98		0 5 0		0 5 0
.. Additional payments for monthly notices		0 18 0		0 18 0
.. Sale of <i>Transactions</i>		1 11 0		1 11 0
.. Donation		0 5 0		0 5 0
.. Grant from Life Membership Fund		10 0 0		10 0 0
		£04 14 0		£04 14 0
LIBRARY ACCOUNT.				
To Balance from last year		£ 4 0 0		£ 4 0 0
		3 0 0		3 0 0
		43 0 0		43 0 0
		£4 0 0		£4 0 0
			By Bookbinding	0 14 0
			.. Purchase of two numbers of <i>The Ibis</i>	0 16 0
				£8 0 0
LIFE MEMBERSHIP FUND.				
To Balance from last year		£ 95 12 7		£ 95 12 7
.. Two Compositions for Life Membership		6 0 0		6 0 0
.. Interest		2 5 11		2 5 11
		£103 18 6		£103 18 6
By Balance due to Treasurer				
.. Fletcher and Son, for Printing <i>Transactions</i> , 1890-94			48 17 0	48 17 0
.. A. H. Cross for Printing			0 2 0	0 2 0
.. Advertisement			0 8 0	0 8 0
.. Postage and Carriage			5 14 0	5 14 0
.. Year Book of Scientific Modelling			0 0 0	0 0 0
.. Gratuity to Bookkeeper			0 10 0	0 10 0
.. Rent of Room			1 1 0	1 1 0
.. Tips of Room for Landlady			6 0 0	6 0 0
.. Assistant Secretary's Salary			0 8 0	0 8 0
.. Balance at Messrs. Currier			0 8 0	0 8 0
			£04 14 0	£04 14 0
WM. UPPING, Auditor.				
Examined and found correct				£103 18 6

Norwich, 26th March, 1896.

*List of the Publications received by the Society as Donations  
or Exchanges from March, 1894, to March, 1895.*

- 
- BARRETT (Charles G.). The Lepidoptera of the British Islands.  
Vol. ii. 8vo. Lond., 1895. *From the Author.*
- BARROW Naturalists' Field Club and Literary and Scientific  
Association. Annual Report and Proceedings for the year  
ending March, 1894. Vol. ix. 8vo. Barrow-in-Furness, 1894.  
*From the Club.*
- BELGIUM. Annales de la Société Belge de Microscopie. Tome 18  
fasc. ii. et tome 19 fasc. i. 8vo. Bruxelles, 1894—95.  
*From the Society.*
- BATH Natural History and Antiquarian Field Club. Proceedings.  
Vol. viii. no. 1. 8vo. Bath, 1894. *From the Club.*
- BIANCONI (Prof. C. G. G.). Degli scritti di Marco Polo e dell'  
Uccello Ruc da lui menzionato. pp. 64. 4to. Bologna, 1862.  
*From Professor Newton, F.R.S.*
- BRISTOL Naturalists' Society. Proceedings. New Series, vol. vii.  
part 3. 8vo. Bristol, 1894. *From the Society.*
- BRITISH Association. Report of the sixty-fourth Meeting of the  
British Association for the Advancement of Science held at  
Oxford in August, 1894. 8vo. Lond., 1894.  
*From the British Association.*
- Report of the Corresponding Societies Committee, 1894.  
8vo. Lond., 1894. *From Mr. Clement Reid, F.L.S.*
- CAMBRIDGE. Studies from the Morphological Laboratory in the  
University of Cambridge. Edited by Adam Sedgwick, F.R.S.  
Vol. v. part 2. roy. 8vo. Lond., 1892.  
*From Professor Newton, F.R.S.*
- CARDIFF Naturalists' Society. Reports and Transactions. Vol.  
xxvi. parts 1 and 2. 8vo. Cardiff, 1894—95. *From the Society.*
- CLARKE (W.E.). Some Fishes new to or rare in the Firth of Forth.  
[From 'The Annals of Scottish Natural History' for January,  
1895, pp. 23—28.] 8vo. *From the Author.*
- CROYDON Microscopical and Natural History Club. Proceedings and  
Transactions, 1893—94. 8vo. Croydon, 1894. *From the Club.*
- DOBIE (W. Henry, M.B.). Birds of West Cheshire, Denbighshire,  
and Flintshire. [From 'The Proceedings of the Chester Society  
of Natural Science and Literature,' 1893, pp. 282—351.] 8vo.  
*From the Author.*

- EDINBURGH NATURAL HISTORY SOCIETY. TRANSACTIONS. New Series.**  
 Vol. II, part 1. 8vo. Edinburgh, 1894. *From the Society.*
- EDINBURGH BOTANICAL SOCIETY. TRANSACTIONS AND PROCEEDINGS. Vol.**  
 IX, part 1. 8vo. Edinburgh, 1894. *From the Society.*
- EDINBURGH GEOLOGICAL SOCIETY. TRANSACTIONS. Vol. VII, part 1.**  
 8vo. Edinburgh, 1894. *From the Society.*
- EDINBURGH. ROYAL PHYSICAL SOCIETY OF EDINBURGH. PROCEEDINGS.**  
 Vol. XII. 8vo. Edinburgh, 1892-94. *From the Society.*
- EMERSON P. H., B.A., M.B. Birds, Beasts, and Fishes of the Norfolk**  
**Broadland. 8vo. Lond., 1895. *From the Author.***
- GLASGOW. ANDERSONIAN NATURALISTS' SOCIETY. ANNALS. Vol. I. 8vo.**  
 Glasgow, 1893. *From the Society.*
- GLASGOW. NATURAL HISTORY SOCIETY OF GLASGOW. TRANSACTIONS.**  
 Vol. IV, part 1. 8vo. Glasgow, 1894. *From the Society.*
- GURNEY (J. H., F.Z.S.). Catalogue of the Birds of Prey (Accipitres**  
**and Striges), with the number of Specimens in Norwich**  
**Museum. 8vo. Lond., 1894. *From the Author.***
- IBIS (The), a Quarterly Journal of Ornithology. Edited by Philip**  
**Lutley Sclater, M.A., Ph.D., F.R.S. Sixth Series, vol. VI, nos.**  
**2-4; vol. VII, no. 1. 8vo. Lond., 1894-95.**  
*From Mr. G. P. Buxton, F.Z.S.*
- LINCOLNSHIRE NATURALISTS' UNION. TRANSACTIONS. No. 1. 8vo.**  
 Louth, 1895. *From the Society.*
- LONDON. GEOLOGICAL SOCIETY. QUARTERLY JOURNAL, nos. 196-201.**  
 8vo. 1894-95. *From Col. Feilden, F.G.S.*
- LONDON. ROYAL GEOGRAPHICAL SOCIETY. THE GEOGRAPHICAL JOURNAL,**  
**including the Proceedings of the Royal Geographical Society.**  
 1894. 2 vols. roy. 8vo. Lond., 1894.  
*From Mr. H. G. Barclay, F.R.G.S.*
- LONDON. ROYAL MICROSCOPICAL SOCIETY. JOURNAL OF THE ROYAL**  
**Microscopical Society; containing its Transactions and Pro-**  
**ceedings, etc. April, 1894 to February, 1895. roy. 8vo.**  
 Lond., 1894-95. *From the Society.*
- LONDON. ROYAL INSTITUTION OF GREAT BRITAIN. PROCEEDINGS. Vol.**  
 XIV, part 2. 8vo. Lond., 1895. *From the Royal Institution.*
- MANCHESTER GEOLOGICAL SOCIETY. TRANSACTIONS. Vol. XXII, nos.**  
 16-21; vol. XXIII, nos. 1, 2. 8vo. Manchester, 1894.  
*From the Society.*
- MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY. MEMOIRS. Fourth**  
**Series. Vol. IX, no. 2. 8vo. Lond., 1895. *From the Society.***
- MANCHESTER MICROSCOPICAL SOCIETY. TRANSACTIONS AND ANNUAL**  
**Report, 1893. 8vo. Manchester, 1894. *From the Society.***
- MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM. JOURNAL.**  
 Vol. III, nos. 2, 3. 8vo. Lond., 1894.  
*From Professor Newton, F.R.S.*

- NEW ZEALAND. Transactions and Proceedings of the New Zealand Institute. Edited and published under the authority of the Board of Governors of the Institute, by Sir James Hector, K.C.M.G., M.D., F.R.S. Vol. xxvi. 8vo. Wellington, 1894.  
*From the Institute.*
- NORTHUMBERLAND. Natural History Transactions of Northumberland, Durham, and Newcastle-on-Tyne, being papers read at the Meetings of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, and the Tyneside Naturalists' Field Club. Vol. xi. 8vo. Lond., 1894. *From the Society.*
- NOVA SCOTIA. The Proceedings and Transactions of the Nova Scotian Institute of Science, Halifax, Nova Scotia. Second Series. Vol. i. part 3. 8vo. Halifax, N.S., 1893.  
*From the Institute.*
- PEARCE (Rev. S. S.) and MAYFIELD (A.). The Land and Freshwater Mollusca of East Norfolk. [From 'The Journal of Conchology,' vol. vii. pp. 391—404.] 8vo. 1894. *From Mr. A. Mayfield.*
- PLYMOUTH Institution and Devon and Cornwall Natural History Society. Annual Report and Transactions. Vol. xi. part 4. 1893—94. 8vo. Plymouth, 1894. *From the Institution.*
- RUSSIA. Bulletin de la Societé Impériale des Naturalistes de Moscou. Année 1894. no. 4. 8vo. Moscou, 1895. *From the Society.*
- SAVIN (A. C.). A short Guide to the Geology of Cromer and neighbourhood. With lists of Fossils. pp. 53. sm. 8vo. Norwich [1887]. *From Mr. J. H. Gurney, F.Z.S.*
- TUCK (W. H.). The Avi-Fauna of a Suffolk Village, 1847—93. pp. 8. sm. 8vo. *From the Author.*
- UNITED STATES OF AMERICA. Annual Report of the Smithsonian Institution for the year ending July, 1892. Part I. Report of the Smithsonian Institution proper. Part II. Report of the U.S. National Museum. 8vo. Washington, 1893.  
*From the Smithsonian Institution.*
- Bulletin of the United States National Museum. no. 43. 8vo. Washington, 1893. *From Professor Newton, F.R.S.*
- No. 43. A Monograph on the Bats of North America. By Harrison Allen, M.D.
- Comparative Oölogy of North American Birds. By R. W. Shufeldt, M.D. From the Report of the U.S. National Museum for 1892, pp. 461—493. 8vo. Washington, 1894.  
*From Professor Newton, F.R.S.*
- On the Relations and Nomenclature of Stizostedion or Lucioperea. By Theodore Gill, M.D. From the Proceedings of the U.S. National Museum, vol. xvii. pp. 123—128. Washington, 1894. *From Professor Newton, F.R.S.*
- Twelfth and Thirteenth Reports of the United States Geological Survey, to the Secretary of the Interior, 1890—92. By J. W. Powell, Director. In 5 vols. imp. 8vo. Washington, 1891—93. *From the U.S. Geological Survey.*

- UNITED STATES OF AMERICA. Monographs of the United States Geological Survey. Vols. xix, xxi, xxii. 4to. Washington, 1892—93. *From the U.S. Geological Survey.*
- Vol. xix. The Penokee iron-bearing series of Michigan and Wisconsin. By R. D. Irving and C. R. Van Hise. 1892.
- Vol. xxi. Tertiary Rhynchophorous Coleoptera of the United States. By S. H. Scudder. 1893.
- Vol. xxii. A Manual of Topographic Methods. By Henry Gannett. 1893.
- Bulletins of the United States Geological Survey. Nos. 97—117. 8vo. Washington, 1893—94. *From the U.S. Geological Survey.*
- Mineral Resources of the United States. By David T. Day. 1892, 1893. 8vo. Washington, 1893—94. *From the U.S. Geological Survey.*
- North American Fauna. Published by authority of the Secretary of Agriculture. No. 8. 8vo. Washington, 1895. *From the U.S. Department of Agriculture.*
- United States Department of Agriculture. Report of the Microscopist for 1892. By Thomas Taylor, M.D. 8vo. Washington, 1893. *From the U.S. Department of Agriculture.*
- United States Department of Agriculture. Food Products. By Thomas Taylor, M.D. 3 nos. 8vo. Washington, 1893—94. *From the U.S. Department of Agriculture.*
- American Museum of Natural History. Annual Report for the year 1893. 8vo. New York, 1894. *From the American Museum.*
- American Museum of Natural History. Bulletins, vol. vi. 8vo. New York, 1894. *From the American Museum.*
- First Report of the State Zoologist, accompanied with notes on the Birds of Minnesota, by Dr. P. L. Hatch. 8vo. Minneapolis, 1892. *From the State Zoologist.*
- Twelfth Annual Report of the Board of Trustees of the Public Museum of the City of Milwaukee. 1893—94. Milwaukee, 1894. *From the Board of Trustees.*
- WOODWARD (Horace B., F.G.S.). Geology in the Field and in the Study. [From 'The Proceedings of the Geologists' Association,' vol. xiii. pp. 247—273.] 8vo. 1894. *From the Author.*
- YEAR-BOOK of the Scientific and Learned Societies of Great Britain and Ireland; comprising lists of the Papers read during 1893. 8vo. Lond., 1894. *Purchased.*
- YORKSHIRE Geological and Polytechnic Society. Proceedings, vol. xii. pt. 4. 8vo. Halifax, 1894. *From the Society.*
- ZOOLOGIST (The): a Monthly Journal of Natural History. April, 1894, to March, 1895. 8vo. Lond., 1894—95. *From Mr. G. F. Buxton, F.Z.S.*



## ADDRESS.

*Read by the President, CHARLES B. PLOWRIGHT, M.D., to the Members of the Norfolk and Norwich Naturalists' Society, at their Twenty-sixth Annual Meeting, held at the Norwich Castle-Museum, March 25th, 1895.*

LADIES AND GENTLEMEN—My first and most urgent duty this evening is to thank you for the great honour you have conferred upon me, by selecting me, as you did twelve months ago, to fill the office of President. Had the status of our Society been less assured, or had its 'Transactions' a less extended circle of perusal, I should still have felt the distinction you then conferred upon me a great one. Under the existing circumstances, however keenly I might feel my unfitness for the office, the temptation to accept the honour was too great for me to resist.

It will be within your remembrance that I endeavoured, at the commencement of the present session, to interest you in a subject to which I have devoted considerable attention, by giving a demonstration in the hall of the Church of England Young Men's Society on Poisonous Fungi. By the co-operation of various friends, a representative collection of the best known deleterious species was exhibited, in juxtaposition with one of edible kinds. It was shown that in the vast majority of cases in which death ensues from eating poisonous fungi, it does so from the consumption of one particular species, and from one only, namely, *Agaricus phalloides*. Specimens of this in all stages of development, and in all the varieties of colour which it assumes, were exhibited side by side with the true Mushroom. The structure of both species was further illustrated by the aid of diagrams. *Agaricus phalloides* has been

fatal to persons in Norfolk and Suffolk several times during the past few years. A case occurred in 1865, near Ipswich, in which a woman cooked it in mistake for the common Mushroom, and partook of it with her two children. They all became ill; the children died in forty hours; the woman, however, recovered sufficiently to give her evidence at the coroner's inquest, but she relapsed and died on the fifth day. Another case happened in Lynn, in 1879, by which a boy lost his life; and in the autumn of 1894 a child died from the same cause at Bawsey. It is in all probability this species which is answerable for the death of two persons at Yarmouth in 1892. *Agaricus phalloides* sometimes bears a certain resemblance to the true Mushroom. It is whitish, and about the same size and form, but its gills are permanently white; its stem is hollow, its top shining, but the most distinctive mark about it is the bulbous base to the stem. This bulb is surmounted by the remains of the volva, so that the stem appears to spring from the interior of the "poison cup," so called by a recent American writer.

Later in the year, Mr. Long, of Wells, brought before the Society an instance of that very interesting phenomenon, luminosity of decaying wood. In this instance it was the trunk of a Silver Poplar, which had been dead for six or seven years. The luminosity was confined to the central portion, or hard wood, and it was much more bright on the first evening it was observed than on the following, from which period it gradually diminished, until its final disappearance took place. It was most marked at the lower part of the trunk, and upon the larger roots. Luminosity has been observed with the mycelia of various fungi, especially of the Hymenomycetes and Pyrenomycetes. Subsequently, Mr. Long sent me a specimen of an Agaric which he found upon this trunk. It was dried up, but had all the appearance of a somewhat abnormal specimen of *Agaricus ostreatus*, in which the top of the pileus was covered by a development of sterigmata, an abnormality not very uncommon with this species. Future observations are desirable in order that this point may be settled, as the phenomenon is one which is not very frequently observed.

In another branch of botany we have been favoured with a very interesting paper on the Flora of Spitzbergen by Colonel Feilden and Mr. H. D. Geldart, which will be found printed in the 'Transactions,' as is also an interesting note from Mr. Amyot, on a recent measurement of the Winfarthing Oak, which, to his surprise, had decreased eighteen inches in circumference since the year 1874. Similar decrease seems also to have been shared by other large trees; these variations are very striking phenomena and difficult to account for. Mr. Clayton, of Bradford, is stated to have found small differences between the circumferences of various tree trunks between the months of October and February, and in these cases the alteration was attributed to frost. Mr. Hotblack favoured us with some interesting observations on the Herring, which should be read in conjunction with Mr. Stacy-Watson's paper in our last year's 'Transactions,' and the latter gentleman has contributed the usual paper on the Herring Fishery which has been a feature in the 'Transactions' since the year 1881. As a matter of course, communications on ornithology have been numerous: for these we are indebted to Mr. J. H. Gurney, the Rev. M. C. H. Bird, and the Rev. Julian Tuck, Mr. Southwell also contributing his usual report as to the more interesting additions to the Castle Museum. Insects have not been neglected, and in this department Mr. W. H. Tuck, of Tostock, has been a contributor; and we are indebted to Mr. Bridgman for the exhibition of a specimen of *Pezomachus corruptor*, bred from the larva of a Beetle by Mr. Thouless, the first instance which has come to Mr. Bridgman's notice of an Ichneumon of this genus being bred from a Coleoptera. Mr. Petches' list of Land and Fresh Water Mollusca, found by him in West Norfolk, is of value, coming from a district which has been little worked. Mr. W. G. Clarke's paper on Flint Implements found in the neighbourhood of Thetford, illustrated by an extensive series of specimens of Neolithic work, was a particularly interesting and valuable communication.

We have also to thank Mr. Patterson for his frequent and interesting notes from Yarmouth.

On 28th June a joint excursion of the Society with the Yarmouth

Section took place, which was attended by about thirty members and friends. The party drove from Yarmouth to Ormesby, and taking boats on Ormesby Broad, rowed through Rollesby and Filby Broads. On starting a sea-mist came up very rapidly over the water, but it soon disappeared. Special interest was taken in the ornithology of the district. Mr. W. H. Hudson (author of 'The Naturalist in La Plata'), who formed one of the party, expressed the great pleasure afforded him by seeing the Bearded Titmouse in its home—a bird he regards as being one of the rarest in Great Britain. Some botanical work was also done. The very name of Rollesby recalls to the Norfolk mycologist that it once upon a time was endowed with a prefix, Mildew-Rollesby, on account of the prevalence of "Wheat Mildew" in the village. This was many many years ago, but the astute agriculturists are said to have rooted up all the Barberry bushes, and the mildew disappeared, so the place lost its evil reputation. The Rev. C. J. Lucas, of Burgh (President of the Yarmouth Section), kindly provided tea at the Hall, and showed his fine collection of birds. On the way home a short stoppage allowed the excursionists to view the exterior of Caister Castle.

On 2nd August, the second excursion of the season, which was attended by about seventeen naturalists, was made to Runton. The afternoon was showery, which two malacological non-members who went said was just the weather they wanted. A very pleasant walk was taken by the party from Runton Station, through the woods to the so-called Roman Camp, thence to Beeston Regis, where Mr. T. Wyndham Cremer hospitably entertained the members. The return was by Beeston Abbey to Sheringham, where tea was provided in the evening, and thence home by train.

During the past year we have elected fourteen new members, and have lost seven, leaving us the present membership of 275, an increase of seven over the preceding year. We have to lament the loss by death of three members. Mr. Henry Birkbeck, of Stoke Holy Cross, whose death will be lamented by a wide circle. Early in life Mr. Birkbeck evinced great interest in ornithology; and to the last was a keen naturalist and sportsman, and ever ready to aid

with his purse and influence the promotion of any object of scientific or general interest. Mr. T. Wyndham Cremer, whose fine collection of birds and genial hospitality afforded so much pleasure to those members who went to Beeston last August, must with extreme regret be included in the obituary. He was one of the old school of sportsmen-naturalists, now becoming so rare, and nearly all the extensive local collection of birds at Beeston Hall were trophies of his own gun. Mr. E. T. Cooper never took an active part in the affairs of the Society.

The Treasurer's balance sheet is on the whole satisfactory, which is always a pleasant fact to announce.

The thanks of the Society are due to Professor Newton, Mr. J. H. Gurney, Mr. Hugh G. Barclay, and Mr. Geoffrey Fowell Buxton for additions to the Library.

In accordance with the custom which has in the past been associated with very happy results, whereby your President in his annual address refers to some subject to which he has given special attention, I will take the present opportunity of making a few remarks upon one of the problems involved in the biology of one branch of the great Fungus kingdom. It is over twenty years since I had first the honour of communicating a paper to you, which was deemed worthy of publication in your 'Transactions.' It was one of the first, if not the first paper of any importance which I had at that time written, and the thought has often occurred that, had you seen the writer, you would have felt inclined to have told him to wait a few years before he presumed to address you. It was, however, the outcome of seven years' special work, and if you will pardon me making a personal remark, I should like even now, after the lapse of those twenty years, to thank you for your appreciation. I have often felt that the vitality of a Society like yours does not depend so much upon the great names you may have amongst your Presidents and Vice-Presidents as it does upon your younger members. Unless a man begins the study of any branch of natural science when he has the vigour of youth on his side, he is seriously handicapped. Youth is necessarily inexperienced; youth may be rash in drawing conclusions; but youth is generally diffident, often

meritly to the prestige of seniority. Of course, a Society whose members are confined to the elements found in the mutual improvement class of a public school cannot be expected to rank with such an one as ours; but, on the other hand, a Society in which none but the grey-headed receive an appreciative hearing will soon degenerate into fossilised senility.

The importance of young members taking up a special line of research cannot well be over-estimated. Doubtless there are many amateur naturalists who derive a great amount of enjoyment by culling the cream from all branches of the subject, but they never accomplish, except under very special circumstances, much in the way of solid and enduring work: they are mere dilettanti, and as such remain to the end. Of course a man who takes no interest whatever in other branches of natural history outside his own, if such an one exists, cannot be taken as a desirable model for imitation. All-round knowledge is admirable, but very few of us can aspire to be all-round men. When a young man starts with that enthusiasm which success demands, working on any special line of research, he is only too apt to receive disparagement, and therefore discouragement, from his candid friends. He is almost certain before he has been long at work to be asked, what is the good of all this labour which he is taking? He will not find it easy off-hand to give a satisfactory answer to his would-be mentor, unless he follows the good old plan of when in doubt speaking the truth, and saying that he is working because it gives him pleasure—for if his investigations are not a genuine source of enjoyment to him he will never succeed in accomplishing anything of importance. Benefits to humanity may arise from his work, but they may not. He works for the love he has of his work. If he be incited to some extent by a desire of acquiring a certain amount of renown, do not let us judge him too harshly: it is not a dishonourable motive: it is not the prime force actuating him, and is it not preferable to attain distinction in such a manner than in many others? He will be told times and often that he is wasting his time, and that his talents and energies would be better employed in his business or in his profession. But is this the case? Is the man who concentrates his whole energies

upon his business, who thinks and dreams of nothing but success in business, an altogether desirable ideal? A man whose sole aim is success in life is apt to become a mental if not a moral obliquity, and as wearisome a bore as the man who has no thought outside his profession, be that profession clerical, medical, or legal.

It is now many years since helminthologists became acquainted with the life history of certain Entozoa, in which the parasite in one stage of its existence is embedded in the tissues of its host, either in the muscle, bone, liver, brain, or some such organ : while the other state is found in another animal in the form of a flattened articulated worm, whose head is anchored to the interior of the animal's intestine. The host of the first named or hydatid-form is mostly an herbivorous animal, while the latter or tapeworm host is a carnivore. The eggs of the tapeworm, which are discharged in enormous numbers, are quite innocuous to healthy individuals of the tapeworm host; but if they find their way into the alimentary canal of the vegetarian hydatid host cause it to become affected with the hydatid disease.

A very parallel life history involving a heteroecism or change of host is encountered when we turn our attention to certain parasitic fungi, the best known instance of which is afforded by that terrible pest, the Mildew of Wheat. To many this may appear a worn-out topic, but there are certain peculiarities connected with this disease, and with several closely allied diseases of cereals, that render the whole question worthy of attention, especially from us who dwell in an agricultural county like Norfolk. What is known of the life history of the Wheat mildew fungus for certain may be briefly summarised as follows. As a matter of observation amongst the Norfolk farmers of the eighteenth century, it was known that the presence of Barberry bushes in the hedges of Wheat fields increased the tendency of the Wheat grown in those fields to become mildewed, and that the maximum amount of disease was to be met with in the immediate vicinity of the Barberries. Arthur Young, at the end of the eighteenth century, instituted a series of special observations, which by drawing public attention to this fact led to a Barberry crusade, whereby this shrub was almost exterminated as

a hedgerow plant in Norfolk, and even at the present time it is but rarely encountered growing in these places. Subsequent examinations by scientific botanists, aided by the microscope, of the parasite itself, showed that the fungus on the Barberry was totally unlike that upon the Wheat plant, and these two states of it were long regarded as not only being different species, but as belonging to distinct genera. It was not until 1865—6 that Professor De Bary demonstrated their identity by means of biological research. Although differing so much in the size, and in the form, and in the colour of their spores, yet they do not differ more from one another than the tapeworm does from the hydatid. To the peculiar habit the fungus possesses of spending a part of its existence upon one plant and the other upon another of a totally different kind, the term heterocœism has been applied. But the whole chapter of the life history of the Wheat mildew is by no means closed by these observations of De Bary.

The fungus, under its ordinary conditions, presents itself in three distinct forms. First, upon the Barberry, in groups of beautiful little cups, edged with white teeth, and filled with golden yellow spherical spores. These spores, if they chance to fall upon a healthy Barberry leaf, are incapable of reproducing the parasite upon it; but if they fall upon Wheat or upon certain other cereals and grasses, they in due course produce the second stage of the disease—the condition known popularly as “rust.” These rust-spores are not developed in cups at all, but in little oval pustular heaps; the spores themselves are darker in colour, and instead of being spherical in form are oval. Placed upon a healthy Barberry leaf they are incapable of affecting it, but when applied to a healthy Wheat leaf they originate fresh pustules of rust. The function of the rust-spores then is to spread the disease upon the Wheat plants. After a time we meet with the third form of the disease, the true Wheat mildew. This presents itself in the form of black lines, principally on the leaf-sheaths and stems. These lines are so solid and compact in their structure that they split up the affected stems in a very characteristic manner. The mildew-spores are dark brown in colour, bicellular in form, and remain firmly attached by their bases to the



straw. They evince no sign of vitality until the following spring. When they do germinate this curious fact occurs, viz, that they are incapable of infecting a Wheat plant, but on a Barberry leaf give rise to the beautiful yellow cluster-cups with which it began. All these phenomena are so well known, and are detailed in all modern botanical works with such accuracy, that it may seem superfluous to enumerate them, but this has been done because I know how easily some of these little details are apt to escape one's memory.

Let us now pursue the subject a trifle further. How is it to be accounted for that we find crops seriously damaged in districts from which the Barberry is either absent or very rare? Some years ago, I read a paper on Wheat Mildew, at Norwich, before the Chamber of Agriculture. After the meeting, Mr. W. C. Little of Stags Holt mentioned in the course of conversation that on the Mahonias in his garden a cluster-cup was very common upon the immature berries. He was kind enough to send me sufficient specimens of these disease berries for experiment, and it was found that the Mahonia spores were capable of producing the rust on Wheat plant just as the Barberry spores do. This observation was subsequently confirmed by Buchenau in Germany and by De Bary himself. Now this is an important fact, because although the Barberry is rare in many districts, yet the Mahonia is grown in almost every garden. It is moreover very frequently planted in woods as cover for game. The cluster-cups do not occur on the Mahonia leaves, but on the berries while they are still green, and before they have assumed the dark purple tint of maturity. As the cluster-cup is the starting-point of the disease—the rust being the disseminating form—we have now no difficulty in accounting for numerous centres from which the mildew may originate in this country. There is a further point worth considering. How is it that the fungus spore is able to alight on the berry? At the time the berry receives the infection it is a very small object as compared to the surface area of the foliage. This is a question which has never properly been worked out, and its solution would fill up an hiatus in our knowledge of the life history of these heterœcious parasites. It would

take too long to explain all the reasons in detail, but there is strong presumptive evidence that this is brought about by insect agency.

No country in the world suffers greater injury to its Wheat crops from this disease than does Australia. With us it is only in certain years that the disease causes us much injury, but in Australia immense loss is sustained every year. But the Barberry is not an indigenous plant in that country, so that some other explanation must be afforded.

While there is no doubt that the Barberry is not indigenous in Australia, I find upon inquiry that it is sometimes grown in gardens, although not so commonly, I am told, as the Mahonia is. It is however, I think, clear, that the Barberry plays a much less important part in the dissemination of the disease in the Colonies than is the case in Europe. It is hardly possible to imagine, however, that the disease ever started in Australia, except from the cluster-cup stage; nor, indeed, that it does not, from time to time, here and there originate even now in this way; still there are reasons for the belief that this is much less necessary for its perpetuation than is the case with us. In the first place, the colonial agriculturists do not complain of mildew at all, it is "The Rust in Wheat" which does them injury. The examination of specimens of diseased Wheat from Australia shows this perceptibly. The little pustules of rust-spores cover the plant, but the black lines of mildew are few and far between. This fact shows that the fungus has been for many generations reproducing itself without the intervention of the cluster-cup stage, a condition which is exemplified by many allied species of the fungus parasite in Europe. But this is not all. I have received specimens, in the mildew stage, from various parts of Australia, for the purpose of experiment; but I have hitherto been unable to induce these spores to germinate, although they have been placed under the same conditions of moisture and temperature as English spores, while the latter germinated with the greatest facility. The only difference in the treatment between the two has been this,—the one came directly from Australia; the other had been exposed during the resting stage to those variations of temperature which

characterise our English winter. Possibly there may be places in Australia in which the temperature falls sufficiently to render the mildew spores capable of germination, but they must be few. On the other hand the cluster-cup stage is really unnecessary in that country for the perpetuation of the fungus, because, by reason of the absence of frost, there will always be more or less graminaceous foliage in a suitable condition for the rust stage to occur upon. If it be argued that since there are no mildew-spores capable of germination produced in Australia, therefore the cluster-cup stage can never occur, I would remark that European grown straw is not uncommonly used for packing, and that the unpacking of parcels is an operation very frequently performed in the gardens of private houses.

Very little is known as to the predisposing causes operating upon the Wheat plant which are calculated to favour its attack by the parasite. We do know, however, that a crop which is over stimulated by too abundant a supply of nitrogenous manure is especially liable to the disease. It does not seem to matter whether the nitrogen be supplied in the form of natural or artificial manure. The result is the same—predisposition of the crop to mildew.

In England, especially in Norfolk, we have long been familiar with the fact that a "gathering crop"—that is to say, one in which the Wheat plants are few and far between, and in which each plant increases by throwing out numerous lateral stems—is especially liable to become mildewed. In Australia the very opposite is the case—gathering crops suffer less from rust than others do.

The Barberry mildew, although the most important Wheat-disease, economically is not the only mildew affecting this crop. There is another whose cluster-cup stage is passed upon certain Boraginaceous plants (*Puccinia rubigo-vera* = *P. dispersa*, Eriks. and Henn.), as well as a third, *P. glumarum*, Schum. Special attention has recently been paid to these Wheat mildews by the Swedish botanist Eriksson, who has published a series of observations on their life history, from which it appears that the whole matter is much more complex than we have hitherto supposed. The Barberry mildew, as has been already stated, occurs not only on Wheat, but on certain

other cereals and grasses. Eriksson's experiments tend to show that it exists in more than one form or variety, if, indeed, they be not distinct species. These varieties do not differ from one another morphologically, so that by simple microscopic characters they are indistinguishable. Biologically, however, they are distinct. For instance, one form (*Puccinia graminis*) occurs on Rye, Barley, and Twitch, as the rust-spores taken from any one of these plants, and applied to another of them, will reproduce itself. A second form affects the Oat (as well as *Milium effusum*, *Alopecurus pratensis* and *Dactylis glomerata*), but this form when applied to Rye or Barley, does not reproduce itself on them, nor, conversely, does the form from Rye affect the Oat. A third form occurs on *Aira cæspitosa*, a fourth on *Agrostis*, and a fifth on *Poa*. All these five forms have their cluster-cups on Barberry. In like manner, Eriksson finds with the rust of *P. glumarum*, that when it occurs on Wheat it gives rise to the same rust when applied to other Wheat plants, but does not affect Barley, and, conversely, the form on Barley does not produce the disease on Wheat. If subsequent observation confirms these results of Eriksson's, and there is no *prima facie* reason to think otherwise, a very important modification of our views on the nature of these parasites and of the diseases caused by them must take place.

It is debatable whether these different forms, as Eriksson calls them, are sufficiently distinct from each other to be considered species. We are dealing with plants, it will be remembered, which are essentially parasites, and which belong to a class where differences in external appearance are not great. In the year 1874 the late Dr. Georg Winter drew attention to the fact that the pretty little cluster-cup on the wild Garlic (*Allium ursinum*) was connected with a mildew (*Puccinia sessilis*) on *Phalaris arundinacea*. In 1885 I found that the rare cluster-cup on *Arum maculatum* also had its *Puccinia* on the same grass; and further, that although these two mildews on *Phalaris* were practically indistinguishable in the mildew state (although there were more marked differences in the rust-stage), yet the one which came originally from the Garlic would not affect the *Arum*, and the one which came

from the *Arum* would not affect the Garlic. They were at the time, and are still considered to be species. More recently Mr. Soppitt found that the cluster-cup on Lily-of-the-Valley has its *Puccinia* upon *Phalaris*, the spores of which closely resemble the two above-named species. From a number of experimental cultures on the part of Mr. Soppitt, many of which I repeated and confirmed, it is clear that the *Puccinia* on *Phalaris* which originates from the Lily-of-the-Valley cluster-cup, will not give rise to the cluster-cup on *Arum*, nor on *Allium*, and *vice-versa*, the *Arum* and the *Allium* cluster-cups will not give rise by their respective mildews to the Lily-of-the-Valley cluster-cup. It is clear, therefore, that we have here to do with distinct biological species. To take one more case—the Dodder. Are the different forms of this plant to be called distinct species because they grow upon different hosts? Most people will consider that they should not, as the external or morphological differences between them are practically *nil*. But the Dodder is essentially a parasitic plant,—it can exist in no other way; and if it can be shown that the Dodder on Clover will not and cannot be induced by any means to grow upon Nettle, and the converse, I am inclined to regard them as distinct biological species. To take an illustration: I have been familiar with the plants upon a certain heath in West Norfolk, viz., North Wootton Heath, since my childhood. I received my first lessons in botany upon it, and one knows how tenacious are one's early impressions. Now the Dodder, the Ling, and the common Whin, are all three abundant upon North Wootton Heath, but never from the year 1858, when I gathered my first botanical specimen, down to 1895, have I ever seen the Dodder on any other host than the Ling upon this heath. A few years ago I saw for the first time in Norfolk the Dodder hanging in rich festoons on the Whin bushes at Runton, near Sheringham, and had I been able as I had intended, to have taken part in the excursion last year to this place, it was my intention to have made a careful search to see if it occurred there upon the Ling as well, which quite possibly it does. But be that as it may, I think that if the species at Wootton be the same

as that I saw at Runton, it would long ere this have made its home on some one of the many Whin bushes on the West Norfolk Heath. The presumption is that these two species of Dodder are biologically distinct.

With regard, then, to the Wheat Mildews. Is Eriksson right in his view of their biological distinctness? and again, How do the Mahonia berries become affected? Or, is the Australian disease a different one from that which we have in England?

Why do we have mildew years? What are the predisposing causes of the Wheat plant to mildew?

These questions will have some day to be answered.

Why should not this work be done in England?—with all our boasted advance in agriculture, with our County Councils, and our Technical Education Committees. Here is a matter of great practical importance, and yet I greatly fear no one will be found to take it up. Our agriculturists are wringing their hands in despair, on account of the “badness of the times;” our land-owners are for the same reason plunging their hands into their empty pockets; our young men are taught science in well nigh every school; but not one, I venture to say, will be found willing to complete our knowledge of the Wheat Mildew.

## I.

## SOME QUESTIONS ABOUT HERRINGS.

BY J. T. HOTBLACK.

*Read 30th October, 1894.*

IT has been said, "Of all the fishes the Herring is king;" but that must have been when in English "king" was thought a sufficiently high title for a supreme ruler, now surely he should be styled king and emperor. King of his own order (the Clupeidæ) and emperor over all the other kings in the world of fishes, for is not his importance commercially so great as to put him head and shoulders above all his rivals? When comparing him with the other denizens of the deep, is it not like comparing the British navy of the present day with any possible rival; the question being, not if any one will equal it, but which two or three combined would do so.

I do not propose to burden this paper with statistics, or to attempt to show the relative importance of the Herring and other fish, but I feel that I cannot make myself at all intelligible as to the Herring, without entering into some particulars of its own family, the Clupeidæ.

According to Couch, one of the older authorities on British Fishes, the Clupeidæ includes—

<i>Clupea harengus</i>	-	-	the Herring
<i>Clupea pilchardus</i>	-	-	the Pilchard
<i>Clupea sprattus</i>	-	-	the Sprat
<i>Clupea sardina</i>	-	-	the Sardine
<i>Clupea alba</i>	-	-	Whitebait
<i>Clupea leachii</i>	-	-	Leach's Herring

He puts the Shad into another genus, which he calls "Alosa," and the Anchovy he gives a genus to itself, "Engraulis;" but he

admits that Cuvier includes the Shad, and that Linnæus includes the Anchovy in the Clupea.

Day, one of our later writers, makes the family Clupeidæ include—

<i>Engraulis encrasicolus</i>	-	the Anchovy
<i>Clupea harengus</i>	-	the Herring
<i>Clupea pilchardus</i>	-	the Pilchard
<i>Clupea sprattus</i>	-	the Sprat
<i>Clupea alosa</i>	-	the Shad or Rock Herring
<i>Clupea finta</i>	-	the Twait or Twait's Shad

The *leachii* of Couch is, no doubt, only one of the numerous racial varieties of the true Herring, and there will be little doubt that he (Couch) is wrong, both about the Sardine and the Whitebait, as it is now well established that the Sardine is the young of the Pilchard, and that Whitebait are sometimes Sprats, sometimes Herrings, and other times Herrings and Sprats mixed.

I think it would have been better if Day, who is sound as to the above, had followed the earlier author in leaving the Shads and the Anchovy out of the Clupeidæ, thus retaining only the Herring, Pilchard, and Sprat, about which both authors are equally agreed, and it is to these I propose to limit this paper. It would be impossible to say much about the Herring without referring to the Pilchard and Sprat, so nearly allied are they.

It has been often asserted that Sprats are only young Herring, but there are certain anatomical differences which it seems impossible to get over, and I think it is now generally admitted that they are a quite distinct fish; still it is a curious fact that I have never seen a Sprat with either milt or roe, nor have I ever found any one else who has, and I have met with but one author who says that he has, and he only says that in the North of Scotland, in December, they have been caught with the milt and roe "commencing" to form. Of course, if they are mature fish, they must reproduce their species, and I should like to know where and when.

In Yarmouth, some years since, I met with an elderly Scotch gentleman who was one of the Scotch Fishery Commissioners, and who had recently been paying a visit to Frank Buckland, then just appointed Inspector of Fisheries, or something of that sort, under Government; after telling me a characteristic tale of the



way he spent his time with the jovial naturalist, he added, "But there was one thing about which we could not agree. I was quite sure that Sprats were young Herring, and Buckland was quite sure that they were not." Perhaps some of you will think that Buckland was for once right.

To return to the Herring of Herrings, the Herring itself. Yarrell says that the word Herring is from the German "Herr"—an army—and truly it is as many armies that they periodically visit our shores.

I shall not be tempted to go into the antiquarian side of the question. Every one has heard of the Herrings and Herring pies, which had to be sent to the king and other great people, by such towns as Yarmouth and Norwich; and of the quantity of this fish that must have been caught and cured in medieval times, as witness the convoy which gave name to the Battle of Herrings.

But I should like to say a word or two here about the name of the, at present, most popular form of curing in England. Day says that Bloater is from bloat, to dry by smoke. I have always thought, and I find myself not alone in thinking, that it is from bloated, blown out, and I believe the term is only properly applied to such as are hung up but just long enough to blow out, and that such as have been smoked longer, and have ceased to be blown out, are not bloaters. May not the word bloat, to dry by smoke, have got into the dictionary through these bloater-smoked fish of ours?

Some years since, when in search of a holiday, I took steamer at Yarmouth, and after visiting most of the fishing stations along the east coast of England and Scotland, found myself at last in Stornoway, the chief town in the Island of Lewis, one of the Western Hebrides, which, as you know, lies some way out into the Atlantic, on the extreme north-west of Scotland, and I do not think that I can commence what I have to say about the Herring and its migrations anywhere better than at Stornoway, for it is there that the annual fishing practically begins. By law, I believe, the season opens on the 20th May; but the year I was there the fishermen had held a public meeting, and decided not to commence till some days later, as, I suppose, because they thought the fish were not quite fit. Two or three boats thought differently, and started on the legal days; but it was no use, law or no law, their whole catch was promptly pitched overboard as soon as they came into port.

As I have said, the Stornoway fishing begins the latter part of May or beginning of June; then follows the Shetland fishing, the beginning of July; Wick, in August; the East of Scotland and North of England in September (this year there has been an exceptionally good September fishing out of Grimsby); and the Yarmouth home fishing in October; and so to the south-east of England, where at Hastings they generally get some quantity of Herring the beginning of November, and expect to continue the fishing (as at Yarmouth) till the end of December. Of course the fishing at each place varies a little both as to the time of commencement and duration; but, speaking roughly, it seems as though one might start at Stornoway in May and finish at Hastings with the year. It might be thought they were the same fish you were following all the time; but any one at all conversant with the fishing trade will say at once that they are not; the fish taken in the various localities being often of a markedly different character.

What I have just said applies to the big fishings, and it is with them I intend principally to deal. There are other and smaller local fishings, such as that for the justly celebrated Yarmouth "Long-shores," which I take to be really local fish, and, like the Wild Duck and Snipe hatched on our marshes, they have little connection with the great army of migrants. Among other such local fishings, I believe there is sometimes one at Wick in December and January, when fish of an altogether larger race are caught, full of milt and roe. I suspect they are not local fish, but from their close resemblance to some of those caught off Norway, probably come from the far north. Then there are the Yarmouth and Lowestoft spring and midsummer fishings, during the former of which fish are taken of very inferior quality, without either milt or roe; but during the latter sometimes fish of delicate quality, and well suited for home and immediate use, are brought to market. There might be a great deal said about these two fishings, but I must pass on.

To return to the big fishings. It seems to me that the enormous shoals there met with are vast gatherings of migratory fish, that they are generally different fish in each locality, and that they must have come long distances, but that, like the Salmon and the Swallow, they return each year to the place of their birth; and I find myself in good company in this opinion, for Couch says:

“If, like many migratory birds and the Salmon in the sea, Herrings were led instinctively to return from the deep water to the place of their birth, much of the obscurity which hangs over their motions would be removed.” We know that the Salmon actually do return to the very same rivers year by year, though we do not yet very well know where they spend their time in the sea ; and it is certain that many migratory birds not only return yearly to the same locality, but travel immense distances to and fro. I believe it is the same with the Herring, and that, as the Swallow flies to places far south in the great African continent immediately after rearing its young with us, so the Herring swims yearly to and fro between us and the vast waters of the broad North Atlantic, which has been jokingly, and I contend correctly, called the Herring Pond. I attribute their early appearance off the Western Hebrides to the influence of the Gulf Stream in making those waters then warmer than the east coast would be.

It is, I think, certain that they come into our warmer and shallower waters mainly for the purpose of depositing their spawn. I should hold that even Matties (about which more hereafter) are fish which are already congregating for this purpose, having got fat and, as it were, into a state fit to commence the reproducing process. I expect that not only the estuaries, creeks, and inlets, but the whole of the shallower waters of the North Sea are one huge spawning ground, as there is not only good evidences of spawning in the former, but it is well known, for instance, that in August large quantities of Haddock congregate on the western spits of the Dogger and in the Swashway to the southward of the great Silver Pits, and these fish are so full of Herring spawn that their stomachs often seem like bursting ; and they are there and in this condition, generally, till the end of October. Now this must be the spawn of fish that have spawned before the Yarmouth fishing commences.

Day says that Herrings caught at Stornoway early in the season are “Matties” (the name being a corruption of maiden, or those which have not spawned), fat Herrings destitute of roe, and adds, that there is a good market on the Continent for such ; but I am certain that when I was there in June, the fish then being taken were full of roe, for I saw the fine big roes in the refuse tubs, being carted away from the kipping shops. Several other authors

I have noticed speak of these Matties as fish that have never spawned; but surely fish which have spawned, and have had time to get fat again, would also be "Matties," for it cannot be seriously meant that Herring spawn but once and then mysteriously disappear. I fancy that Yarmouth and Lowestoft buyers do not think much of Matties, for have I not heard them complain of fish caught at a certain season as things without roes, running over with fat, and good for nothing? But it is very difficult to arrive at a true estimation of the quality of fish being caught at any particular time, as the price depends apparently so much more on the supply than the quality; and while the buyer (who really does not want them) will say they are bad, the seller will sometimes loudly declare they are as good as can be.

I think, however, it is certain that the further a Herring is from having spawned, and the nearer it is to spawning again (without having actually commenced the operation), the better it is; and the reason is that when in the course of the reproductive process, the fat (so quickly accumulated after the worst and shotten state) has all been absorbed into the system and transformed into milt and roe, the fish is at its hardiest and best preserving condition. The worst caught (for, practically, shotten fish are not caught) appear to be those called "Mazy," which I have always supposed to be fish in the act of spawning, though I must confess that I should like to be further informed upon this point. I have heard of fish caught off the Humber, in very large quantities, and sold at Yarmouth and Lowestoft at very low prices, and called Dimlington rubbish; but Mr. Stacy-Watson, in his recent very valuable paper on the "Varieties of the Herring, and their localities," refers to these Dimlington fish, while calling it a soft, tender, mazy fish, says, that it has a hard white roe and a leathery milt; if so, may it not be rather a sickly than a spawning fish, for it could hardly be healthy in the act of spawning, with a hard roe and leathery milt. There are many other fish called mazy besides these Dimlington rubbish. Are they spawning fish, or such as are sickly from some other cause?

The proper food of the Herring I take to be the many forms of minute Shrimp-like Crustaceans, often of only microscopic size, that so largely abound in the Northern Seas, though it is said that the "Matties," when they first arrive off the Hebrides, feed

largely on the Sand-Eels ; and Day says that in Scotland they call gut-pocked a Herring which has its stomach distended with small Crustaceans or other food ; but for my own part I have never seen any in this condition, and I should like to know the experience of my friends upon this point. It has always seemed to me that the Herring, like the Salmon, when caught with milt and roe at all developed, never has anything in its stomach, and it seems to be generally admitted that they feed very little, if at all, after the milt and roe has commenced to form. I have heard of their rising at a fly, and that they will bite at anything bright, even an unbaited hook if it is bright enough, but I suspect that this is only play.

After spawning they are, no doubt, most ravenously hungry, and then quickly disperse in search of food, which accounts for shotten Herring being, I think, never taken in very large quantities ; but where do they go ? And this brings me again to the range of our species, which I take to be the whole of the North Atlantic, and from the Arctic Ocean (they have been found in the White Sea of Russia) down to the latitude of the South of England, and lower on the American side because of the difference in temperature on this side caused by the Gulf Stream. I do not say that they are to be found far within the Arctic Circle, though I should not be much surprised if they are ultimately found to go into very high latitudes. They are found in large quantities all down the Eastern Coast of North America, and, of course, they visit all the coasts of Norway and Denmark.

As I have said, on the American side they do not go into waters warmer than our own, and it is a fact that the fish found in the South of England always appear to come from the north and never from the *west* ; in fact the Herring never seems to come round the Land's End of Cornwall, though there is fishing, more or less, down the whole coast of the West of England. Off the West coast of Cornwall the Herring appears to meet its cousin, the Pilchard, and goes no further.

Herrings are said to be equally plentiful on the west coast of North America ; but if this Pacific fish is really the same as ours or no, I really do not know. There are said, also, to be Herrings in the Black Sea and the Caspian ; but these are, I think, admitted not to be quite the same as ours, though I expect those of the

Black Sea and the Caspian are alike, thus pointing to a long since time when these two waters were one.

Mr. Stacy-Watson, in his paper, refers to some fresh-water Herrings in the Niagara River, but I much doubt if they are true Herrings. I have seen Herrings mentioned for the Cape of Good Hope, and other distant places in still more southern latitudes, but I suspect none of these are the same fish as ours. It is stated that early in the present century, some Cornish fishermen were employed by the Russians to teach them drift-net fishing in the Black Sea, when among a catch of many Herrings was one solitary Pilchard. I fancy that Pilchard was still further from home than the poor little Anchovy which our friend Mr. Patterson bagged a year or two since at Yarmouth.

Yarrell says that Pilchards were at times taken off Yarmouth in some quantities; and Mr. Patterson has, to some extent, confirmed this, by besides reporting, from time to time, solitary captures, telling us of a large school met with not many years since off that port. Yet it is most certain that these two species do not overlap to any great extent, and that, as the Herrings come from the north, and never from the south, so the Pilchard comes from the south and never from the north. The Cornish fishermen, as a rule, go out to meet the Pilchards, and surround them with their nets as soon as they are close enough to the land; but it has been said that they sometimes find the fish coming from the land, and that they then declare them to have been hidden away since the last fishing in some mysterious way in the fissures and crannies of the rocky coast. I take this to be about as reasonable as to suppose that the myriads of Herrings which annually visit our East Coast can have just popped up from the bottom. I fear you will think my time but ill spent in trying to combat so manifest an impossibility, though I confess that to have been the main object of this paper.

---

## II.

## NEOLITHIC MAN IN THETFORD DISTRICT.

BY W. G. CLARKE.

*Read 27th November, 1894.*

THE neighbourhood of Thetford, on the borders of Norfolk and Suffolk, has long been famous amongst archæologists for the many relics of the occupation of prehistoric man found therein. Amongst the older race of students of prehistoric archæology, those who heralded the birth of the new science, this district is chiefly connected with finds of Paleolithic remains in the river-gravel; but of late years, diligent search has brought to light many surface implements referable to the Neolithic age, which for delicacy of workmanship yield the palm to very few English specimens. However, a brief review of previous discoveries in the neighbourhood, will enable the student to obtain a clearer idea of the nature of the country in which they are found.

In 1866-7, whilst raising stone for the fenland at Red Hill, Thetford, many of the earlier Paleolithic or Old Stone Age implements were thrown up by the workmen, specimens of which now adorn the principal museums of Britain and the Continent. Red Hill is the name given to a portion of Thetford Abbey Heath, by the stone-raisers, on account of the red colouration of the gravel. On the right bank of the Little Ouse river, terraces of ferruginous sands, containing layers of flint-gravel, are found resting on the chalk, extending about a mile and a half along the river, at an average distance from it of forty yards, and rising from eight to ten yards above it. Large nodules of sub-angular flint, with some chalk pebbles and calcareous sand, four or five feet in thickness, compose the base of this bed, and it is in this coarse gravel that nearly all

the implements were found, usually from twelve to twenty feet beneath the surface. The majority of the implements were of a deep ochreous colour, and one of the largest known Paleolithic tools was excavated here, and is now in the collection of Mr. Flowers. The flint for these implements not having been obtained by excavation, they are necessarily rather rough, the two most common types being pear and almond-shaped. A splendid series of Paleolithic implements from the river-gravel at Thetford and Santon Downham may be seen in the Fitch Room at the Norwich Castle-Museum. The neighbourhood of Thetford, too, has also produced one of the few lake-dwellings found in this country. Wretham West Mere was drained of its waters in 1851, and there, underneath eight feet of mud, were found bones of the Red Deer, and the now extinct Long-faced Ox (*Bos longifrons*). There was also a wall built of flints packed together with marl, and bones and portions of a rudely-constructed ladder. In short, hidden beneath the placid waters of a Breckland Mere, was the home of a people who ate the meat of the Long-faced Ox, hunted the Red Deer and used its antlers for pickaxes to excavate the flint, and who broke open its bones to obtain the marrow. Oak-wood piles, shaped and pointed by man, were also found in Wretham Great Mere in 1856, relics of another lake-dwelling.

Having thus briefly noticed previous discoveries of prehistoric relics in Thetford district, we will turn our attention to Neolithic Man, and the traces of his residence in this part of the country. But first, what manner of man was he? We can picture him thus. Seated at the foot of a huge pine tree, on the verge of the broad expanse of water which filled out the ancient river-valley of the Little Ouse. Behind him, the forest depths with their indefinable mystery—the haunt of many a wild beast. He feels none of the nervous apprehension which a highly-civilised man of the present day would experience, since such subtle development of the nervous system would at that date have been fatal to future progress of the race. Standing up, his keen ear quick to detect the faintest sound, we can see that he is of medium height, with long and powerfully developed arms, broad shouldered and hipped, but with thin flanks, a near approach to the typical fenman. His dress is very simple, merely a few skins carelessly sewn together with sinews running through holes, pierced either with his bone needle or flint awl.



Across his shoulder, a bow made of a stout piece of ash and more sinews is slung, whilst half a dozen arrows rest in a bark quiver fastened at his side with a leathern thong. The arrow shafts are made of wood, which has been sawn to the length, shaved to the thickness and planed to the roundness entirely with implements of flint, and are finished off with barbed flint points again bound on with the ever-useful sinew. With the fire obtained by striking a nodule of iron pyrites with a piece of flint, he is heating some "pot-boilers" or "cooking-stones" to a white heat, and presently his wife will carefully put them inside the coarse pot of sun-burnt clay, and thus heat the water. At present, she is busily engaged in scraping the fatty tissue from the skin of a wolf which her lord has recently slain. Now, with stealthy footstep, and eye and ear on the alert, he is off in search of other game, and his wife is left alone.

In the Paleolithic age, implements were made of surface flints chiefly, but in the Later Stone Age, through chance excavations or other causes, man found that freshly-quarried flint was much more easy of manipulation than that which had long been exposed to the elements, consequent on the former containing a certain amount of moisture, which after absorption by the atmosphere from long exposure, renders it very brittle. At Grimes' Graves, Weeting, about six miles from Thetford, are probably the finest remains of Neolithic quarrying extant. Here, in 1870, Canon Greenwell, after much faith and perseverance in working for that which he found not, but hoped for, at length at a depth of forty feet came upon a tunnel in the chalk, which he followed up, and there a sight met his gaze that few men have been privileged to see, for before him lay the workmen's tools just as they had been left after the day's labour—who shall say how many centuries ago? Even the explorer at Pompeii and Herculaneum as he disinters the relics of more than eighteen hundred years ago, is looking upon modern productions when compared with those found at Grimes' Graves. Here were the picks of Deers' antlers, chalk lamp, and a few rough flint flakes and weapons laid down carelessly as the shades of evening fell, with the expectation of being again used on the subsequent day. Perhaps a neighbouring tribe made a raid that night, and the flint-workers were numbered with their forefathers, or, as is more probable, a landslip took place, and the

way to their tools was obstructed with tons of chalk. All the implements were covered with a limestone incrustation that told of the centuries they had lain there, hidden from the light of day. In later years, the most famous flint quarries were those at Lingheath, Brandon, a few miles distant, and which formerly supplied the whole British army with gunflints. But, to resume the quarrying, we will consider for a minute or two their methods of working. The shafts were about six or eight feet in width, sunk perpendicularly through the chalk, the various strata of flint being utilised as found. At Grimes' Graves, after attaining a depth of forty feet, they started working in a horizontal direction, but this is unusual. Successive stages were made on alternate sides of the shaft, and up these the flint was laboriously carried by hand in large blocks. Many of these were probably used in exchange for articles from other parts of England, as miniature cores often occur many miles from localities where flint is found, the knappers there not being able to indulge in the prodigality of those who had an endless store of flint. We will, however, trace a block of flint for use amongst the tribe that dwelt around Grimes' Graves. A knapper, as the flint-workers are called, probably an apprentice to the art in this case, seated at the foot of some forest giant, would take one of the large blocks of stone, and gripping it securely between his knees would strike it obliquely near the edge, using pressure as much as possible, and strike off a flake. After he had obtained all the flakes possible, the piece of flint that was left is what we term the nucleus or core. Many a flake he would spoil, but all the good ones would be put carefully on one side, the majority showing the bulb of concussion, and some being as much as twelve inches in length. Then the expert, or skilled workman would come, and with his hammer of some tough stone and delicately-balanced fabricator of flint, he would mysteriously manipulate the plain flakes into exquisite works of art, and an artist he was, for he possessed a true sense of beauty.

Having arrived at this stage, the finishing off of the various implements, we will review the different varieties, and the specimens of Neolithic workmanship I have either found myself or personally examined within the past three years, 1892—5. Without denoting the exact locality of each separate specimen, I may say that the majority are from Santon Warren, Stoneheath, Thetford Abbey

Heath and Thetford Warren. The reason that heaths and warrens form the happy hunting-grounds of the surface implement-collector, is partly due to the fact that they are easy of access, and therefore more liable to be searched, and also that the land not being good enough for cultivation, the surface has not been changed so much since primeval man roamed the country, and when the forest-fringed heaths would best suit his methods of life. Rabbits and Moles are the collector's best friends, and the best time for search is after a shower of rain has exposed the flints. Taking the geological formation of Red Hill, on Thetford Abbey Heath, as a typical one, we can see the difference between the strata yielding the Paleolithic and Neolithic flint implements. The section there at the time of excavation was recorded by Mr. H. Prigg as follows:—

No.	Feet.
1. Surface soil ... ..	1
2. Yellow sand, slightly clayey, with ferruginous seams and layers of small flint shingle ...	5 to 7
3. Slightly rolled and sub-angular flints in an ochreous sandy matrix, with seams of silt and chalky detritus ... ..	6 to 9
4. Similar matrix, with larger chalky patches, large masses of flint but slightly broken, and some sub-angular flints ... ..	6 to 9

It is in No. 3 that the Paleolithic implements chiefly occur, at from twelve to fifteen feet below the surface; they also occur sparingly in the lower bed. No. 2 yields the Neolithic flint implements at a distance of a few feet below the surface, intermingled with fragmentary pieces of pottery, some simply ornamented, merely impressed with the thumb or finger, or by the finger-nail, and some marked diagonally or horizontally with a pointed stick.

Before starting on the descriptive list of implements, it is well to note that the word "celt" as applied to an implement of stone is now discarded by scientific men. By a transcriber's mistake in the Vulgate of Job xix. 24, *celte* was written for *certe*, and consequently the word crept into the language, but C. K. Watson in 'Notes and Queries,' and 'Chambers' Cyclopædia' of 1889, exposed the fallacious use of this term.

**ARROWHEADS AND SPEARHEADS.**—Arrowheads were formerly divided into five varieties, but three are now made to suffice, the

leaf-shaped, lozenge-shaped, and triangular; the barbed, and those with only a basal stem being included in the latter. As bronze arrowheads have never been found in Britain, arrow points of flint must have continued in use during the Bronze age, and it is therefore impossible, in ordinary cases, to refer them correctly to either age. However, in Thetford district, on account of the extreme rarity of remains of the Bronze age, showing it to have been very sparsely populated during that period, we are justified in concluding that these arrowheads belong to the Neolithic age. Leaf-shaped arrowheads are very rare in the neighbourhood, though Mr. F. Russell has one found on Thetford Abbey Heath that is perfect in shape and exquisitely balanced. It is of the type known as the ash-leaf arrowhead and a peculiarity is, that in addition to the secondary chipping, the more obtrusive angles have been rubbed off, thus making it a most symmetrically finished implement. Lozenge-shaped arrowheads, too, are uncommon, and those that can be referred to this type are generally very rough. Of the old variety of indented or hollow-based arrowheads, now classed with triangular, Elveden has proved a fertile hunting-ground. One I have from Santon Warren had been previously chipped, and has a more acutely hollowed base than is usual, the length from point to extremity of hollow base  $\frac{1}{4}\frac{5}{8}$  inch, and from point to extremity of barb being  $1\frac{1}{4}$  inches. Another I have from the same locality is formed by utilising a very thin and sloping flake, the chipping starting from the central ridge and running to the edge on one side, whilst on the other the smooth slope of the flake is used, the chipping on the edge being extremely minute. The length of this specimen is  $1\frac{1}{2}$  inches, and the width at the base  $\frac{3}{4}$  inch. None of the arrowheads in my collection are of black flint, though various shades of blue and yellow are represented. The average length of barbed specimens from this locality is  $1\frac{1}{4}$  inches, the width at the base and the length being equal in the most symmetrical specimens.

The history of the smallest arrowhead I possess is rather interesting, if my conjectures regarding it are correct. We know that in Denmark, during the Later Stone Age, religious feeling was very highly developed, and the best of everything was dedicated to the gods, and put aside for their use. Thus it is, that in the peat-bogs of Denmark, finds of exquisitely polished flint axes are occasionally made, hidden under huge slabs of stone, and mingled with superb

specimens of flint daggers and spearheads. The same thing occurs in Scotland, and likewise in England, though very rarely. This arrowhead may thus have been used for religious purposes. It is of yellow flint, semi-transparent,  $\frac{5}{8}$  of an inch in length and  $\frac{2}{3}$  of an inch in width across the base, the basal stem being  $\frac{1}{2}$  of an inch long.

**AXES.**—Compared with the South Downs, and other store-houses of Neolithic treasures, very few axes or so-called “celts” occur in the district. Some exceedingly fine specimens have however been found, one I particularly recall, from a stoneheap at West Harling, is now in the collection of a gentleman at Eastbourne, who informed me that it was the finest English specimen he had ever seen, and his experience embraced almost every collection of note in the British Isles. Another axe, found near Thetford, is in the museum of the Scottish Society of Antiquaries, and is of calcareous stone,  $8\frac{3}{4}$  by  $3\frac{1}{2}$  inches, flattish on one side, and perforated through the centre of the flat face. A perfect specimen from Santon Warren is 4 inches in length, and 2 inches in width at the cutting or working end, tapering to a point at the other. Of the semi-lunar axes, a fair quantity occur. Their use cannot be accurately told, but they appear to be powerful knives that were held in the hand. The uses of axes generally were innumerable—one was found in a coal seam in Dean Forest, another in the trunk of a tree in Cromer Forest Bed; a skull found at Thetford had been pierced by one, and it is probable that in hand-to-hand conflicts these weapons accounted for a great many of the missing.

**AWLS AND BORERS.**—The dividing line between awls and borers is not very definitely marked, but taken generally, awls are the finer piercing tools, whilst borers are more bulky, and would be used for coarser work. The finest awl I possess is that represented in Figure 1, which is there very accurately figured as to size and shape. It is of semi-transparent yellow flint, and has a wonderfully delicate point. Many awls are merely flakes trimmed to a point invariably on the left, one being two inches in length, the point projecting  $\frac{1}{2}$  of an inch extra, and  $\frac{3}{4}$  of an inch in width; but in addition to having a finely worked point, the flake is trimmed along



Fig. 1. Awl.

both edges. Another of the same type, though from its more bulky nature we must designate it a borer, is  $1\frac{1}{2}$  inches long from point to base, and only one inch from the base to the right-hand top edge, the point on the left reaching an extra half-inch. A borer which would be taken for a leaf-shaped arrowhead, were it not for its bulk, is  $1\frac{3}{8}$  inches in length, and  $\frac{3}{4}$  inch in width, the under surface being flat, whilst the top slopes down from  $\frac{1}{4}$  inch in thickness to the point. Awls were chiefly used for piercing holes in skins, through which sinews could be passed for keeping the clothing together.

**CORES.**—Cores or nuclei are the hearts of flint that remain after the knappers have chipped off all the flakes possible, or all that they require. In places where flint is scarce, and where the unworked blocks had to be transported, the cores are very small indeed, being used up to the last possible degree; but in the Thetford district, where there was no lack of material, the knappers showed a reckless prodigality in their work, for many of the cores they threw away would have been flaked in other parts over and over again. One from Grimes' Graves is 4 inches long,  $3\frac{1}{2}$  inches broad, and 2 inches high, whilst the measurements of one from Santon Warren are  $4\frac{1}{4}$  inches in length, 3 inches wide, and  $1\frac{1}{2}$  inches high. I have also many other bulky ones from the neighbourhood. In contrast to these, small ones are often found, which are by many supposed to have been used as slingstones. Be that as it may, that they were originally cores no one can doubt. Of three small ones, the bases measure  $1\frac{5}{8}$  by 2 inches,  $1\frac{1}{2}$  by 2 inches,  $1\frac{1}{2}$  by  $1\frac{3}{8}$  inches; and the heights  $1\frac{1}{3}$ ,  $1\frac{1}{2}$ , and 1 inch respectively.

**CHISELS AND FABRICATORS.**—Chisels have been divided into a great many varieties, but I have only found broad and narrow in this district. The broad ones of blue flint bear a most striking resemblance to the white flint ones of the South Downs. A typical specimen is  $2\frac{1}{4}$  inches in length and 2 inches in width, the rounded cutting edge, however, not being more than an inch in length. One specimen of a narrow chisel that I have is  $2\frac{1}{8}$  inches in length, whilst one inch from the base it is  $1\frac{1}{2}$  inches in width, gradually tapering down until the working edge is not more than a quarter of an inch long. Fabricators or flaking tools are one of the scarcest type of implement, but some of them show exceeding beauty.



They are a kind of narrow chisel, and were used with a hammer to do the finer chipping on other implements, and it has been found by experiment, that even now, the chipping can be best accomplished by flint, and the lost art of "rippled" chipping is probably due to the fact that the work is now done with steel instead of stone. Figure 2 is a representation of a fabricator that was first chipped, and then rubbed down to a better shape. It is of mottled grey flint, opaque, about three inches in length, width of base  $\frac{5}{8}$  inch, and height  $\frac{1}{2}$  inch.

This and another implement are the only two specimens I have found on Barnham Common, though my searches have been long and diligent. The length of other fabricators in my collection ranges from  $1\frac{5}{8}$  to 4 inches, and the width from  $\frac{3}{4}$  inch to  $1\frac{1}{8}$  inches, the average being  $\frac{1}{16}$  inch.

Fig. 2. Fabricator.

**FLAKES.**—Flakes are the strips of flint that are chipped off a block of stone for the purpose of being made into various implements, and before they receive any further chipping. In my own collection they vary in length from  $\frac{1}{2}$  to 4 inches, and in width from  $\frac{1}{16}$  to 2 inches. It is an almost invariable rule that wherever flakes are found, implements may be found also. A perfectly formed flake has a flat top surface and two sloping faces, the flat face being double either of the sloping faces.

**KNIVES.**—The simplest forms of implements are knives, and some of them are among the most beautiful. Many of them are merely flakes trimmed to a cutting-edge, and are designated flake-knives, but some of the leaf-shaped and triangular are very fine specimens of workmanship, and were fixed in a cleft in a piece of stick, somewhat after the manner of arrowheads. Knives are of all shapes and sizes, and under this title the greatest variety in any kind of implement is found. Many of the South Downs knives are rubbed, but local specimens are extremely rare. By far the greater part of the flake-knives only have the chipping on one edge. Many of the triangular knives are beautiful pieces of workmanship,

the chipping of this type far surpassing that of any other in the district. The general similarity of the measurements of triangular knives is rather remarkable, the average being  $1\frac{1}{4}$  by  $1\frac{1}{4}$  inches. Two are chipped equally on both faces, three are slightly chipped on the flat back surface, whilst the remainder have no chipping at all on the back. The one leaf-shaped knife that I have is 2 by  $1\frac{1}{8}$  inches, ridged  $\frac{3}{8}$  inch from the left side, to which it is smooth, the chipping running from the ridge to the right-hand side. Semi-oval knives are by no means uncommon, and the chipping on their worked edge generally compensates for the lack of it on other parts, one specimen having been rubbed down from the centre ridge to the edge, and then just touched round with exquisite fineness.

**SAWS.**—In England, flint saws are very rare, possibly on account of the delicate manipulation required, and the extreme fragility of the teeth. Indeed it seems hard to believe that they were ever intended for anything more than toys, though a medical man has



Fig. 3.  
Double-edged Saw.

expressed the opinion that the one represented in Figure 3 would be sufficiently strong to saw bone, and it has been suggested that it might have been used for such a delicate surgical operation as trepanning. This, the only specimen I have found, was picked up on Thetford Warren during a violent thunderstorm, the heavy rain having washed away the sand that covered it, and at the time was thought to be a flake, but subsequent examination in my sanctum proved it to be a saw. The figure is a very accurate representation, and the flake is of black flint, semi-transparent, whilst there are nearly thirty teeth on each edge.

**SCRAPERS.**—"Scraper" is the most comprehensive term now used with reference to a type of flint implement, for it embraces so many widely-differing varieties, used for so many widely-differing purposes, that almost any implement with a rounded chipped edge is denominated a scraper. They are by far the most abundant implements in this locality, indeed, out of every 100, the proportion of scrapers is about 50, whilst 20 knives, 5 awls and borers, 5 chisels and fabricators, and 10 of the remaining types would complete the



number. The scrapers found at Thetford I have divided into five varieties, to one of which I am able to refer all that I have yet found. They are:—

1. Circular.
2. Oval.
3. Hollow.
4. Duck-bill.
5. Worked to a quadrant or more of a circle.
  - (a) Narrow at bulb.
  - (b) Wide at bulb.

Of fifty-eight specimens noted, only three have any other chipping on the under surface than the tap which is always given to the bulb of concussion. One of these is the double hollow scraper (Fig. 4), another is circular, and the third belongs to type 5*a*, and is more properly a knife-scraper. Only four circular scrapers have fallen to my lot in this neighbourhood, one of which is from Icklingham Heath. The first one is an interesting specimen, in that, like many other Neolithic implements, it has been re-chipped. The original piece of flint was of a blue slaty colour, and for that reason probably attracted the eye of some wandering Neolithic knapper, for they always seem to have preferred any variations in colour that they could obtain. He fashioned it into a scraper, and whilst fishing one day from his canoe, probably in the creek that now forms the Little Ouse Valley, accidentally dropped his scraper in the water, and it became buried in the alluvium, where the acidity of the peat tinged the surface red. During a drought, perhaps, or when from some cause or other the alluvial deposit was laid bare, another Neolith, though of a much later generation, again discovered it and chipped it afresh round the edge, leaving the trade-mark of the fenland on the flat top and bottom surface. It is now as nearly as possible a perfect circle.

Of the five specimens of oval scrapers, the first is beautifully chipped over the entire top surface, the second and third have the flaking ridges but no secondary chipping, whilst the fourth and fifth are perfectly smooth. The third type of scraper is the "duck-bill," which is a flake-like implement chipped to a rounded edge at one end, and on this, as well as type 5, the crust of the flint is often left, as when working with greasy fingers, this would enable a much firmer grip to be obtained than could otherwise have

been the case. Some of the duck-bills were probably used as "strike-lights," with a nodule of iron pyrites. The length ranges from  $1\frac{5}{12}$  to  $2\frac{7}{12}$  inches, and the width of the narrow type from  $\frac{2}{3}$  to  $1\frac{1}{8}$  inches, the maximum of the broad type being  $1\frac{1}{2}$  inches. A fact worthy of note is, that out of twenty-one specimens, nineteen are hollow-backed, there being a distinct inward curve, the hollow being a most convenient place for resting the thumb.

Hollow scrapers are of comparatively rare occurrence, though flakes with a chipped indentation on one side are not infrequently found. I have two duck-bill scrapers  $1\frac{7}{12}$  by  $\frac{2}{3}$  and 2 by  $1\frac{1}{4}$  inches, which are hollowed out in the centre of the end of the flake, and were probably used for rounding off arrow-shafts. Another almost



Fig. 4.  
Double Hollow Scraper.

unique type is the double hollow scraper (Fig. 4), which in addition to the strongly defined and well-chipped indentations on each side, is also chipped at either end to form a semi-circular scraper, an arrangement of great utility. The face represented in the engraving is of deep blue flint, whilst the major portion of the other face is taken up with the yellow crust, no doubt for obtaining a firmer hold. To type 5a, the most beautifully chipped and symmetrical scrapers belong, indeed, out of fourteen examples, eleven are almost without a flaw.

A small specimen,  $\frac{5}{8}$  inch in length and width, and  $\frac{7}{12}$  inch at base, is rubbed smooth on one side, and is semi-transparent except where the bulb makes the thickness greater. The only chipping is on the edge and is exceedingly minute. Another specimen is of black flint, 2 by  $2\frac{1}{4}$  inches, and 1 inch at the base, and would be correctly designated a "knife-scraper," as the chipping on the back surface, about  $\frac{1}{4}$  inch deep, combined with the chipping in front, makes the edge as sharp as a knife. The front face is chipped over the entire surface, whilst the back is smooth, save the previously mentioned narrow band of chipping. The remaining specimens are of the

same well-known type, though of all, it needs but a glance to show that they were designed by true artists. One, however, of mottled grey flint, 2 by  $2\frac{1}{2}$  and  $1\frac{1}{2}$  inches at the base, deserves more than passing mention. It is hollow-backed, and the only chipping truly on the top surface is a strongly-marked ridge, running straight in the centre, the other chipping being around the edge. This ridge is  $\frac{2}{3}$  inch high, and the chipping is perpendicular to the front edge, whilst the slope from the ridge to the sides is one of  $60^\circ$ . This makes a perpendicular face at the end of the implement,  $1\frac{1}{2}$  inches in length, with the sides of the triangle 1 inch. Type 5*b* is very common indeed at Thetford, and has nothing exceptional to make it worthy of note.

SMOOTHING-STONE.—I have one smoothing-stone, found on Thetford Warren, which, although not partaking of the form of the Scotch specimens, can undoubtedly be referred to this type. It is in the shape of a triangle, the base being  $1\frac{1}{2}$  inches in length, and the sides exactly 2 inches. The base has merely been flaked off, but the sides have been rubbed smooth, and slope down at an angle of  $60^\circ$ , which would thus enable each side to be used as a plane alternately. It is of a peculiar opaque mottled yellow flint.

MISCELLANEOUS IMPLEMENTS.—Of miscellaneous implements, two I think can be classed as the Hand-borers of Dr. Plowright (Trans. Norfolk and Norwich Nat. Soc. vol. v. p. 259). One from Santon Warren is  $4\frac{1}{2}$  inches in length, and 1 inch in height, whilst in the middle a stem 2 inches in width projects 2 inches. The other is from Grimes' Graves, and is a stouter implement, being 5 inches in length, 2 inches in width, and 2 inches in height at the base, gradually sloping down to a narrow point. Two others are wedge-shaped hand-diggers, one from a stoneheap at Euston, Suffolk, the other from Santon Warren. Measurements are:—Length  $3\frac{1}{2}$  inches, width 3 inches, the point of the triangle being about  $90^\circ$ ; and length  $2\frac{3}{4}$  inches, width  $2\frac{1}{2}$  inches, the angle at the point about the same as the other. A discoidal-shaped implement is chipped equally on both sides, and would probably be used as a throwing weapon. Its length is  $2\frac{1}{4}$  inches, width 2 inches, and thickness in the centre  $\frac{1}{2}$  inch. A peculiar type is that with a small rectangular face projecting at the end. In three specimens this face is  $\frac{3}{8}$ ,  $\frac{5}{8}$ , and  $\frac{3}{4}$  inch in length, and is perfectly straight. Another peculiar specimen is roughly triangular, the sides being

2,  $2\frac{5}{8}$ , and  $2\frac{1}{8}$  inches respectively. On the working edge of  $2\frac{1}{8}$  inches there are three projections and two indentations, all being beautifully chipped, but to a very sharp and cutting edge. Of the remaining two specimens I shall describe, one seems to resemble a hollow axe more than anything else. It is triangular, being roughly  $2\frac{3}{4}$ ,  $3\frac{3}{4}$ , and 3 inches, but instead of running straight from angle to angle it is a sweeping hollow curve, and each apex of the triangle is beautifully chipped. The last specimen seems to be a combined semi-circular and hollow scraper and awl. It is 2 inches long,  $1\frac{1}{4}$  inches wide, the bottom end being chipped to a point on the left about  $\frac{1}{2}$  inch in length, forming an awl, at the base of which is a beautifully-chipped indentation which forms the hollow scraper.

For the drawing of the illustrations which accompany this, I am indebted to the kindness of Miss R. Fryer.

---

### III.

#### A LIST OF THE ACULEATE-HYMENOPTERA OF A SUFFOLK VILLAGE.

By W. H. TUCK, M.A.

*Read 30th October, 1894.*

It was about four years ago that I began to keep a list of our village Aculeate-Hymenoptera. I had always been fond of this branch of entomology, as the insects it embraces certainly stand in the front rank from their rare intelligence in nest building, and the pursuit of them gives plenty of field work during the most pleasant months of the year, commencing in early spring with the first rush of Bees, to the Sallows and Blackthorn; later with the Whitethorn and Wild Roses in early summer; and again with the advent of the autumn flowers and the blossoming of the Bramble.

It is a matter of surprise and regret that Suffolk, rendered classic for this branch by Kirby, never of late seems to have been properly worked, except a few places on the coast line during a brief summer stay by touring entomologists. This village is about fourteen miles from Kirby's home, and although only 945 acres in extent, it is admirably adapted both in soil and situation for many of the rarer species.

I am greatly indebted to Mr. J. B. Bridgman who has assisted me in naming many specimens, and allowed me to see his magnificent collection, and to Mr. Edward Saunders, through whose hands many of the insects named in my list have passed, whose book now in progress will probably be the means of adding to the limited number of students in this department.

I have followed the order and nomenclature of Mr. Saunders' list of 1890 (Perth: Thos. M. Gregor), with the few alterations to date, giving brief notes when it appears necessary.

## HETEROGYNA.

### FORMICIDÆ.

LASIUS FULIGINOSUS, Latr.

„ NIGER, Linn.

„ UMBRATUS, Nyl. For over forty years we have had a colony in the house which emerge from under a doorstep facing west, early in September, on hot days, when all the sexes appear.

„ FLAVUS, De Geer.

### MYRMICIDÆ.

MYRMICA RUGINODIS, Nyl. Not very common.

„ LEVINODIS, Nyl.

„ SCABRINODIS, Nyl.

### FOSSORES.

#### MYRMOSA, Latr.

MYRMOSA MELANOCEPHALA, Fab. I took a single specimen, September, 1894, by the holes of small *Halicti*.

#### SAPYGA, Latr.

SAPYGA 5-PUNCTATA, Fab. Rather common in June.

POMPILIDÆ.

PRIOCNEMIS [Salius].

PRIOCNEMIS EXALTATUS, Fab.

„     OBTUSIVENTRIS, Schiödte. One female, June, 1893.

„     PARVULUS, Dhlb.

POMPILUS CONSOBRINUS, Dbm. Mr. Bridgman named this for me in August, 1891, and again in 1892.

„     GIBBUS, Fab.

„     UNGUICULARIS, Thoms. One female, August, 1893.

„     PECTINIPES, V.D. Lind. The females are not uncommon.

I took a male on the bloom of wild Carrot, August, 1894.

LARRIDÆ.

TRYPOXYLON FIGULUS, Linn.

„     CLAVICERUM, Lep.

„     ATTENUATUM, Sm.

None of these are very abundant.

PEMPHREDONIDÆ.

STIGMUS, Jur.

STIGMUS SOLSKYI (Pendulus Panz). Not uncommon.

DIODONTUS, Curt.

DIODONTUS MINUTUS, Fab.

„     LUPERUS, Shuck. Rare. One male, August, 1893;  
two females, September, 1893.

PASSALÆCUS, Shuck.

PASSALÆCUS CORNIGER, Shuck. Not uncommon.

„     INSIGNIS, V.D. Lind.

„     GRACILIS, Curt.

PEMPHREDON, Latr.

PEMPHREDON LUGUBRIS, Fal.

„     SHUCKARDI } Unicolor, Latr.  
„     WESMAELI }

„     LETHIFER.

All these are fairly common in August.

PSEN, Latr.

PSEN PALLIPES, Panz. Occasionally in summer on sunny palings.

NYSSONIDÆ

NYSSON SPINOSUS, Fab. Not uncommon.

GORYTES MYSTACEUS, Linn. Rather common in June, flying round the bloom of the Maple in hedges.

MELLINIDÆ.

MELLINUS ARVENSIS, Linn.

CRABRONIDÆ.

CRABRO, Fab.

CRABRO CLAVIPES, Linn.

„ LEUCOSTOMA, Linn.

„ PODAGRICUS, V.D. Lind.

„ PALMARIUS, Schreb.

„ PALMIPES. Local. I have obtained both sexes in plenty.

„ VARIUS.

„ WESMAELI, V.D. Lind.

„ ELONGATUS, V.D. Lind.

„ VAGABUNDUS, Panz.

„ 4-MACULATUS, Fab.

„ CRIBRARIUS, Linn.

„ PELTARIUS, Schreb.

„ CEPHALOTES, Panz.

„ CHRYSOSTOMA. Lep.

„ INTERRUPTUS, De Geer. Rare. I took two females in August, 1894.

„ ALBILABRIS, Fab.

[ENTOMOGNATHUS] BREVIS, V.D. Lind. One specimen, August 31st, 1894.

OXYBELUS UNIGLUMIS, Linn.

DIPLOPTERA.

VESPIDÆ.

VESPA CRABRO, Linn.

„ VULGARIS, Linn.

„ GERMANICA, Fab.

„ RUFA, Linn. Although I generally take a neuter or two in August I have never found a nest. I found a female in a Spider's web, Aug. 27th, 1894, which shows this to be an early breeder.

40 MR. TUCK ON THE ACULEATE-HYMENOPTERA OF A SUFFOLK VILLAGE.

*VESPA SYLVESTRIS*, Scop. Not common. The earliest Wasp in spring. I found two nests in August, 1893, both underground, and obtained all the sexes; also one in a roof.

EUMENIDÆ.

(ODYNERUS, Latr.

- ODYNERUS CALLOSUS, Thoms.  
" PARIETUM, Linn.  
" PICTUS, Curt.  
" TRIFASCIATUS, Olio. Rare.  
" ANTHOPE, Panz. Not very common. The largest of our local species.  
" PARIETINUS, Linn.  
" GRACILIS, Brullé. I took a female in 1894.

These Wasps are very partial to the flowers of the garden *Helichrysum* (better known as the "Everlasting.")

ANTHOPHILA.

(OBTUSILINGUES.)

COLLETES, Latr.

- COLLETES PICISTIGMA, Thoms. Two females, August, 1893, on a species of Hawkweed.  
" DAVIESANA, Sm. I took a specimen in July, 1892, which Mr. Bridgman named.

PROSOPIS, Fab.

- PROSOPIS COMMUNIS, Nyl.  
" HYALINATA, Sm.  
" CONFUSA, Nyl. Rare. One female, May, 1894, on flower of wild Raspberry; one August, 1894, on a Bramble flower.  
" BREVICORNIS, Nyl. Rare. One female on Hawkweed September, 1892.  
" PICTIPES, Nyl. Mr. Bridgman named this in August, 1892. It was taken on a Bramble flower.



(ACUTILINGUES.)

SPHECODES, Latr.

SPHECODES GIBBUS, Linn.

- „ SUBQUADRATUS, Sm. I took a male and female in a sandpit, September, 1893.
- „ PILIFRONS, Thoms. One female, June, 1894.
- „ SIMILIS, Wesm. I took a female in April, 1894. It was running about a sunny cart-track in the wood, and did not attempt to fly.
- „ VARIEGATUS, V. Hag. Rare. One small female, May, 1893.
- „ DIMIDIATUS. I generally find this Bee, in September near the holes of *Halicti*. I believe that all these Bees are more or less parasitic.
- „ AFFINIS, V. Hag.

HALICTUS, Latr.

HALICTUS RUBICUNDUS, Chr.

- „ LEUCOZONIUS, Schr.
- „ QUADRINOTATUS, Kirb.
- „ CYLINDRICUS, Fab. I sent a male to Mr. Saunders in September, 1894, with two *Halictophagi* in it. I fancy Suffolk is a new locality for this parasite.
- „ ALBIPES, Kirb.
- „ PAUXILLUS, Schk. Rare. Two females, August, 1893 on flowers of *Inula dysenterica*, on which all these Bees swarm in this parish, as the plant is abundant
- „ SUB-FASCIATUS, Nyl.
- „ VILLOSULUS, Kirb.
- „ MINUTUS, Kirb.
- „ NITIDIUSCULUS, Kirb. We have a large colony of these in a sandpit.
- „ PUNCTATISSIMUS, Schk. One female on Hawkweed, August, 1893.
- „ MINUTISSIMUS, Kirb.
- „ TUMULORUM, Linn. The males are very fond of sleeping in the Harebell, often two or three in the same flower
- „ MORIO, Fab.
- „ LEUCOPUS, Kirb.

ANDRENA. Fab.

- ANDRENA CETIL, Schr. I took a female on the bloom of the Spear Thistle. August 22nd. 1894.
- „ CINGULATA, Fab. Not uncommon in May on the Whitethorn.
- „ ALBICANS, Fab.
- „ PILIPES, Fab. I took a female on Raspberry bloom, May. 1893.
- „ ATRICEPS, Kirb. A few on Sallows in April. I sent Mr. Saunders a stylopized specimen, March, 1893.
- „ BIMACULATA, Kirb. Not very common. A specimen or two on Sallows every spring.
- „ ROSE, Panz. [var. *Trimmerana*]. Not uncommon in April and May. One stylopized.
- „ NITIDA, Fourc. Not common. I have taken females on Blackthorn in the early springs of 1893—4, the first week in April.
- „ FULVA, Schr. Fairly common in June on Whitethorn and Raspberry flowers. I have never taken the male.
- „ NIGROGENEA, Kirb. One stylopized.
- „ GWYNANA, Kirb. [var. *bicolor*]. Very common at Sallows, and later at the Bramble blooms.
- „ PRECOX, Scop. Our most abundant Bee here at the Sallows, but generally considered a local insect.
- „ VARIANS, Rossi. Not common.
- „ HELYOLA, Linn.
- „ FUCATA, Sm.
- Mr. Saunders now considers these distinct species. In that wonderful May, 1893, I took several of both on Whitethorn, and again in June, 1894.
- „ NIGRICEPS, Kirb. I took a female on a Bramble flower, August, 1894, and another, a few days later, on the Coreopsis in our garden.
- „ ALBICRUS, Kirb. Not uncommon on Whitethorn.
- „ CHRYSOSCELES, Kirb.
- „ COTTANA, Kirb.
- „ LAHALIS, Kirb. A colony of large extent are established on the railway embankment.

ANDRENA MINUTULA, Kirb.

- „ NANA, Kirb. Not uncommon.
- „ DORSATA, Kirb. Not common. I have taken a few males on Sallows.
- „ AFZELIELLA, Kirb. Rare. Appears very late in the autumn.
- „ WILKELLA, Kirb. Rather common on Whitethorn, and again in September on Bramble.

CILISSA, Leach.

CILISSA LEPORINA, Panz. I took a female on a flower of White Clover, July, 1894.

NOMADA, Fab.

- NOMADA SUCCINCTA, Panz. One female, May, 1894, flying round the holes of *Halicti*.
- „ LINEOLA, Panz. I took a male on Whitethorn, May, 1893.
- „ ALTERNATA, Kirb.
- „ RUFICORNIS, Linn.
- „ FURVA, Panz. One, June, 1894.

MELECTA, Latr.

MELECTA ARMATA, Panz.

CÆLIOXYS, Latr.

- CÆLIOXYS QUADRIDENTATA, Linn. I took a female in June, 1893, flying round the holes of *Osmia fulviventris*.
- „ RUFESCENS, Lep. Not very common. I took three females in May, 1893.
- „ ACUMINATA, Nyl. I took several females on the flower of the Bramble, August, 1894. I believe it is parasitic on *Megachile lignesecca*.

MEGACHILE, Latr.

- MEGACHILE WILLUGHBIELLA, Kirb. Not uncommon. I fancy this is often confused with *lignesecca*.
- „ VERSICOLOR, Sm. I took a female in September, 1892, which had a hole in an old Broom stump on the railway embankment. In July, 1893, I secured another by the same spot, and sent it, with the stump, to Mr. Saunders, who obtained several of both sexes from it a year later. I took a third female close by on the bloom of *Inula dysenterica*, September 22nd, 1893.

44 MR. TUCK ON THE ACULEATE-HYMENOPTERA OF A SUFFOLK VILLAGE.

*MEGACHILE CIRCUMSCRIPTA*, Lep. Not common. I took three females in May, 1893.

.. *LIGNESECA*, Kirb. Rather common in July; the males on Thistles in August.

.. *CENTUNCULARIS*, Linn. This Bee varies greatly in size.

ANTHIDIUM, Fab.

*ANTHIDIUM MANICATUM*, Linn. Not common. On Labiate plants from June to August. Will use the holes made by *Megachile*, as it is not a wood-borer itself.

STELIS, Panz.

*STELIS ATERRIMA*, Panz. I have taken a specimen or two near a colony of *Osmia* in a wall.

.. *PHŒOPTERA*, Kirb. I took a male and female in June, 1893, flying round the holes of *Osmia fulviventris*, and two females in June, 1894.

CHELOSTOMA, Latr.

*CHELOSTOMA FLORISOMNE*, Linn. Common in June, breeding in old posts.

.. *CAMPANULARUM*, Kirb. Not very common.

OSMIA, Panz.

*OSMIA RUFA*, Linn.

.. *CŒRULESCENS*, Linn. Rather scarce. I get one or two in a season.

.. *FULVIVENTRIS*, Panz.

.. *SPINULOSA*, Kirb. Not very abundant.

EUCERA, Scop.

*EUCERA LONGICORNIS*. I took a male in June, 1893. I had not seen it for thirty years here.

ANTHOPHORA, Latr.

*ANTHOPHORA PILIPES*, Fab. Our earliest spring Bee.

.. *FURCATA*, Panz. Not very common. On Labiate plants, June to August.

PSITHYRUS, Lep.

*PSITHYRUS RUPESTRIS*, Fab.

.. *VESTALIS*, Fourc.

.. *BARBUTELLUS*, Kirb. Not common.

.. *CAMPESTRIS*, Panz. Both sexes frequently occur; the males are often quite black.

PSITHYRUS QUADRICOLOR, Lep. Scarce. A female, May, 1893 ;  
male, June, 1894.

BOMBUS.

BOMBUS COGNATUS, Steph. Not very common. It is fond of the  
flowers of the Rest-harrow.

„ MUSCORUM, Linn.

„ LATREILLELUS, Kirb. The rarest of our local *Bombi*.  
I found a nest in a hole by the side of a stony bank,  
August, 1893, and secured all the sexes going in  
and out, but although I dug a hole two feet square,  
I never reached the nest. My attention was called  
to it by the loud noise of the males going in and  
out, as described by the late F. Smith, in the  
'Entomologists' Annual' for 1858.

„ HORTORUM, Linn.

„ SUBTERRANEUS, Thoms. [var. *Harrisellus*, Kirb]. This is  
now claimed to be identical with *Hortorum*, but  
I much doubt it. I have found a nest with all  
the sexes, coal-black, and of great size. It was  
five feet deep in a pit of white sand. The sting  
is very painful.

„ PRATORUM, Linn. The earliest of the *Bombi* at the  
garden flowers.

„ SYLVARUM, Linn. This pretty Bee does not appear before  
June. I have not found a nest.

„ DERHAMELLUS, Kirb. Not common. April until June,  
when it disappears.

„ LAPIDARIUS, Linn.

„ TERRESTRIS, Linn. The variety known now as *lucorum*  
(Smith) often occurs, sometimes of a very fulvous  
type. I certainly am inclined to class it as distinct.  
The nest is also to be found *earlier*, and in rather  
more open situations, than *B. terrestris*.

APIS, Linn.

APIS MELLIFICA, Linn. We have had a colony in the roof of the  
house for many years. They appear to thrive  
when unmolested, and throw off a swarm every  
spring. It is considered very unlucky to disturb  
them.

46 MR. TUCK ON THE ACULEATE-HYMENOPTERA OF A SUFFOLK VILLAGE.

The result of this list is:—

Ants, 7; Formosa, 44; Wasps, 12; Bees, 97. Total, 160.

The only printed lists are:—

	Ants.	Formosa.	Wasps.	Bees.	Total.
BRITAIN. )					
Revised by E. Saunders. )	30	121	23	201	375
NORFOLK AND NORWICH. )					
(J. B. Bridgman.) )	7	76	16	133	232
HASTINGS DISTRICT. )					
(E. A. Butler and )	16	59	17	135	227
Rev. E. N. Bloomfield.) )					
GLoucestershire. )					
(V. E. Perkins.) )	10	50	11	106	182
PART OF CHESHIRE AND )					
LANCASHIRE. )	14	38	11	96	162
(Willoughby Gardner.) )					
PART OF ESSEX. )					
(W. H. Harwood.) )	11	60	18	125	214
TYNESIDE, DURHAM, )					
PART OF NORTHUMBERLAND. )	11	38	13	71	133
(J. Bold.) )					
GLANVILLE'S, WOOTTON, )					
DORSET. )	8	43	10	87	148
(C. W. Dale.) )					

All the Insects in my list have been taken by myself in this parish.

The following species have been determined by Mr. Saunders since this paper was sent in, and as I am giving up this particular branch, I have added them as an appendix.

PASSALECUS MONILICORNIS, Dbm. I took a female of this rare insect early in June.

ODYNERUS SINUATUS, Fab. Several males in June, flying round a post.

COLLETES FODIENS, Kirb. A female, September, 1894.

„ SUCCINCTA, Linn. A female, September, 1894, on Hawkweed.

ANDRENA AMBIGUA, Perkins. I sent two females to Mr. Saunders in May, 1894. This is an allied species with *varians*, *helvola*, and *fucata*.

NOMADA BOREALIS, Zett. I took a male on Sallow blooms in April.

„ FLAVOGUTTATA, Kirb. A female in June.

„ OCHROSTOMA, Kirb. A female, June 8th.

June 15th, 1895.

## IV.

NOTES ON A SMALL COLLECTION OF  
SPITSBERGEN PLANTS.

BY COLONEL H. W. FEILDEN AND MR. HERBERT D. GELDART.

*Read 27th November, 1894.*

THE small collection of plants from Spitsbergen, described and named by Mr. Herbert D. Geldart, was made during a flying visit to that interesting country in the month of July, 1894. The localities in which I collected plants were only three in number, namely, Advent Bay, Ice Fiord, where I gathered during the night of the 1st July; again, during the morning of the 2nd July, in the immediate vicinity of our anchorage, and, in the afternoon of the same day, at the head of Advent Bay; again, whilst on shore for a few hours at Green Harbour, Ice Fiord, on the 4th of July; and, finally, at Dane's Island, when on shore for a couple of hours on the 6th of July.

The first week of July is rather too early for collecting plants in the Polar regions, for many have not commenced to show their blossoms, and, consequently, may very easily be overlooked. The extraordinary rapidity with which flowers develop and come to maturity under the continuous light of the Polar regions is very striking. You may search an area for blooms one day, and see only a few Saxifrages in bud peeping out, and twenty-four hours later the same spot may be bright with many kinds of blossoms. It should be remarked that in Spitsbergen, as well as in other parts of the Arctic regions, the rarest plants are not, as a rule, to be found in the lowlands, or near the shore-line, for there the most fertile-looking areas are usually to be met with; and these often present a very gay appearance, from the amount of bloom which greets the eye, though the plants which produce them may be limited in species.

The Rev. A. E. Eaton—a well-known naturalist and botanist, who, twenty years ago, did excellent work in Spitsbergen, when accompanying Mr. Leigh Smith—gave such excellent advice in a letter I received from him, prior to my leaving England this spring, that I do not hesitate to transcribe the following: “In view of the likelihood of your visiting Wiide Bay (north coast of Spitsbergen), it may be useful to state that I began to learn there, chiefly, that rare plants are more likely to find shelter in such a country, on sunny patches of soil, tolerably high up on hill sides, or on cliffs, sheltered from the coldest winds, and on the upper parts of the *talus* of precipices, than on lower ground. It is well to mention that I did not work in Wiide Bay with this elementary principle in the art of collecting clearly before me.” But to carry out this excellent advice requires time and a large amount of physical exertion, for the mountain slopes of Spitsbergen are peculiarly steep; and the ascent of a thousand feet, up the sliding, slipping slope of rocky *talus* is arduous work, and not to be undertaken lightly, when time is an all important object, and there is only a problematical chance of obtaining a prize at the top.

A glance at the map will show that Advent Bay possesses a peculiarly favourable position; it is one of the inlets that open out on the southern side of the great Ice Fiord, a noble indentation, penetrating the west island of Spitsbergen for sixty or seventy miles on its western side, and about mid-way between its southern and northern extremities. No land in the same latitude, in any portion of the Polar area, can be compared with the south side of Ice Fiord for fertility and plant-growth. This is due to the prolongation of the warm Atlantic current which laves the western shore of Spitsbergen, fends off the Polar ice from Hakluyt's Headland, and, sweeping along the north coast, opens up a waterway, at the close of nearly every summer, as far as the Seven Islands. Advent Bay has another physical peculiarity which is almost unique when compared with the other subsidiary indentations of Ice Fiord, namely, it has no discharging glacier; nor has the long valley, which proceeds inland for many miles from the head of the present bay, any permanent ice in it, although massive moraines, formed under water, indicate that at no very distant time, when the land stood at a lower level, discharging glaciers occupied



the area, which is now an extensive low-lying valley. With these physical advantages, it is not surprising that the flora in the neighbourhood of Advent Bay should be remarkably abundant.

It is a difficult matter to convey to the minds of others the optical impressions made on one's self, and, probably, no two persons would agree precisely on the subject; but I will endeavour, in a few words, to give you my impression of the general features of a Polar flora, taking Advent Bay as my text, and the period of the year the first week in July. Looking at the shore from seaward, say from a distance of a couple of English miles, the tract of low-lying moorland which extends for a mile or so from the base of the hills, with a gradual slope to the sea, has a brown, mournful hue, broken here and there by small streaks of green, which mark the rivulets issuing from the melting snow-patches. Cold-looking grey boulders are scattered about, and the actual seashores are either rock or beaches of shingle, which appear, at a little distance, to be completely barren. Glancing upwards to where the coast range of mountains raise their heads on high, you will observe that a great deal of the winter mantle of snow has been melted off. Many of the crags are too precipitous for snow to lie upon them at any time, and for miles the snowy mantle has been withdrawn from the steep slopes of *talus* that descend for a height of eight hundred to a thousand feet from the overhanging precipices. In the wide re-entering angles between the prominent mountain faces, the snow lies in vast quantities; and it is this alternation of black-looking cliff, peak, sombre rock-slope and white curtain, which, in a great measure, give to the west Spitsbergen coast-line its weird and solemn majesty.

I am asking the reader to focus his eye on a small piece of coast-scenery in the neighbourhood of Advent Bay, and not to let his view wander too far afield to where the frozen peaks of the interior rise from a crystal sea, while mighty glaciers fill the valleys and fiords. The sublimity of that spectacle is so entrancing, that if once your sight is directed to it, my description of the humble flora, will, I am afraid, be passed by.

On landing at Advent Bay, and crossing the shingle beach, you will note that yellow and white *Drabas* are plentifully sprinkled between the stones; patches of *Saxifraga oppositifolia* in lovely pink bloom, and clumps of *Silene acaulis* in full flower, take the

place of the Sea-Pink of our shores. As you step on to the moorland that looked so brown and sad from seaward, you are delighted to find that everywhere it is bedecked with flowers. Prominent above all is *Dryas octopetala* in clumps and in small patches, occupying every little hillock and dry spot, where its numerous blossoms give quite a cheerful air to the surroundings. The Arctic Poppy, with its delicate sulphur-tinted petals, waves its head in all directions; and the bright yellow *Drabas* are conspicuous, whose flower-stalks stand up in groups three to four inches high. If you look a little more closely, you will find a colony of delicate little yellow-blossomed Saxifrages peeping at you (*Sax. flagellaris*), and note its tendrils stretching in various directions, and taking root in the soil. More striking, and giving colour to the ground, is the larger *Sax. Hirculus*; whilst several other species of Saxifrage that delight in damp spots, push their blooms through the green Moss by the side of rivulets. *Pedicularis hirsuta* is a wide-spread plant, but as it grows singly and broadcast, it does not leave so strong an impression on the eye as many of the other plants.

When I remarked that *Dryas octopetala* was the most prominent plant, I ought to have coupled with it *Andromeda tetragona*; but though it grows most plentifully at Advent Bay, it was scarcely in flower at the time of my visit, and I had difficulty in finding its wax-like bloom to add to my collection. Ranunculuses abounded, and every damp spot was brightened by their familiar yellow flowers, though I have noticed that the little *R. pygmaeus* affects drier spots than some of its relatives. In the small pools, the white tufts of *Eriophorum* bow themselves to the breeze. *Sax. oppositifolia*, *Silene acaulis*, and the *Drabas* are in no way confined to the shingle of the shore-line, but are spread broadcast over the moorland. There is, however, one plant that grows only, as far as I am aware, in close proximity to the sea, and that is *Mertensia maritima*, which, with its fleshy leaves and stalk, and bright blue petals, seems to me a plant out of keeping with Arctic surroundings.

I have no doubt that, before long, the hitherto generally accepted theory, that the present Polar flora owes its presence to the gradual creeping back of plant-life from the south since the glacial epoch, must be modified. That certain species of plants now found in the Polar regions have been transported there from more southern latitudes by the agency of birds, winds, waves,

ice-rafts, and other causes, is probable; but, to my mind, it seems indisputable that several plants, now confined to the Polar area, must have originated there, and have outlived the period of greatest ice-development in that region. To wit, *Saxifraga flagellaris* and *Pleuropogon Sabinii*, two striking examples of plants only found in the extreme northern portions of the globe, and both circum-polar in their distribution.—H. W. FEILDEN.

The plants found in Spitsbergen by Colonel Feilden are :

- RANUNCULUS NIVALIS, Linn. Advent Bay.  
 „ PYGMEUS, Wahl. „ and Dane's Island.  
 PAPAVER NUDICAULE, Linn. „  
 BRAYA GLABELLA, Rich. „ and Green Harbour.  
 DRABA LEPTOPETALA, Th. Fr. „  
 „ MARTENSIANA, I. Gay. „  
 COCHLEARIA GRÆNLANDICA, Linn. „  
 ARENARIA PEPLOIDES, Linn. „  
 LYCHNIS APETALA, Linn. „  
 „ „ var. INVOLUCRATA, Ch. and S. Advent Bay.  
 (= L. AFFINIS, I. Vahl. WAHLBERGELLA AFFINIS, Fr.)  
 SILENE ACAULIS, Linn. Advent Bay.  
 CERASTIUM ARCTICUM, Lange. „  
 DRYAS OCTOPETALA, Linn. „  
 POTENTILLA PULCHELLA, Linn. „  
 SAXIFRAGA HIERACIFOLIA, W. and K. Advent Bay and Green  
 Harbour.  
 „ HIRCULUS, Linn. Advent Bay.  
 „ FLAGELLARIS, Wild. „  
 „ OPPOSITIFOLIA, Linn. „  
 „ CERNUA, Linn. „ and Dane's Island.  
 „ RIVULARIS var. PURPURASCENS, Lange. Green Harbour.  
 „ CÆSPITOSA, Linn. Advent Bay.  
 „ NIVALIS, Linn. „  
 TARAXACUM OFFICINALE var. ALPINUM, Koch. Advent Bay.  
 CASSIOPE TETRAGONA, Don. Advent Bay.  
 PEDICULARIS HIRSUTA, Linn. „  
 MERTENSIA MARITIMA, Don., var. TENELLA. Advent Bay.  
 POLYGONUM VIVIPARUM, Linn. Advent Bay.  
 OXYRIA DIGYNA, Hill. Advent Bay.

SALIX POLARIS, Wahl. ? Advent Bay and Dane's Island.

„ RETICULATA, Linn. „  
 LUZULA HYPERBOREA, R. Br. „  
 ERIOPHORUM CAPITATUM, Host. „  
 ALOPECURUS ALPINUS. Sm. „  
 HIEROCHLOË ALPINA, Linn. „  
 (POA. ) „  
 LYCOPODIUM SELAGO, Linn. „

There are, in addition to the above, about five or six *Drabe* which I have failed to get named, and one or two plants not identified; in all, a total of over forty species, or nearly a third of the species of flowering plants known to be found in Spitsbergen. Most of these species are of very extensive distribution throughout the Arctic regions; but there is one notable exception in *Potentilla pulchella*, which (I quote from 'Warming's Tables,' 1887) occurs nowhere else in the Eastern Hemisphere. *Saxifraga hieracifolia* and *S. Hirculus* are also of curious distribution, both being absent from Greenland, excepting the north-east coast, from N. lat. 70° to 76°. The strange little *Saxifraga flagellaris* is confined to extreme Arctic regions, and does not reappear in either Great Britain or on the European Alps, as do most of its genus.

Satisfactory as this collection is, considering the very few hours Colonel Feilden was able to devote to it, it is not sufficient to illustrate either the origin or the general distribution of the flora of Spitsbergen. The very commonly accepted theory that the whole of the Phanerogamic Flora of the Arctic regions was driven southwards by the ice during the Glacial Period, and returned afterwards, when the ice had retreated, by means of "bridges" since submerged (in the case of Spitsbergen, between that archipelago and Novaya Zemlia), may, in the light of recent observation, require reconsideration. The views of geologists respecting the extent of the ice-sheet which is supposed to have covered the North of Europe seem to have become modified of late, and some of the results which have been attributed to the action of the ice-sheet are now referred to that of water-borne ice. The travels of Lieut. Peary show that, even in very high latitudes, flowering plants hold their own on every little refuge or vantage ground, such as rocks protruding through the ice (Nunatak) as well as on

the sea-coast; and, from recent observations of American botanists in Alaska, it seems probable that many plants when buried under glaciers become torpid, but retain enough vitality to grow again when uncovered by the retreat of the ice. I hope, at some future time, to have an opportunity of returning to this subject from a larger base, and in detail; meantime I would ask: Is it not probable that a large proportion of the present Arctic flora is the remains of an old and widely distributed flora, which was where it is now before the Glacial Period, held its own (sorely straightened, no doubt) during that period, and was not driven southward by the ice-sheet at any time?

I have once more to thank Mr. Arthur Bennett for his great kindness in naming many of these plants, and for his great assistance, so willingly given at all times.—H. D. GELDART.

---

V.

NOTES ON THE HERRING FISHERY OF 1894.

By C. STACY-WATSON.

*Read 28th January, 1895.*

I HAVE been requested by the Secretary to continue these annual Notes, and have, with considerable reluctance, consented, for I cannot forget that I follow in the footsteps of our late President in this matter, who has, for so many years, ably performed this duty. May I, therefore, crave your indulgence whilst I strive to place before you, as concisely as I can, the few facts that pertain to the most important industry for the year.

As you are aware, the Drift Herring Fishery is divided, roughly, into four seasons, viz., the Spring, Midsummer, North Sea, and Home fishings. We will, therefore, take them in their order.

The Spring fishing begins the first week in March, the boats proceeding to the fishing-grounds, about fifty miles E.N.E. of the South Crossing sands; and ends about the middle of May, opposite Lowestoft. The fish are of poor quality, lean and thin; they are caught, presumably, for bait, but, if the markets warrant it, the best samples are made into kippers and bloaters. The number of boats engaged in this fishing this year were four from Yarmouth and fifteen from Lowestoft, and the total number of Herrings landed at both places was 740.8.8. The voyage was not considered successful, and the catchers seem less inclined every year to risk life and capital in this enterprise. The large importations of Scandinavian-caught fish, together with the earlier, than formerly, fishings in the Moray Firth, may have influenced them to discontinue this fishing, preferring rather to fit out their boats and send them to the West of England to the great Mackerel fishing. The four Yarmouth boats landed 72.5.6, an average of 18.1.4 per boat; whilst the fifteen Lowestoft men landed 668.5.2, an average of 51.4.0. You will observe there is a remarkable difference between the average of the Lowestoft and Yarmouth boats; the former have an excess of 33.2.6 per boat.

MIDSUMMER.—This fishing commences the first week in June, somewhat in the same vicinity as the previous one; the school of Herrings making its way south, and, in its progress, nearing the coast until reaching off Southwold the second week in July, when it vanishes from the ken of the fishermen, and is not met with again until the following year.

This season 62 Scotch boats left their northern homes, eager for the fray, 20 of them making Yarmouth their headquarters, the remaining 42 sailing from Lowestoft. There were also 50 Yarmouth and 168 Lowestoft boats in the campaign; a total of 280 boats, manned by 2,834 men and boys. The total number of Herrings caught was 2,777.8.8, divided as follows: Yarmouth, 1,083.5.8; Lowestoft, 1,694.3.0. The quality of the fish was, for the main part, excellent, and the fishermen were rewarded with remunerative prices; a few of the English boats reaching a return of from £300 to £400, the Scotch ranging from £50 to £150. The good quality of the fish

tempted some of the buyers to speculate freely, and to experiment in change of cure and market. This fishing may be regarded as very good, and encouraging to the fishermen for future effort, especially if the area of distribution can be increased.

**NORTH SEA AND HOME FISHERIES.**—By the time the Midsummer fishing ended, the shipyards and quays were scenes of activity, carpenters, riggers, engineers and painters, owners and men busily engaged in getting their boats ready for their natural element, and equipping them for the approaching campaign. Some of the earliest to take to the briny sailed away to the North *countrie*, and during the first few weeks fished off the coast of Aberdeenshire in groups, according to ownership; the catch of the several boats being transferred to one, which, turning her nose southward, bowled merrily along, anxious to catch a good market. Others of these "early worms" of the fleet stopped short to fish off the Northumberland and Yorkshire coasts; running their catches into Shields, Whitby, Scarborough, and Grimsby, whilst fresh; in the event, however, of these markets being unremunerative, and the wind and tides favourable, some of the boats would salt their catch, and run for the Yare. The fish now being fairly scented off the coast, no time is lost in fitting out the remainder of the fleet; rigging is set up, sails bent, stores and nets stowed away, the last brush of paint given; and away they go, a merry crew, to hunt the silvery host, and bring to land the daintiest morsel man ever tasted. The total number of boats engaged in the North Sea and Home fishings from Scotland, Lowestoft, and Yarmouth was 464, with a complement of 2,974 men and boys, divided as follows: 137 Scotch and 327 English; 42 Scotch and 182 English sailing out of Lowestoft, and 95 Scotch and 145 English out of Yarmouth. The total number of Herring landed at Lowestoft and Yarmouth for these fishings amounted to 20,922.6.4; Yarmouth contributing 17,407.0.4, and Lowestoft 3,515.6.0.

The Herrings, throughout, were of good quality and size. Several good deliveries of the Black-nosed school were made, notably by the "Kiama" and "Snowflake," both vessels fishing off the outer Dowsing, in thirty-five fathoms of water. These fish are very fine in form, sound and healthy in flesh, and of rich flavour; of late years they have been somewhat scarce.

Some very good catches were made by individual boats, the

highest being 23.8.0; and 64 boats the same day ranged from 10 to 20 lasts per boat; these were amongst the largest catches of the season. The following table shows the days upon which the largest deliveries were made at Yarmouth. On

October	29th,	52 E.	boats landed at the Wharf	225 lasts.	
"	30th,	46 E.	" " " "	230 "	} 541
"	"	86 S.	" " " "	311 "	
November	4th,	90 E.	" " " "	630 "	
"	6th,	30 E.	" " " "	201 "	} 352
"	"	79 S.	" " " "	151 "	
"	12th & 13th,	104 E.	" " " "	1,100 "	
"	19th,	67 E.	" " " "	559 "	
"	20th,	36 E.	" " " "	29 "	

equal to  $528\frac{7}{10}$  lasts per day for the seven days.

I regret I am unable to give a similar table of deliveries at Lowestoft; but, doubtless, they were in proportion to the above.

By the end of November the catch, which hitherto had been less than the previous year, exceeded it by 617 lasts. The prices did not fluctuate throughout the season as violently as is usually the case; but for a few days specially fine fresh Herrings realised as high as £28 per last, whilst, on other days, inferior quality, fresh, only obtained £4 per last. Bloater "stuff," superior, one day touched £18 per last, and another £6 10s.; whilst salt "stuff" travelled from £5 to £10, according to quality.

The value of these fishings to the catchers ranged from £400 to £1400 per boat. One boat's season's catch realised £1400; another £1,300; another £1000. The average per boat of the fleet of 145 Yarmouth boats is estimated to be about £750; whilst, for the Scotch boats, the prices ranged from £300 to less than £100. Their ill-fortune may be attributed somewhat to the fact that during the closing days of October these boats fell in with a large school of fish, which, in many cases, struck their nets and filled them so heavily that they carried them to the bottom, twisting and entangling them to such an extent that many of them were so injured as to be of no further use; this misfortune prevented them taking their full share of the spoil during November, when quality, quantity, and prices are generally at their best.

The season has not been signalised by those destructive gales which so frequently ravage our coast at this period of the year,



and send a thrill of anxiety into the hearts of so many weary watchers and waiters for the return of loved ones. Happily no lives were lost, although some property was destroyed or injured.

The weather on the whole was good, and the boats were seldom kept in the harbour, so the market was fairly regularly supplied. The moons falling full about the middle of each month were not accompanied with those sudden changes of weather as has so often been witnessed, so that, on the whole, the North Sea and Home fishings may be described as very favourable to the catchers, and were continued with success into December, the December catch being the greatest known for many years, viz., 2,452; these figures have only been exceeded twice within the last twenty years.

The total number of Herrings landed, North Sea and Home fishings :

	1893.			1894.		
	Lasts	Thousands	Hundreds	Lasts	Thousands	Hundreds
Yarmouth .	15,117	3	1	17,407	0	4
Lowestoft .	6,352	5	9	5,878	4	2
Total .	21,469	9	0	23,285	4	6

An increase of 1,815.5.6 as compared with 1893.

The total catch of the four fishings during the year is 24,441.6.0.

	Lasts	Thousands	Hundreds
Yarmouth . . .	18,563	1	8
Lowestoft . . .	5,878	4	2
	24,441	6	0

In 1893, for the same period, the catch was :

	Lasts	Thousands	Hundreds
Yarmouth . . .	16,184	3	8
Lowestoft . . .	8,157	7	8
	24,342	1	1

So that 1894 exceeded the previous year by 99.4.9 only.

The gross value of the North Sea and Home catch (the greatest fishing) may be estimated, in round figures, at £207,748; and it may fairly be estimated that some £20,000 beyond this was distributed for labour to those who worked amongst the Herrings on shore.

I desire to acknowledge my indebtedness to Mr. W. J. Nutman, the Borough Accountant of Great Yarmouth, and to the Harbour Master of Lowestoft, for the following particulars of the catches of the various fishings.

of the ventral margin of the body, when it continued horizontal till about under the centre of the dorsal fin; then taking a sudden bend upwards and backwards till it reached the centre of the vertical depth of the body at a point immediately below the posterior border of the dorsal fin, it continued horizontally as midway between the posterior border of the dorsal fin and the insertion of the caudal appendage, where it suddenly returned upon itself, slanting downwards to within one-third of the distance from the first deflection, and resumed the horizontal line till brought to a point by the curvature of the body, where it merged into the uniform black colour of the extremity. The under surface of the caudal fin was also of the same yellowish white, which extended a short distance along the inferior caudal ridge, gradually, but sharply defined, giving place to the black colour of the under surface of the tapering extremity.

The dorsal fin was rather high and slightly falcate, and the borders of the caudal flukes almost flat, with a well-defined central notch. The pectoral limb was rather broad, and measured  $14\frac{1}{2}$  inches along the anterior border; 12 inches in a direct line from the point of insertion to the posterior angle; and 7 inches in its greatest depth; somewhat bluntly truncated, but ending in a rather pointed extremity.

The following were some of the principal measurements:—

	ft.	in.
Extreme length, from point of rostrum to medial notch of caudal fin, in a straight line	7	6
Point of rostrum to blow-hole	0	$14\frac{1}{2}$
Blow-hole to anterior insertion of dorsal fin	2	$1\frac{1}{2}$
Base of dorsal fin	1	1
From posterior insertion of dorsal fin to medial notch of caudal fin	3	2
Height of dorsal fin	0	$8\frac{1}{2}$
From tip to tip of flukes	1	10
Greatest dorso-ventral height (in front of dorsal fin)	1	9
Length of lower border of pectoral limb (along curve)	1	$2\frac{1}{2}$
"    upper    "    "    "    "	0	$11\frac{1}{2}$
From tip of lower jaw to angle of mouth	0	$10\frac{1}{2}$
From the tip of the lower jaw to the anal opening	3	$5\frac{1}{2}$
Mammary pits	0	$6\frac{1}{2}$
Anal opening to caudal notch	4	$1\frac{1}{2}$

Sex, female; weight, 4 cwt.

VII.

THE LAND AND FRESH-WATER MOLLUSCA  
OF WEST NORFOLK.

BY T. PETCH, B.A. LOND., M.C.S.

*Read 28th January, 1895.*

In comparison with the list of East Norfolk Mollusca, the following one will, no doubt, seem small; but this might have been expected, since there is no district in the West which offers such a happy hunting-ground to the conchologist as the Broads do in the East. In addition, the species named below have been collected within easy walking distance of Lynn and Hunstanton, so that the greater part remains unexplored.

The low-lying country to the south of Lynn seems particularly favourable for fresh-water forms, but, on closer examination, is rather disappointing, as much of the water is brackish, and the ditches are, from a naturalist's point of view, too often cleaned out. Consequently, the larger bivalves are rare. I have found *Anodonta* in one locality only. *Segmentina nitida* occurs at Lynn, but will, no doubt, be exterminated by an "improving" Town Council. *Limnæa glabra* is found in two small ponds which are dry in the summer.

An interesting point in distribution is brought forward by comparing the ditches near the Wash with those on the Yorkshire bank of the Humber. In the former, *Pl. nitidus* is the common *Planorbis*, whilst *Pl. nautilæus* has not been found; in the latter, the reverse holds, *Pl. nautilæus* being present in hundreds in ditches and ponds from Hull to Spurn.

If we accept the theory of dispersion by birds (and both species are small enough), ought we not to find the same shell in the two localities? With regard to distribution by rivers, masses of reed-roots, brought down to Lynn by the ice, yielded living specimens

of the ventral margin of the body, when it continued horizontally till about under the centre of the dorsal fin ; then taking a sudden bend upwards and backwards till it reached the centre of the vertical depth of the body at a point immediately below the posterior border of the dorsal fin, it continued horizontally as far as midway between the posterior border of the dorsal fin and the insertion of the caudal appendage, where it suddenly returned upon itself, slanting downwards to within one-third of the distance from the first deflection, and resumed the horizontal line till brought to a point by the curvature of the body, where it merged into the uniform black colour of the extremity. The under surface of the caudal fin was also of the same yellowish white, which extended a short distance along the inferior caudal ridge, gradually, but still sharply defined, giving place to the black colour of the under surface of the tapering extremity.

The dorsal fin was rather high and slightly falcate, and the borders of the caudal flukes almost flat, with a well-defined central notch. The pectoral limb was rather broad, and measured  $14\frac{1}{2}$  inches along the anterior border ; 12 inches in a direct line from the point of insertion to the posterior angle ; and 7 inches in its greatest depth ; somewhat bluntly truncated, but ending in a rather pointed extremity.

The following were some of the principal measurements :—

	ft.	in.
Extreme length, from point of rostrum to medial notch of caudal fin, in a straight line	...	7 6
Point of rostrum to blow-hole	...	0 14 $\frac{1}{4}$
Blow-hole to anterior insertion of dorsal fin	...	2 1 $\frac{1}{4}$
Base of dorsal fin	...	1 1
From posterior insertion of dorsal fin to medial notch of caudal fin	...	3 2
Height of dorsal fin	...	0 8 $\frac{3}{4}$
From tip to tip of flukes	...	1 10
Greatest dorso-ventral height (in front of dorsal fin)	...	1 9
Length of lower border of pectoral limb (along curve)	1	2 $\frac{1}{2}$
"    upper    "    "    "    "	0	11 $\frac{1}{2}$
From tip of lower jaw to angle of mouth	...	0 10 $\frac{1}{2}$
From the tip of the lower jaw to the anal opening	...	3 5 $\frac{1}{2}$
Mammary slits	...	0 6 $\frac{1}{2}$
Anal opening to caudal notch	...	4 1 $\frac{1}{2}$

Sex, female ; weight, 4 cwt.

VII.

THE LAND AND FRESH-WATER MOLLUSCA  
OF WEST NORFOLK.

By T. PETCH, B.A. LOND., M.C.S.

*Read 28th January, 1895.*

IN comparison with the list of East Norfolk Mollusca, the following one will, no doubt, seem small ; but this might have been expected, since there is no district in the West which offers such a happy hunting-ground to the conchologist as the Broads do in the East. In addition, the species named below have been collected within easy walking distance of Lynn and Hunstanton, so that the greater part remains unexplored.

The low-lying country to the south of Lynn seems particularly favourable for fresh-water forms, but, on closer examination, is rather disappointing, as much of the water is brackish, and the ditches are, from a naturalist's point of view, too often cleaned out. Consequently, the larger bivalves are rare. I have found *Anodonta* in one locality only. *Segmentina nitida* occurs at Lynn, but will, no doubt, be exterminated by an "improving" Town Council. *Limnea glabra* is found in two small ponds which are dry in the summer.

An interesting point in distribution is brought forward by comparing the ditches near the Wash with those on the Yorkshire bank of the Humber. In the former, *Pl. nitidus* is the common Planorbis, whilst *Pl. nautilus* has not been found ; in the latter, the reverse holds, *Pl. nautilus* being present in hundreds in ditches and ponds from Hull to Spurn.

If we accept the theory of dispersion by birds (and both species are small enough), ought we not to find the same shell in the two localities ? With regard to distribution by rivers, masses of reed-roots, brought down to Lynn by the ice, yielded living specimens

of *B. tentaculata*, *B. leachii*, and *L. truncatula*, after having been stranded on the bank for four weeks.

The commoner land-shells may be found in abundance on the chalk at Hunstanton and Ringstead. I have not met with *Cyclostoma* here, though Dr. Plowright found one specimen. The sand hills to the north of Hunstanton are worth a visit in wet weather. They are then covered with *H. nemoralis*, *virgata*, *itala*, and *caperata*. *Nemoralis* shows little variation, but *virgata* is well represented, most of the specimens being var. *hyalozona*, perhaps the prettiest shell on the British list. The corresponding variety of *itala* may also be found.

Between the marshland and the chalk comes the most unfavourable feature of the Lynn district—the large area covered by sand hills. This is absolutely barren, no species having yet developed a taste for sand, heather, and pine. Most of the plantations in the district consist of Conifers, and to this may be attributed the absence of many of the tree-loving species, even of such a common one as *Helix aculeata*.

ARION ATER. Common. The chocolate-brown form is found at Middleton, Gaywood, Wormegay, and Setch.

„ var. RUFA. One specimen at Middleton.

„ MINIMUS. St. Germans.

„ HORTENSIS. Common in gardens.

„ CIRCUMSCRIPTUS. Under wood, etc., St. Germans.

AMALIA SOWERBYII. Amongst nettles near the beach, Hunstanton.

LIMAX MAXIMUS. Common.

„ FLAVUS. Common in gardens and outbuildings with *L. maximus*.

„ MARGINATUS. A very pale form. On a wall, near the station. (Holt.)

AGRIOLIMAX AGRESTIS. Common in fields, gardens, etc.

„ LEVIS. Amongst wet moss in company with *H. nitida*. Wormegay, St. Germans.

VITRINA PELLUCIDA. Castle Rising, Hunstanton, Ringstead, Terrington, Middleton.

HYALINIA CELLARIA. Gayton, Castle Rising, Reffley, North Wootton, etc.

„ NITIDULA. (Holt), Castle Rising, Middleton, Wormegay, St. Germans, Terrington, Reffley, Brancaster.

- HYALINIA ALLIARIA.** Usually singly. Under wood, stones. Gayton Road, Castle Rising, Hardwick, Middleton, North Wootton, Hunstanton.
- „ **CRYSTALLINA.** (Holt), Hunstanton, Ringstead, Castle Rising, Middleton.
- „ **FULVA.** Common, amongst leaves and moss. North Wootton, St. Germans, Bawsey, Castle Rising, Middleton.
- „ **NITIDA.** Rare. In wet moss on the sides of ditches. St. Germans, Wormegay, Hunstanton.
- HELIX ROTUNDATA.** Certainly rare in West Norfolk. Gayton Road, Castle Rising.
- „ **PYGMÆA.** Gayton Road, North Wootton, Middleton, Wolferton.
- „ **PULCHELLA.** Common under stones and at the roots of hedges. Castle Rising, Bawsey, Middleton, North Wootton, Ringstead.
- „ „ **var. COSTATA.** Generally found with the type.
- „ **ASPERSA.** Everywhere.
- „ „ **var. FLAMMEA.** West Winch, Lynn, Hunstanton.
- „ „ **var. MINOR.** Lynn, Hunstanton. Very common after rain on flower-beds at Hunstanton.
- „ **NEMORALIS.** Common. The prevailing varieties being *libellula* and *rubella*.
- „ „ **var. MINOR.** Hunstanton, Wormegay.
- „ **HORTENSIS.** Local. Middleton, West Lynn, Lynn, Gaywood. Generally *var. lutea*.
- „ „ **var. ROSEOZONATA.** Lynn.
- „ „ **var. ALBINA.** Lynn.
- „ „ **var. INCARNATA.** Lynn.
- „ „ **var. LILACINA.** North Runcton, Gaywood. “A pale form which has been distinguished as *var. pallida*.”—J. W. TAYLOR.
- „ **CANTIANA.** Fairly common, usually amongst nettles. Lynn, Middleton.
- „ „ **var. ALBIDA.** South Lynn.
- „ **RUFESCENS.** Common in gardens and waste places.
- „ „ **var. ALBA.** Castle Rising.
- „ „ **var. ALBOCINCTA.** Lynn.

HELIX HISPIDA. Common everywhere.

- „ „ var. ALBA. West Winch.
- „ „ var. RUBENS. Middleton.
- „ „ var. MINOR. West Winch.
- „ ITALA. On the chalk, Ringstead ; on the sand hills, Hunstanton.
- „ „ var. HYALOZONATA. Hunstanton.
- „ „ var. ALBA. Hunstanton.
- „ „ var. GRIEDESCENS. Hunstanton.
- „ CAPERATA. Rare. Hunstanton, Gayton Road Station. Probably brought with ballast to the latter place.
- „ „ var. ORNATA. Hunstanton.
- „ VIRGATA. Common, especially near the coast. Brancaster, Holme, Hunstanton, North Wootton, West Winch, Setch, Lynn.
- „ „ var. HYALOZONA. Common on the sand hills, Hunstanton ; on the Ringstead road.
- „ „ var. ALBICANS. Not very numerous. Hunstanton.
- „ „ var. SUBDELETA. Hunstanton.
- „ „ var. LINEATA. Usually found with the type.  
I have observed two cases of union between vars. *lineata* and *hyalozona*.

BULIMINUS OBSCURUS. One specimen of this arboreal species turned up amongst nettles on a rubbish heap. Gaywood.

PUPA CYLINDRACEA. Under stones, Ringstead.

„ MUSCORUM. A few manage to exist on the Town Wall, Lynn.

VERTIGO EDENTULA. One specimen, on dead stems of *Rumex*. Gayton Road Station.

„ SUBSTRIATA. Amongst moss. Bawsey.

„ PYGMEA. On bark, leaves, etc. Middleton, Ringstead, Castle Rising.

„ „ var. QUADRIDENTATA. Abundant on dead stems. Gayton Road Station.

CLAUSILIA RUGOSA. Middleton, Castle Rising.

COCHLICOPA LUBRICA. Common. North Wootton, Wolferton, (Holt), Hunstanton, Middleton, etc.

SUCCINEA PUTRIS. Common.

„ ELEGANS. Generally with the above. Gaywood, West Winch, Wormegay, Lynn.



**CARYCHIUM MINIMUM.** Common amongst moss and dead leaves.  
(Holt), Castle Rising, Middleton, St. Germans,  
Hunstanton.

**SEGMENTINA NITIDA.** Amongst the reeds on the Recreation  
Ground, Lynn.

**PLANORBIS FONTANUS.** Common in all ditches round Lynn,  
Wormegay, North Wootton, Watlington.

„ **NAUTILEUS** var. **CRISTA.** One specimen in a pond at  
West Winch.

„ **ALBUS.** Common. Hunstanton, Lynn, Wormegay,  
St. Germans, West Winch.

„ **VORTEX.** Common in ditches and ponds. The prevailing  
form is a very thin one.

„ **SPIRORBIS.** With the preceding at Gaywood; alone,  
in shallow ponds at Reffley and North Runcton.

„ **CARINATUS.** Common in ditches. Saddlebow, Gaywood,  
Watlington, etc.

„ **UMBILICATUS.** Universally distributed.

„ „ var. **RHOMBEA.** In a ditch at Saddlebow, which  
is dry during the summer.

„ **CORNEUS.** Gaywood, Lynn, Middleton, Watlington.

„ **CONTORTUS.** Babingley, North Wootton, Watlington,  
Gaywood, St. Germans.

**BULLINUS HYPNORUM.** Rare. In a ditch at St. Germans.

**PHYSA FONTINALIS.** Common. North Wootton, Setch, Hunstanton,  
Terrington, St. Germans, Gaywood, etc.

**LIMNÆA PEREGRA.** Everywhere, even in brackish water with  
*Hydrobia ventrosa.*

„ „ var. **LABIOSA.** A pond on the Wash bank,  
Lynn.

„ „ var. **MARITIMA.** Reffley. In a shallow pond,  
which I expect influences the size of the shell.

„ „ var. **INFLATA.** Ditch at West Winch.

„ „ var. **OVATA.** Pond, Runcton.

„ „ var. **LACUSTRIS.** Lynn.

„ **AURICULARIA.** Moderately common. In ditches at Lynn,  
St. Germans, Setch, Babingley. In the Nar valley  
drain at West Winch.

„ „ var. **MINOR.** Setch.

- LIMNÆA STAGNALIS.** Gaywood, North Runcton, Saddlebow  
St. Germans, North Wootton, Babingley.
- „ „ var. **FRAGILIS.** Generally found with the type.
- „ „ var. **PICTA.** In a ditch near St. Germans. Older  
specimens lose their epidermis, and only show  
the banding when viewed from the inner side.
- „ **PALUSTRIS.** Common in ditches to the south of Lynn.  
St. Germans, Babingley, North Wootton, Gaywood,  
Setch. Several specimens approach var. *lacunosa*.
- „ „ var. **ELONGATA.** Lynn.
- „ „ var. **MINOR.** North Wootton.
- „ „ var. **VARIEGATA.** Ditch near the Ouse, Lynn.
- „ „ var. **ROSEOLABIATA.** Saddlebow, Lynn.
- „ **TRUNCATULA.** In marshy places, or on the banks of  
ditches, seldom in the water. Gaywood,  
North Wootton, Hardwick, St. Germans, Holt,  
Hunstanton.
- „ **GLABRA.** In shallow ponds at Refley and North Runcton.
- ANCYLUS FLUVIATILIS.** One specimen near the Waterworks,  
Lynn, probably brought down by the Gaywood  
river.
- VELLETIA LACUSTRIS.** On reeds, St. Germans. Judging from the  
number of shells brought down amongst the reeds,  
this species is common higher up the Ouse.
- VIVIPARUS CONTECTUS.** On leaves of *Nymphaea alba*. Wormegay.
- BYTHINIA TENTACULATA.** In ditches everywhere.
- „ **LEACHII.** Common in ditches with the last named at  
North Wootton, Gaywood, Lynn, Saddlebow,  
West Winch.
- „ „ var. **ALBA.** South Lynn.
- VALVATA PISCINALIS.** Common in ditches and drains. Babingley,  
North Wootton, Gaywood, Setch, Hunstanton,  
West Winch, St. Germans.
- „ **CRISTATA.** Gaywood, St. Germans, North Wootton,  
West Winch.
- ANODONTA CYGNEA.** In a drain at North Wootton.
- SPHERIUM CORNEUM.** Common in most ditches.
- „ „ var. **VITTATA.** Saddlebow.
- „ „ var. **NUCLEUS.** St. Germans.

- SPHÆRIUM LACUSTRE.** Almost as common as the preceding. Lynn, (Holt), Wormegay, Saddlebow, etc.
- PISIDIUM AMNICUM.** In a drain at Wormegay.
- „ **FONTINALE.** In most ditches. Holt, Babingley, North Wootton, etc.
- „ „ **var. PULCHELLA.** Gaywood.
- „ **PUSILLUM.** About as common as the preceding. St. Germans, Babingley, North Wootton, Gaywood.
- „ „ **var. OBTUSALE.** St. Germans.
- „ **MILIUM.** Rare. In ditches. West Winch, St. Germans.
- HYDROBIA VENTROSA.** In brackish water. Lynn, Hunstanton.
- CONOVULA BIDENTATA.** At the roots of grass, by the side of the railway bridge over the Ouse, Lynn.

---

VIII.

ON THE RECENT ABUNDANCE OF THE LITTLE AUK  
(*MERGULUS ALLE*, LINN.) IN NORFOLK.

By J. H. GURNEY, F.L.S.

*Recd 25th February, 1895.*

It is not necessary, in this paper, to give an account of the Arctic weather which prevailed during January, 1895, which was the theme of every tongue at the time. The snow and frost lasted far into February, by which time bird-life was suffering starvation and famine. January was a bitter month, with a prevalence of strong northerly and north easterly gales, straight off the sea, which had an immediate effect on one well-known Arctic species which sometimes comes to England, the Little Auk or Rotche (*Mergulus alle*), sprinkling these dapper little sea-birds broadcast over the northern part of Norfolk, nearest to the coast; but a few were found

a long way inland, even to Quidenham and Thetford. On New Year's Day, three were picked up at Wells, and taken to Colonel Feilden, and about the same time two were shot or found at Yarmouth, and Mr. J. A. Cole had one from Wreningham and one from Forncett. On the 5th, Mr. Leach encountered four in his walk at Blakeney, on or near the shore; and on the 7th, two were picked up at Sidestrand, and others, about the same date, at other places.

As far as I can make out, the greatest number of these castaways were picked up—very few being killed with the gun—between the 10th and 27th of January. It is probable a good many met their fate on the 23rd, the day when Eccles church on the shore was swept away. On Monday the 21st the poor half-starved and enfeebled Little Auks were passing along the north coast of Norfolk, near enough to the beach for Mr. E. Ramm, who was on the look out, to estimate that one flock contained a hundred. It is easy to understand how a gale would blow them inland, already weakened by hunger; and, probably, not one of these flocks seen by Mr. Ramm, or even a single individual of them, escaped.

About the same time, or earlier, large numbers were noticed on the Yorkshire coast, where Mr. W. J. Clarke of Scarborough writes that he must have seen, swimming, flying, or lying dead upon the sands, considerably over 1000. Many of these Scarborough Auks, passing Lincolnshire comparatively unscathed, were doubtless the same individuals afterwards arrested in their southward course by the projecting coast of Norfolk. The greatest number were undoubtedly obtained between King's Lynn and Salthouse, and especially near Snettisham, Wells, and Blakeney, being buffeted in The Wash, and eventually (to save being cast ashore), flying a few miles inland, and dropping just anywhere. Many of them, when discovered, were alive, but nearly starved, and all of them were very thin, as if they had eaten nothing for some time. Mr. J. A. Cole tells me that one was caught by a dog, and another picked up on the pavement by the railings of the Norwich Hospital, and a third in Chapel Field. Another penetrated into the precincts of a rector's kitchen; while another perched on the stables of Hunstanton Hall, and was snowballed into the moat; and one or two more were found among farm premises. From Yorkshire I hear of one which came down a chimney.

I am much indebted to Colonel Feilden of Wells for helping to reckon up the number which fell victims to the elements; but, in order to avoid counting the same Auks twice over, it seems safest to confine the register to what were actually received by each of our taxidermists. This brings out a result of 285.

## REGISTER OF LITTLE AUKS.

Stuffed by Mr. Clarke of Snettisham	...	...	41
„ „ Gunn of Norwich *	...	...	36
„ „ Dack of Holt	...	...	35
„ „ Pashley of Cley	...	...	30
„ „ Cole of Norwich *	...	...	28
„ „ Wilson of Lynn	...	...	22
„ „ Roberts of Norwich *	...	...	20
„ „ Lowne of Yarmouth	...	...	19
„ „ H. Cole of Northrepps	...	...	17
„ „ Howlett of Newmarket	...	...	12
„ Other Norfolk Birdstuffers	...	...	13
Remains found on the beach of	...	...	10
Sent to the Zoological Gardens	...	...	2

---

 285

How long it was before all the Auks on the coast and in The Wash died or were killed, it is hard to say. Some, stronger than the rest, may have managed to remain out at sea; but more likely it was later comers from the North which occurred to Colonel Feilden on February 6th, and at Cley on the 12th, when Mr. E. Ramn saw four alive. The last of Mr. R. Clarke's forty were a male sent him from Docking on February 28th, and a male shot on the beach near Snettisham on March 6th, by which time, if there were any left, they may have been going north again.

Most of the specimens were not in full winter plumage; and perhaps the fore-neck does not attain a perfect purity of white the first year. Some had a little of the summer plumage remaining, particularly one which Mr. Roberts received from Cromer, which had the sides and lower part of the neck nearly black, but retained the white chin; as also two forwarded by Mr. Robert Clarke of Snettisham. One shot by Mr. W. J. Clarke, in Yorkshire, is said to have been in full summer dress, which was not the case with

\* Though sent to be preserved in Norwich, many of these had been found on the coast, or in parishes near it.

any Norfolk specimen this year (though such are known to have occurred in 1846, 1857, 1870 and 1872, in Norfolk).

In Yorkshire, Mr. W. J. Clarke proved a large preponderance of females by dissection; and all the earlier ones sent to Mr. Gunn, and dissected in his absence by his son, were females except one, and the later ones nearly all males. The same thing was noticed by Mr. Roberts and Mr. Robert Clarke of Snettisham, viz., that the earlier ones were females, which is curious, as indicating a separation of the sexes. Similar separations have been observed over and over again in many species of birds, but we are still ignorant of the laws which govern them.

On looking back at the past history of this species, it appears that Norfolk has had no such visitation of Little Auks since October, 1841, at which time several hundreds were recorded on the coasts of Durham and Yorkshire and Norfolk, and at the same time Mr. W. R. Fisher stated that a great many appeared near Yarmouth ('Zoologist,' 1843, p. 182). Mr. Fisher and my father recorded a good many in December, 1846 ('Zoologist,' p. 1601), and Mr. Stevenson "many specimens" in November, 1861 ('Zoologist,' p. 7845); and again several in November and December, 1878. Since then there has been no special migration, though hardly a winter passes without a few being picked up; but for the last few years they have been comparatively scarce.

---

## IX.

ABSTRACT OF A PAPER ON OLD-TIME YARMOUTH  
NATURALISTS.

BY F. DANBY PALMER, V.P. YARMOUTH SECTION.

*Read at Yarmouth, 18th March, 1895.*

**THE** subject to which I wish to draw your attention this evening appears to be one which, if properly treated, should, relating as it does to the acts and deeds of those naturalists of former times who have preceded us in local research, with regard to the subject which we are founded to foster, attract the special attention of our Society.

The County of Norfolk has, as you are aware, been noted for its Naturalists, and of these worthies those who lived in or near Yarmouth have been some of the more noted; therefore it is in the hope of preserving the memories of such that I have prepared this paper, which I think I cannot better open than by quoting the following words of the late Mr. Dawson Turner, when, presiding at the fifth annual meeting of the Norwich Museum, held on the 25th November, 1829, he said:—

“When I speak of Norfolk as a county distinguished for the love and the pursuit of science, I am by no means using words of course, or wishing to flatter the self-love of you or of our fellow-countrymen at the expense of truth. I do, indeed, feel that Norfolk is deserving of such an epithet. I remember, about thirty years ago, being in company with one of the most distinguished naturalists of Europe, and, at the same time, with a botanist from a distant part of England, who had been upon a visit in Norfolk. The former, congratulating the latter upon what he had seen and gathered, observed that there must, of necessity, be some singular advantage in the soil, the climate, or the position of Norfolk which made it so celebrated as abounding in the rarer productions of Nature; and he was not a little astonished when told that, on the contrary, Norfolk was one of the districts of England the

least favoured in these respects, and that any pre-eminence she might enjoy was altogether owing to the industry and talents with which her resources had been investigated and developed. And when I call to mind, that in the short space of my own life, I have known and associated with such men as Sir James Smith, Mr. Crowe, Mr. Woodward, Dr. Rigby, Mr. Whitear, Mr. Burrell, Mr. Bryant, Mr. Wigg, Dr. Hooker, Professor Lindley, and probably many others, whose names have at this moment escaped me, all of them natives of and residents in Norfolk, the probability of such an assertion will be easily admitted, even by those who have not had an opportunity of investigating its truth."

Passing to our subject, I find several former men of mark, of whom the following appear worthy of special notice.

THOMAS DIVERSON, who died in 1785, aged 76, is mentioned by Sylas Neville as a "Republican, to his honour be it spoken,"—to use his own words; he was also Collector of Salt Duties at Yarmouth. On his decease, his collection of shells, fossils, petrifications, and curiosities was purchased by Mr. Bartlett Gurney. He seems also to have had a fine collection of medals.

JOHN DAWSON DOWNES, who died in 1829, aged 71, was a very remarkable man. He lived for many years in the house, then a bookseller's, at the south-west corner of Row 55, on the Hall Quay, which he purchased, with his partner, Mr. Marsh, in the year 1784, when they had leave from the Corporation to "box out" the whole length of such shop 5 feet 7 inches. He was a man of singular skill in the breeding of domestic animals, the cultivation of fruit trees, and the training of birds. On retiring from business he took up his residence at Gunton Old Hall, near Lowestoft, where he was most earnest in his endeavour to revive the once favourite pastime of hawking. Here he was visited by Lord Rivers, Colonel Wilson (afterwards Lord Berners), Sir John Sebright, Mr. Brigg, Fountaine of Narford, and other gentlemen, who took an interest in the same pursuit. In his walks he was usually attended by a tame Heron. He proved satisfactorily that the same Swallows revisited the same places annually, and usually on or about the same days. Downes was an open, plain-speaking, matter-of-fact man. He possessed a good library, containing, among other rare books, some curious old



treatises on Hawking. He had also a few good paintings, one by Sir Joshua Reynolds. The whole of his collections were sold by auction after his death, which occurred at Lowestoft.

LILLY WIGG, of whom so little is known. The late Hampden Glasspoole compiled a notice of his life, which has appeared in our 'Transactions' (vol. ii. p. 269). There is one fact with regard to him which is never forgotten by naturalists. I allude to the eating of the Red-breasted Goose, as to which it has been stated that the only example of this beautiful and extremely rare species, recorded as procured in Norfolk, is the one mentioned by most of our local authorities as purchased by him in the Yarmouth market. This specimen, however, according to contemporary evidence, was plucked and eaten, and its claim to a place in the Norfolk list must rest entirely on the credibility of the statements respecting it made by himself. In Sir William Hooker's manuscript notes from 1807 to 1840, "Touching the Natural History of Yarmouth and its Environs," Mr. Wigg's name appears on the title-page, associated with that of the late Mr. Dawson Turner and others, as joint contributors; whilst, among the entries, signed with the initials "L. W.," is "Red-breasted Goose shot near Yarmouth." Mr. Hunt, who gives a very accurately-coloured plate of this species in his 'British Birds,' published in 1815, and was well aware of its rarity in collections, remarks: "Mr. Wigg, of Yarmouth, informs us that he purchased a specimen in the Market Place of that borough a few years since." And the following explanation, as given by Mr. Dawson Turner to Mr. J. H. Gurney, after Mr. Wigg's decease is, I have no doubt, correct. The latter gentleman, it seems, had a habit, arising from a curiosity, partly scientific and partly gastronomic, of tasting every variety of bird that came in his way; and not aware, at the time, of its real value, he bought and ate this Goose as one he had never before tasted, and was not a little chagrined afterwards to find that he had sacrificed so great a rarity. It is further interesting to note, as regards this worthy, that Messrs. Sheppard and Whitear, writing in 1825, state Wigg had two specimens of the Castaneous Duck, both killed at different times in the neighbourhood of Yarmouth. One of these he presented to Youell, while the other he appears again to have eaten.

CHARLES J. PAGET (contributed by his brother, Sir James Paget, Bart., F.R.S.). Charles John Paget was born in January, 1811, and died in March, 1844. His devotion to Natural History may be thought to have been inherited from his mother; for she collected and kept in orderly arrangement shells and corals, and many other natural objects, and encouraged the study of them, so far as she could, in all her children. From her, too, he seemed to inherit the artistic skill which made Natural History the more attractive to him, and which was sustained by friendship with the Cromes of Norwich, and with John Bell, his fellow-pupil at Bowles' school, who became the celebrated sculptor of the Crimean monument in Waterloo Place. He began collecting plants and insects in early boyhood; and among the water-colour drawings which he left, are some of Butterflies and Moths, made when he was only eleven years old, truly admirable both in likeness and skill of colouring. At first he merely collected and kept these in good order, but in a year or two, he gave up plants, and studied "Insects" in Kirby and Spencer's 'Entomology,' and such other books as he could get. And now, he not only collected but named and arranged every species that he could find; and admired each, not only for beauty, but even more for rarity and local interest, and these to the number of 750 species. Gradually his zeal was increased by correspondence and mutual exchange with such other active entomologists as Sparshall, Hooker, Chawens, and especially with the very distinguished author of the 'British Entomology,' John Curtis, to whom he owed the honour of having his name given to a new species which he had discovered. It is figured and described as *Agrypnia pagetanus*, "The Yarmouth Grammon or May-fly," in the twelfth volume of the 'British Entomology' (pl. 540, 1835); Mr. Curtis says of it: "I have named it after my friend, C. J. Paget, Esq., who took it off some rushes in a salt marsh between Yarmouth and Caister, the 14th August, 1833." The plant which is illustrated with it is the *Frankenia laevis*, at that time much more common near Yarmouth than it is now. And, in a note in the 'Natural History' (pp. xxi. and 34), it is said that the insect was caught "by sweeping the short herbage with a strong bag-net." This was one of the methods of capture which he invented or adopted; for he always looked earnestly for the opportunities of getting the insects that were attracted by the

peculiar conditions of the localities near the town, such as the Caister marrams, the parts of the beach to which they were driven by gusts of wind, the attractions of the brightness of the Lowestoft lighthouse, the heaps of fresh sea-weeds, and the like. The studies of the few naturalists who lived in or near Yarmouth when Charles Paget began to collect insects may be a good illustration of what Kirby and Spence noted in their preface, as to the zeal shown before 1820 in the pursuit of botany, and the ridicule and contempt in which entomology was held. Dawson Turner, Lilly Wigg, and Hooker fully maintained, in Yarmouth, the renown of the Norfolk school of botanists; but there was not one active entomologist in the town till Charles Paget began to work. The extent of his work, his true zeal and industry in it, may be estimated by the extent of the list of insects given in the 'Natural History of Yarmouth,' in which all that relates to insects was written by him. Every species there enumerated had been examined, named, and arranged by him; and of nearly every one he had one or more specimens displayed in natural posture. Many he bred from the eggs, and these he often illustrated by water-colour drawings of them in the larval and pupal, as well as in the complete state. Of course the list may now be deemed very incomplete indeed; in his own interleaved copy of it, he added about 100 species which he collected in a few years after its publication, and he never doubted that many more might yet be found. In the sixty years that have passed since that time some species may have ceased to survive in the altered conditions of the land and water; but those may have been more than replaced by new species migrating to the new conditions, and better methods of capture may have been invented. Still the list, and the general commentary on what it tells, which is given in the introductory essay, may be regarded as a remarkable example of the work in Natural History, which may be well done by one young man in the few hours that can be spared in an active life at school and in business. And, certainly, it may be studied as an illustration of the charms of a thorough study of even a portion of Natural History, if it be remembered that all this "dull work," as some would call it, was the chief recreation of twenty years constantly saddened by ill-health and anxiety. For, from the age of thirteen years to the close of his life, Charles Paget was an invalid, often severely suffering and

even dangerously ill; and, for the last ten years, he was heavily overworked in anxious and unsuccessful business. But, even in all these times of sadness, the study of nature and of art brought such contrast in the events of his life that it could make him happy, and could mitigate many sorrows that might else have seemed intolerable.

CHARLES STUART GIRDLESTONE (a friend of the Pagets) was the only son of the locally-famed M.D., Thomas Girdlestone, who lived in one of the houses recently pulled down to enlarge Lacon and Co.'s Brewery, fronting the North Quay, at the north-west of Say's Corner. In early life the doctor had served in the army under Colonel Sir Charles Stuart, and he appears to have named his son after him. He was the author of several works of a classical and antiquarian character. The son's life was but a short one, as he died in 1831, aged 33, unmarried, when the large collection of birds which he mostly shot with his own gun in the neighbourhood of Yarmouth was dispersed; the record of his "Game Bag from 1820—29" is in the possession of Mr. T. M. Baker, Town Clerk of Great Yarmouth.

DAWSON TURNER was born in 1775, at No. 40 Middlegate Street, while his mother was paying a visit at the house of her husband's uncle. He received the earliest rudiments of education at the North Walsham Grammar School, then conducted by the Rev. Joseph Hepworth, whence he was removed to Barton, and placed under the private tuition of the Rev. Robert Forby. In 1793 he was entered at Pembroke College, of which his uncle, the Rev. Joseph Turner, Dean of Norwich, was master; but, in consequence of the death of his father in the following year, he was compelled to leave the University (where he subsequently took the degree of M.A.), and apply himself to the less congenial occupation of banking. The charms of literature were, however, irresistible, and during a long life Mr. Turner devoted every minute that could be spared from business, with insatiable ardour, to the pursuit of his favourite studies, among which the first was botany. In 1797 he was elected a Fellow of the Linnæan Society; in 1802 he published 'A Synopsis of the British Fuci'; in 1804 'Muscologiæ Herbernicæ Spicilegium'; in 1805 'The Botanists' Guide through England and Wales'; and, in 1808, 'Historia Fucorum,' a splendid work, in four quarto volumes, with coloured

plates. He was elected a Fellow of the Royal Society in 1802; of the Society of Antiquaries in 1803; of the Dublin Society and Royal Irish Academy in 1804; and of the Royal Society of Literature in 1824. The foreign literary honours conferred upon Mr. Turner were extremely numerous. In 1820 he published his 'Tour in Normandy,' chiefly undertaken with a view of investigating the architectural antiquities of that duchy; and he wrote the letterpress for Cotman's 'Etchings of Architectural Antiquities in Normandy,' in two folio volumes. In 1831 Mr. Dawson Turner did good service to the antiquarian world by publishing the 'Correspondence of John Pinkerton,' from the originals in his own possession; and in 1835 he edited and printed at Yarmouth 'The History of the Religious Orders and Communities and of the Hospitals and Castle of Norwich,' written about the year 1725 by John Kirkpatrick. In 1839 he printed, for private circulation only, a Catalogue of the Works of Art in the possession of Sir Peter Paul Rubens at the time of his decease, together with two 'Letters' from Sir Balthazar Gerbier; and, in 1847, appeared his 'Sepulchral Reminiscences,' as afforded by a list of the interments within the walls of the parish church of St. Nicholas, Great Yarmouth, collected chiefly from monuments and gravestones still remaining in June, 1845. The book is dedicated to the Rev. Henry Mackenzie, then minister of the parish, and afterwards Bishop Suffragan of Nottingham. Mr. Turner also printed, for private distribution, 'Outlines in Lithography,' being drawings on stone by several of the members of his talented family of pictures then in his possession. He was instrumental in establishing the Norfolk and Norwich Archæological Society, of which he became the first vice-president; wrote the preface to the 'Norfolk Archæologia,' and was a frequent contributor to its pages. The walls of his rooms were adorned with pictures by celebrated masters, and he had, in the course of years, collected a very extensive and valuable library, many of the works being plentifully illustrated. The most remarkable work of this description in Mr. Turner's library was his 'Blomefield's History of Norfolk,' the eleven volumes of which were swelled into seventy by the introduction of manuscripts, printed matter, drawings, and engravings. He passed the last few years of his life at Brompton, where he died in 1858, aged 83.

THE GLASSPOOLES (father and son). The former of whom, Richard Glasspoole, was a native of Yarmouth, where the family had been settled for several generations. At an early age he went to sea, in the service of the late Hon. East India Company, and rose to command the "Buckinghamshire," one of their fleet. He was an ardent sportsman, and made a large collection of birds and other objects of interest, many of which he presented to the Norwich Museum, of which institution he was President in 1844. There is an interesting account of his capture by Chinese pirates in 'Banditti and Robbers.' He died in 1846 at his residence, where the family still reside, at Ormesby.

HAMPDEN GLASSPOOLE (son of the above), born 6th April, 1825, died 5th March, 1887, with whom I was personally acquainted, although not in connection with his studies; thus I am indebted to Mr. Geldart for the following notice of his life and work. Glasspoole was a good botanist, and had collected a large local herbarium, which included smaller herbaria collected by John Priest, George Clowes, and George Cooper, all of which are now in Mr. Geldart's possession. He added one species to the British flora (*Carex trinervis*, Deyland), and two species to the County list (*Ammophila battica*, Link, and *Sparganium neglectum*, Beeby). He was, for many years, Honorary Curator of Botany at the Norwich Museum, and, for a short time, he was Botanist at the Alexandra Palace. He was a member of the Norfolk and Norwich Naturalists' Society from its commencement, and wrote two papers, 'Biographical Memoirs of some Norwich Botanists,' and 'Memoirs of Lilly Wigg,' published in the Society's 'Transactions.' He also wrote several papers on botanical subjects for 'Science Gossip.' He was "in" with a very good set of botanists in London, such as Arthur Bennett of Croydon; James Britten, South Kensington; E. S. Holmes, Pharmaceutical Society; Daydon Jackson, Kew; the late Rev. W. W. Newbould, and the late W. W. Reeves, and others; and these London friends would say: "If we could only get Glasspoole to tell all he knows, we should learn something." His modesty in showing his knowledge was only equal to his kindness in working for other people; he would take any amount of trouble in identifying specimens, or hunting up references for his country friends. He was as much interested in Microscopy as in Botany;

was a member of the Norwich Microscopical Society for many years, until its extinction; and a member of the Quekett Club until his death. He died from congestion of the lungs following cold caught at a meeting of the Linnæan Society, to which Arthur Bennett, Reeves, and Geldart accompanied him, on the 17th February preceding his decease; it was a cold, frosty, sleety night, and he never left his house afterwards.

**ROBERT RISING.**—This distinguished sportsman and collector, who died in March, 1885, aged 84, at his seat at Horsey, was the son of a gentleman of the same name who, in early life, commanded a Yarmouth vessel, and who was also a well-known local ornithologist. Both father and son had ample opportunities for indulging their tastes in this direction, having been, in succession, proprietors of an estate which, in the latter part of the last century and the beginning of the present, was one of the chief haunts in Norfolk of all kinds of wild birds. The late Colonel Hawker, a frequent visitor to Mr. Robert Rising, sen., at Horsey, in his 'Instructions to Young Sportsmen' (4th ed. p. 374), records as follows: "The fens from Holme to Ramsay were, at one time, the best I had seen. . . . But afterwards, in 1816, I found those near Winterton, in Norfolk (the private property of J. B. Huntingdon and R. Rising, Esqs.), far superior; and the variety of wild birds here was such, that, in the breeding season, you might kill from twenty to thirty different sorts in a day. Some, by the by, I had never seen before, and, if I mistake not, I was favoured with a sight of two or three that were not even in Bewick. . . . In many parts you could scarcely walk without treading on the eggs of Terns, Plovers, Redshanks, and almost every other kind of marsh-bird. At certain times in the winter the fowl, on their passage from Holland to the South, dropped in here, and literally blackened the centre part of the lakes called Horsey Broad and Heigham Sounds." In his recently-published 'Diary,' Colonel Hawker makes frequent allusions to his visits to Horsey and Somerton, where he was alternately the guest of his friends, Mr. R. Rising, sen., and Mr. Huntingdon. The subject of our sketch, as a boy, thus had every opportunity, of which he did not fail to avail himself, of observing the habits of the numerous species of wild birds which resorted to Horsey in the

breeding season; and, in company with his friend and school-fellow, the late John Gunn of Irstead, who was afterwards also well known as a geologist and an old "Valpeian," delighted, during their holidays, in bird's-nesting expeditions, which led to the formation, by Mr. Rising, of a valuable collection of eggs. This collection thus commenced by Mr. Robert Rising was added to from time to time, and is now in the possession of his son, Mr. T. A. Rising of Ormesby and Great Yarmouth; it contains the eggs of many rare and some almost extinct specimens of British birds, such as the Avocet, Bittern, and Reeve. Mr. Rising used to relate how, on one occasion, he discovered, in one marsh alone, no less than twenty-two nests of the Avocet; whilst the eggs of the Black-headed and other Gulls were found in such enormous quantities that they were gathered in large linen-baskets, and formed a staple diet for the villagers, by whom they were made into custards, etc. So numerous were their nests that the marsh-men, in raising the drainage banks, would remove the nests on their spades, and put them out of their way, when the sitting birds would again return to them. Another incident of which Mr. Rising used to speak was the capture of a number of young Sheldrakes. The old birds nested in the rabbit-burrows on the warren next the sea, and observing some of their young broods swimming in the pools of water in the adjoining marsh, he and the late John Gunn, boy-like, waded in and caught a number of the young ones, which they took home and turned off in a pond with the tame Ducks. In those days the boom of the Bittern or "Bottle-bump," as it was termed by the marsh-men, was a familiar sound in the breeding season; whilst the fierce combats of the Ruffs were frequently observed, when their annual contests took place on their regular battle-fields, which were generally the higher ground in the marshes, where the Reeves were nesting. Altogether it was a perfect paradise for youths with any love for Natural History. Under such favourable circumstances, Mr. R. Rising commenced the celebrated collection of Norfolk Birds of which he died possessed, and which were, with scarcely an exception, shot on the estate, and not a few of them with his own gun. Many of these are referred to in Yarrell's and Stevenson's works. The collection, which was sold at Mr. Rising's decease, included such rare specimens as the White-winged Black Tern (almost if not the first recorded specimen shot in England),



the Crested Pochard, Buffel-headed Duck, Grey Snipe, Little Bittern, Black Stork, and Pallas's Sand Grouse. It also comprised a very complete series of the local Raptores. Fortunately many of the most valuable specimens of the collection passed into the hands of the trustees of the Norwich Museum, and will thus be preserved to the county.

JOHN SMITH, librarian at Yarmouth, was, in his time, a famous collector, but he, again, has left but faint traces of his favourite pursuit. I find the following entry referring to him. In the 'Zoologist' (1849, p. 2528) he wrote to the effect that three specimens of the Little Bittern had been shot in the marshes near Yarmouth, during the spring of 1849, but no further particulars are given respecting them; and in a note on this it is stated that, in the Bury Museum, was an adult female of this species, amongst Mr. Dennis's birds, which, in the memorandum attached, was said to have been killed at Potter Heigham, on the 18th of May, 1849.

STEPHEN MILLER (a contemporary and a friend of Smith) lived at Southtown, and was very active in his time, but has left little record, although I find it stated in our 'Transactions' that he had a specimen of the Snowy Owl, which, if not obtained in this district, was most probably British killed. An adult specimen of the very rare Tengmalm's Owl was in his collection, and it is possible that the bird of this species recorded by Messrs. Gurney and Fisher to have been taken some years since at Bradwell may have been the bird above referred to. His collection was, after his decease, dispersed by auction on the 22nd September, 1853.

BOULTER and YUPELL.—As these families are connected, I join them in this notice, regretting that the present members of the family are unable to give any information about them. The former was a Quaker, and carried on the business in the Market Place, where he sold "Birmingham, Wolverhampton, Sheffield, and Pontipool goods," with stationery wares, haberdashery, gloves, perfumery, and patent medicines. He also dealt in "natural curios, antiquities, coins, and medals." During a long life he made a very considerable collection, which included Natural History specimens, and which he called "Museum Boulterianum," but which was, unfortunately, dispersed on his death in 1802. And

we have the evidence of Messrs. Paget in 1834, that Youell, who was a nurseryman, near the North Gate, had known six or seven Night-Herons to have been killed in that locality at different times. Again, on the 24th of May, 1824, from one of his fruit trees near there, was shot the memorable specimen which, first recorded by him in the Linnean Society's 'Transactions' (vol. xiv. p. 588) as the Cayenne Night-Heron (*Ardea cayennensis*, Linn.), was, as such, included by Selby in his 'Illustrations of British Ornithology,' an error subsequently corrected, the bird being in Mr. Gurney's collection. I find no other record of what became of Youell's collection.

FREDERICK FRERE.—This gentleman, the eldest son of the Rev. E. B. Frere, was born in the house still occupied by the family in King Street; was a well-known sportsman and naturalist, who is recorded, among other doings, to have noted, on Breydon, the decrease of the Kentish Plover, although scarcely a year passes without one or more examples being still obtained in that neighbourhood, either in spring or autumn. Frere died some few years since, but did not, so far as I know, leave any collection.

HENRY TEASDEL, JUN., born in 1828, eldest son of Henry Teasdel, Mayor of Yarmouth 1873—4, died in 1888. He was well known in the town, both for his artistic tastes and for the great interest he took in Natural History. He made a good collection of British Butterflies and Moths, as well as collections of local Birds and British Birds' Eggs. The latter has been presented to the Yarmouth Museum by his son, Mr. R. H. Teasdel, a member of our Society, who has kindly contributed this note.

LUCIA, in his earlier life, was a well-known grocer and Liberal politician, whose shop was opposite the eastern end of Regent Street. His was a well-known figure on our beach in the fifties, where, gun in hand, he used to be a terror to the Gulls; these, of which he made a very excellent collection, his widow tells me, were dispersed on his leaving Yarmouth, but that some of them were then secured for the Norwich Museum. I have the same authority for stating that he never wrote anything upon his favourite study.

JOHN G. OVEREND, also a grocer, his shop being in the Market Place; but studying Natural History rather than his business

perhaps led to his difficulties. He died in December, 1894; his collection having been sold at the Corn Hall, June 18th, 1876, and his books also, a "disaster" he never forgot or recovered from. His was a good representative collection, and contained many birds in their nuptial plumage, such as would be difficult to obtain now, with the close season protection and the paucity of birds also forbidding it. At this sale there were 96 lots and over 180 specimens in all; and these, all authenticated birds and well selected, for Overend knew a bird when he saw it, fetched ridiculously low prices.

EDWARD SMYTH PRESTON (eldest son of Edward H. L. Preston) was born at Yarmouth, in the house on the North Quay now occupied by the Colchester Brewery, formed a very fine collection of eggs, which was sold in his life-time by Christie, in London, for a considerable sum of money; he also collected birds, which were, in like manner, sold. I find it recorded that his collection contained a Black-winged Stilt, shot by Thomas (the gunner) in May, 1823, and which was given to him by his uncle, the late Charles A. Preston; and a Little Bittern which, Paget says, was killed at Lowestoft in 1830. He also possessed a Bittern's egg, from the collection of Mr. John Smith, before referred to, taken at Horsey in 1841. Mr. Preston left Yarmouth after disposing of his collections, and is since dead.

JOSEPH TOMLINSON.—Who made a collection of eggs and birds, but never wrote anything on the subject. He had a pair of White Spoonbills, shot on Breydon in May, 1865. Upon his leaving Yarmouth his collection dispersed; subsequently he returned to the town, and died at Gorleston.

In conclusion, I may say that I feel many worthy names have been omitted from this paper, and that I shall be only too happy to receive any information which may tend to recover such from the dust of ages, which has obscured their "name and fame."

To those ladies and gentlemen who have assisted in compiling this paper, I beg to express my thanks; and, at the same time, to record my gratitude for the assistance I have experienced from the 'Transactions' of our Society, and Palmer's 'Perlustration of Great Yarmouth.'

X.

SOME ADDITIONS TO  
THE NORWICH CASTLE-MUSEUM IN 1894.

BY THOMAS SOUTHWELL, F.Z.S.

*Read 25th March, 1895.*

THE year 1894 has been an eventful one in the history of the Museum. On the 1st of January the Norfolk and Norwich Museum, which had for seventy years prospered exceedingly, notwithstanding its chronic state of impecuniosity, closed its career as a private institution, and under the new title of the Norwich Castle-Museum, passed into the hands of the Corporation, and commenced a new era as a public rate-supported institution. The management was taken over by a mixed committee consisting of members of the Corporation and citizens, selected for their special qualification, most of whom were members of the old Museum Committee, the Mayor for the time being acting as *ex-officio* chairman, and Mr. Edward Wild vice-chairman.

The building being in a sufficiently advanced state to receive the collections, the removal actually commenced on the 9th July, 1894, and on the 23rd of October of the same year the Museum was opened to the public by the Duke and Duchess of York. Although wonders had been accomplished in that brief period in the way of removing and arranging, and all the departments were quite presentable to the distinguished visitors on that occasion, a vast amount of work remained to be done, and a considerable period must still elapse before the collections are fully arranged and systematically labeled, yet sufficient has been accomplished to render all the galleries very attractive; and the greatest possible credit is due to Mr. Reeve and his assistants for the rapid progress which they have made, and are still making, towards completing their very arduous task. The appreciation of the public may be judged from the fact that a total of 16,736 persons visited the Museum

during the first three days on which it was open ; and the interest seems hardly to have shown any appreciable falling off, even at present.

It would be out of place here to give any detailed description of the building, and it is only necessary to say that ample space is provided, in well-lighted rooms, for the proper display of the objects in every department ; and that the fittings are not only handsome, but of the most modern construction, the whole building being thoroughly ventilated and warmed, and lighted by electricity.

It is difficult to recognise some of the old occupants of the late Museum in their new home, their appearance is so improved. But I think we did not appreciate the beauty and extent of the fine collection of Raptorial Birds until we saw them in their splendid new cases ; and it needs also a visit to the Skin Room, where cabinet after cabinet will be found filled with unmounted skins, fully to comprehend its magnitude. In the British Bird Room, too, many of our old favourites show to much greater advantage ; and the beautiful case containing the fine group of seven Bustards of the indigenous Norfolk race, I think cannot fail to excite not only interest but admiration.

But it is to additions rather than to improvements that these Notes are intended to refer ; and I must apologise for being led into rather a long preamble, by the excusable gratification which I feel at the vastly improved conditions inaugurated since my last report.

In the department of MAMMALIA, amongst other additions, we have to thank Mr. E. G. Buxton for two good specimens of the Otter, killed on Barton Broad ; an Opossum and a young *Dasyurus* from Australia, from Mr. T. S. Breeze. These are all useful as additional or fresher examples for the collection in the Mammalian Room.

Among the additions to the British Birds the following may be mentioned :—A very beautiful variety of the Night-jar (*Caprimulgus europæus*) killed at Holt in September, 1858, presented by Mr. George Wilkinson. There is in the collection a similar variety, which was presented by Lord Hastings, and was probably obtained in the same neighbourhood. Independently of the rarity of variations in this species, these specimens are of interest from the fact of similar varieties having been produced in the neighbourhood of

Holt in the years 1856, 1858, and 1859, as recorded by Mr. Stevenson in the 'Birds of Norfolk' (vol. i. p. 349). An example of the Scandinavian form of the Dipper (*Cinclus melanogaster*) killed near Aylsham, was presented by Mr. Stanley Bullock. It has been pointed out that the chestnut-breasted form of the Dipper, found in the British Isles, is of excessively rare occurrence in this county, and that those which are occasionally met with here are almost invariably stragglers from the Continent. Lord Lilford has also sent a skin of Richard's Pipit (*Anthus ricardi*), which was taken alive at Caister near Yarmouth. From the Rev. C. J. Lucas the Museum has received a pied Long-eared Owl, shot near Yarmouth in July, 1861, in which the wings, lower part of the breast, and a portion of the facial disk are *pure white*,—a variety produced by the partial absence of pigment in the feathers, very rare in the Accipitres and almost unique in Striges, which makes his gift an especially welcome one.

Mr. Gurney has been kind enough to furnish me with the following notes on some Raptorial birds new to the collection, which have been obtained through him.

"During the year, three additional species have been added to the Raptorial collection, viz., an African Kestrel (*Tinnunculus alopex*, Heuglin), and two Buzzards (*Buteo krideri*, Hoop, and *B. galapagensis*, Gould). The former is a light-coloured geographical race of *B. borealis*, and the latter a form of *B. swainsoni*, two common North American species. *B. galapagensis*, says Mr. Ridgway, differs chiefly from *B. swainsoni*, if not entirely, in its heavier bill and feet ("Albatross Explorations," Proc. N. M., vol. xii. p. 113). In this latter character, and especially in the size of its claws, our example, which is a female, acquired from Dr. George Bauer of Chicago, greatly exceeds the skins of *B. swainsoni* preserved in the Museum at Norwich. This is the only bird which Dr. Bauer has allowed to be separated from the rest of his Galapagos collection, the reputation of the Norwich Museum inducing him to make an exception in our favour, granted to nobody else. He writes: 'This bird (*B. galapagensis*) is exceedingly tame. On Duncan Island one allowed itself to be tickled with a whip, which I moved over its head and neck. This same bird followed me to a small rock about fifty paces from the land. On Indefatigable Island the Buzzard is very common; they

sit in groups up to six on the trees near the shore, and do not move when one passes. They eat Grasshoppers and Scolopendras (Centipedes).—(G. Bauer, *in litt.*). The specimen purchased is a rufous bird, on the under parts especially, in which it resembles the mounted one in the gallery of the National collection. The iris is marked as clay-colour on the ticket by Dr. Bauer.

“For Krider’s Buzzard we have to thank Mr. Arthur Stark, who shot the example now presented, at Pelican Lake, which is the more interesting, as it is one of the specimens described in ‘The North American Birds,’ by Baird, Brewer, and Ridgway.

“The *Tinnunculus alopex* was, I believe, a bird my late father particularly desired to possess, yet, though described so long ago as 1856, he never had a chance of getting one; but with the opening up of Central Africa, this and many other at present rare birds may, perhaps, become much more plentiful in a few years’ time. It is an adult female of a foxy red colour (but the sexes do not differ materially), shot at Keren, Eritrea, forty miles from the Red Sea.”

These are new to the collection; as also a specimen of *Scops sibutuensis* from Sibutu, one of the Philippine Islands, presented by Mr. Gurney. Mr. Bazitt Haggard has presented twenty-four bird-skins from Samoa, including *Strix delicatula*, *Dulunculus strigirostris*, and nine other good species. Two specimens of *Hieracidea orientalis*, an Australian Falcon, and ten other skins of birds from Victoria were contributed by Mr. W. H. M. Andrews. Two very handsome cases, the one containing six specimens of the curious Kakapo Parrot (*Strigops habroptilus*), suitably mounted, and the other three adult specimens of the Kea (*Nestor notabilis*), also handsomely mounted, to illustrate the acquired carnivorous habits of this singular bird, were obtained through the intervention of Mr. Edward Corder, by the liberality of Mr. Alfred Haldinsein and Mr. Louis J. Tillett respectively.

Mr. Gurney has added the *Eggs* of four species of Birds of Prey to the collection; and, in addition to the birds already mentioned, the Museum is indebted to Mr. W. H. M. Andrews for the eggs of fourteen species of Australian birds, most of which were desiderata to the collection.

In the department of ICHTHYOLOGY, Mr. A. Patterson has presented a very rare fish taken at Yarmouth, the Rose Perch (*Scorpena*

*dactyloptera*), which is an interesting addition to the fishes of the East Coast of England. Two very large common Breams (*Abramis brama*) from the river Wensum above the New Mills, have also been presented by Mr. S. Gurney Buxton ; and three very good specimens of the Flying Fish (*Exocoetans volitans*), caught near St. Helena, by Mr. F. J. Brown.

Considerable additions have been made to the Natural History books in the Library of the Museum by the Trustees of the British Museum, the Smithsonian Institution, and the United States Commissioners of Fish and Fisheries. Very many contributions have also been received in various other departments (Antiquities, Ethnology, Fine Arts, &c.), which do not strictly come within our province ; and the Museum is to be congratulated, not only upon its removal to its present splendid home, but also on its rapid extension and increased capacity for usefulness.

---

## XI.

### METEOROLOGICAL NOTES, 1894.

(From observations taken at Bradestone House, Brundall, Norfolk.)

BY ARTHUR W. PRESTON, F. R. MET. SOC.

*Read 28th January, 1895.*

#### JANUARY.

THE meteorological conditions of this month were very remarkable. Following a December of average temperature, with no indications of the approach of any abnormal cold, at the advent of the New Year the country was suddenly plunged into the severity of an Arctic winter, with an intensity of frost seldom equalled in our



most severe and protracted winters. During the first three days the weather was very cold, with frequent snow showers; but on the fourth a biting blast from the east prevailed all day, with a temperature almost stationary at 25 degrees, the maximum for the day being the lowest recorded since these observations were commenced in 1882. The wind blew from the east at gale force during the entire day, and at Yarmouth force 9 (or a strong gale 53 to 60 miles an hour) was reported. On the morning of the 6th the exposed thermometer on the snow fell to 1 degree, or 31 degrees below the freezing-point. On the 7th the temperature did not rise above 26.2 degrees all day, and the rime frost was remarkably beautiful, the trees in the country being covered with spiculae of rime half an inch in length, making the boughs appear as if in full foliage, crystallized by frost. On the 10th the frost disappeared as suddenly as it had come, and the remainder of the month was as remarkable for its mildness as the first week was for its severity. Cyclonic disturbances from the Atlantic skirted our western coasts with great frequency, and the atmosphere was much disturbed with strong winds and gales from the S.W., the barometer oscillated much, and the air was constantly mild and damp, with fine bright days intervening.

#### FEBRUARY.

The first fortnight was very mild and boisterous, with hardly any frost. Severe gales were experienced on many days, that on the 11th being exceptionally violent. The thermometer was above 50 degrees daily (with one exception) from the 1st to the 11th inclusive, the mean temperature of which period was 45.1 degrees, or higher than that of any *April* in the years 1887 to 1892 inclusive. The third week was fine and bright with frosty nights, but mild and stormy weather again set in at the close of the month. The mean temperature of the month was 2.3 degrees above the average, constituting the warmest February since 1884.

#### MARCH.

The weather of March may be divided into two distinct types, the distribution of atmospheric pressure of the first half of the month being cyclonic, with a predominance of south-westerly winds,

strong in force, accompanied by frequent rain though not heavy; the second half was anti-cyclonic, accompanied by high barometric pressure, north-easterly and easterly winds, bright sunshine and dry weather, with considerable warmth at times. During the latter period no rain whatever fell, and the weather of the Easter holidays was magnificent, in fact, there was but little to equal it during the whole of the ensuing summer.

#### APRIL.

Although the amount of cloud was larger, nearly all the meteorological characteristics of this month were more favourable than those of the previous April, which will long be remembered for its magnificent weather. The month entered with a spell of dry warm weather, and it was at one time apprehended that another season of drought similar to that of 1893 was in store for us, there being hardly any measurable rain from March 17th to April 11th, a period of twenty-five days. On the morning of the 12th, however, a refreshing rain set in, and more typical April weather than the alternating sunshine and shower of the latter half of the month has not been recorded for some years. The rains at times were heavy, and the total fall for the month was nearly half an inch over the average, whereas the rainfall of 1893 was 0.10 only, falling on three days, which, as far as moistening the soil was concerned, practically amounted to no rain whatever. The mean temperature of the month was 49.6, the highest registered since 1874. This was chiefly due to the warm nights, the mean of which was  $3\frac{1}{2}$  degrees higher than last year. The fact of the range of temperature being small, and the moisture excessive, was greatly in favour of vegetation, which was again very early, the Hawthorn being in flower by the 29th.

#### MAY.

This was a cold month, with mean temperature 3 degrees below the average. It was, in fact, colder than April, although, in an average season, the mean of May should be 6 degrees above that of April. There was much cloud at times, and considerable falls of rain at short intervals. During the last ten days morning ground-frosts were of frequent occurrence, doing much damage to the Potato crop in many parts of the county.

## JUNE.

The first three weeks were exceedingly gloomy, wet, and depressing, offering a marked contrast to the same period in 1893. From the 21st to the end the weather was chiefly bright and very fine, the heat being tempered by cool breezes. The thermometer, however, only exceeded 70 degrees on four days, and the maximum for the month (73.4 degrees on the 30th) was the lowest recorded for June since 1879.

## JULY.

This was the sixth July, out of the last nine, which yielded over 4 inches of rain, the greater part of which fell during the fortnight ending the 22nd. There was a highly electrical state of the air during the greater part of the month, and thunderstorms were of unusual frequency. The most severe storm was on the night of the 6th, when the lightning was, at times, almost continuous, and was accompanied by disastrous results both at sea and on land. There were also thunderstorms on ten other days. Although there was but little sunshine between the 9th and 27th, the mean temperature of the month was quite up to the average, and as high as in 1893.

## AUGUST.

This month was generally cloudy, with much mist at times and frequent rains, though not excessive in amount. The mean temperature was 2 degrees below the average, and the thermometer only exceeded 70 degrees on five days, as against eighteen days the previous year. There was but little of the fine harvest weather usually associated with August.

## SEPTEMBER.

Cool and cloudy weather prevailed during the greater part of this month, with damp mists and light rains at times. There was only one really warm day (the 19th) when the temperature reached 71 degrees. On no other day was 70 degrees touched. A remarkable feature of the month was the persistency with which the wind remained in the N.W., N., and N.E. quarters. On no day whatever was a S. or S.W. wind recorded.

## OCTOBER.

Rain fell on twenty-five days, but the total amount did not exceed the average. The month was cloudy, but the temperature was rather high for the time of year.

## NOVEMBER.

This was the warmest November since 1881, the mean temperature being nearly 4 degrees above the average. The thermometer exceeded 60 degrees on each of the first three days of the month, and it is but rarely so high a temperature is attained in November. With the exception of the four days 12th to 16th, which were very stormy and wet, causing floods in the valleys, the month was, nearly throughout, fine, warm and dry, with only one night of frost at 4 feet above the ground.

## DECEMBER.

The mean temperature was, as in November, considerably above the average, and the thermometer rarely fell below the freezing point. The last fortnight was stormy, with violent gales on the 22nd and 29th, causing much damage, and accompanied by great floods at Yarmouth and Lowestoft, and in the valley of the Yare. On the 29th the barometer fell 1.26 in. in twenty-four hours. There was a heavy snowfall (the first of the season) on the 30th and 31st, when the melted snow yielded 0.97 in., a considerable portion of which thawed as it fell; but the drifts, particularly in the western part of the county, were considerable.

The following Tables show the mean temperature and rainfall for the four seasons, together with those of the four previous years, and of a twenty-year approximate average:—

TEMPERATURE.							
Seasons.	1890.	1891.	1892.	1893.	1894.	20-year average.	Departure of 1894 from average.
Winter (Dec. to Feb.)...	degrees. 38.9	degrees. 33.9	degrees. 37.0	degrees. 36.5	degrees. 39.2	degrees. 37.8	+ 1.4
Spring (Mar. to May) ...	46.8	44.0	44.9	49.1	47.7	46.2	+ 1.6
Summer (June to Aug.)	58.6	58.9	58.3	61.2	59.3	60.2	- 0.9
Autumn (Sept. to Nov.)	50.2	50.9	48.8	50.0	50.1	49.5	+ 0.6
Year ... ..	48.0	47.7	46.9	49.6	49.2	48.4	+ 0.8

RAINFALL.							
Seasons.	1890.	1891.	1892.	1893.	1894.	20-year average.	Departure of 1894 from average.
	in.	in.	in.	in.	in.	in.	in.
Winter ... ..	4.80	3.10	6.36	5.80	4.81	6.02	+ 1.21
Spring ... ..	5.14	6.64	5.10	1.61	5.62	5.21	- 0.41
Summer ... ..	9.61	9.39	10.20	5.37	8.74	7.17	+ 1.57
Autumn ... ..	6.87	7.00	11.15	6.10	7.12	8.50	- 1.38
Year ... ..	25.96	28.35	31.05	19.66	27.32	26.90	+ 0.42

It will be thus seen that the winter was slightly warmer than the average. It was, in fact, the mildest winter since 1884, notwithstanding the sharp spell of cold at the beginning of the year. The spring months were warmer than the mean, although, through the coldness of May, the table shows a considerably lower standard of temperature than the spring of 1893, which was an exceptionally mild one. The temperature of the summer was slightly below, and that of the autumn slightly above the average. There was no remarkable excess or deficiency in the rainfall of any quarter; the totals for the winter and autumn being slightly below, and those of the spring and summer a little above the normal fall.

#### YEAR.

Altogether the year 1894 was a disappointing one both to the agriculturist and pleasure-seeker, a fine, warm spring, with promise of abundant crops, was followed by a long period of damp sunless weather; neither cold nor warm, nor yet with an excessive amount of rainfall. The frequency of light falls of rain during the summer and autumn was very depressing, and the only really summerlike periods of the year were from March 22nd to April 12th, and from June 21st to July 6th. Owing to the frequency of rain during the summer and autumn the year's total of days on which rain was registered amounted to 220, which was the largest the writer ever recorded, the next on the list being 1888 with 213 days. The year was altogether, with the exception of the month of March, a great contrast to the previous one.

It may be mentioned that the instruments from which the foregoing observations were taken were inspected during the year by Mr. G. J. Symons, F.R.S., one of the Secretaries of the Royal Meteorological Society, who expressed the greatest satisfaction both with the quality of the instruments and their exposure.

1894.

MONTH.	BAROMETER.				THERMOMETER.				HYGRO-METER. Relative Humidity, 9 a.m.	CLOUD. Estimated proportion 9 a.m.	RAINFALL.		WIND.							
	Highest.	Date.	Lowest.	Date.	Highest.	Date.	Lowest.	Date.			Mean.	Inches.	No. of days.	N	NE	E	SE	S	SW	W
JAN.	30.57	3	29.27	31	29.825	16	11.5	8	37.3	7.6	22	1	1	4	3	7	8	4	3	4.1
FEB.	30.56	19	29.14	11	29.973	7	22.6	23	40.8	6.3	14	0	1	4	2	12	6	2	4.2	
MARCH	30.49	23	28.93	13	29.931	31	26.2	18	44.1	5.5	12	0	7	5	3	1	2	11	2	3.5
APRIL	30.20	5	29.41	16	29.873	8	32.8	23	49.6	6.6	15	4	3	4	9	5	3	2	0	3.0
MAY	30.33	24	29.55	28	29.907	16	33.8	5	49.4	7.0	22	4	9	2	0	4	3	5	4	3.8
JUNE	30.40	30	29.57	10	29.965	30	42.0	1	57.1	7.1	15	2	4	0	1	1	11	1	10	2.7
JULY	30.32	1	29.22	11	29.854	2	48.0	15	61.4	6.7	20	0	5	2	6	1	11	2	4	2.3
AUG.	30.25	30	29.47	15	29.884	14	45.0	17	59.4	6.9	21	1	4	2	1	1	8	6	8	3.1
SEPT.	30.45	30	29.63	25	30.112	19	40.0	11	54.0	7.0	16	8	9	4	1	0	0	1	7	2.7
OCT.	30.49	1	28.95	25	29.885	7	31.2	22	50.3	7.7	25	5	5	6	4	0	5	4	2	2.3
NOV.	30.44	30	28.82	12	29.938	3	29.6	23	46.1	7.1	19	1	1	5	0	9	8	3	2.8	
DEC.	30.54	27	29.14	22	29.946	18	28.4	6	41.0	7.0	19	0	0	1	2	5	11	5	7	3.1
MEANS					29.924				49.2	7.0										8.1
EXTREMES	30.57	Jan.	28.82	Nov.		July	11.5	Jan.			220	26.49	36.34	30.82	50.52					

## XII.

## NOTES ON THE GREAT FROST OF 1894-5.

BY ARTHUR W. PRESTON, F. R. MET. SOC.

*Read 25th March, 1895.*

HAVING passed the spring equinox, and the weather having at length become milder, it is now a matter of interest to compare the period of recent cold with severe frosts of previous winters, and in particular with the great frost of four years ago (1890-91), which was one of the most severe and protracted upon record.

It will be remembered that up to Christmas the winter of 1894-95 had been abnormally mild. The mean temperature of November was nearly 4 degrees above the average, the month having, in fact, been the mildest recorded since 1881. The wind was almost constantly from the S. and S.W., and the screened thermometer only fell below the freezing-point on one night. December was the mildest for fourteen years past. There was no snow until the 30th day, and up to the 26th there was no sign whatever of any approaching severity. A very cold north-westerly wind set in on the 27th, and although on the following day it was again milder, it was soon seen that the year was to close with conditions of weather altogether different to those which had been prevalent for many weeks.

The frost may be said to have commenced on the 30th December, 1894, and to have continued, with two breaks, until the 5th March, 1895, a period of 66 days (or nine weeks and three days). A heavy fall of snow occurred on December 30th, which lay unmelted until January 15th. During the earlier portion of this period the frost was not exceptionally severe, but it gradually increased in intensity, until on the 12th the minimum was as low as 11.6 in the screen, and 6.0 on the grass. Fresh snow fell on ten days out of the seventeen, but was at no time of very great depth in the eastern parts of the county, although in the western districts the drifts were considerable. From January 15th to 21st the weather was milder, and there was a decided break in the frost. The thermometer, while never rising to the height usually attained on mild January days, exceeded 40 degrees daily, and on the 16th touched 45 degrees. There was no frost during this period, and the snow

disappeared everywhere except under sheltered hedgebanks. On January 21st a fresh fall of snow occurred, and this day may be said to have ushered in the second and most severe period of the frost, as, until February 21st, there were frosts nightly, the greatest intensity of cold being reached between February 6th and 14th. The mean temperature of the week ending February 12th was 22.4 degrees, or about 16 degrees below the average. The coldest night of this period, and of the whole winter, was the 7th, when the thermometer fell to 4 degrees in the screen, and to 3.5 degrees below zero on the grass, and in other parts of the county even lower; and on the 8th and 10th the low temperatures of 7.0 degrees and 6.1 degrees respectively were recorded in the screen, and 1 degree below zero on the grass. Each of these three nights were colder than any night during the severe winter of 1890—91. A thaw set in on the 21st, but it was not so decided as that of January 15th, and on only two nights the thermometer failed to fall below 32 degrees. On the 24th fresh snow fell, and there were again sharp frosts nightly (with one exception) till March 5th, with snow daily. On the 6th March the temperature rose, the snow disappeared, and a few days later the air was more balmy and spring-like than had been the case for many weeks.

In 1891 Mr. Charles Harding, F. R. Met. Soc. read a most interesting paper to the Royal Meteorological Society upon the great frost of 1890—91, to which he appended a table showing various details of comparison between that severe season and those of other prolonged frosts during the previous hundred years. Such table is now reproduced, with the addition of the results of the writer's own observations during the frosts of 1890—91 and 1894—95 for comparison. When appearing in a tabulated form the details of the recent frost are more easily comparable with those of previous winters, but as the mean temperature of the entire period of 66 days is decidedly higher than the mean of any of the other frosts appearing in the table, although during the greatest intensity of frost certain nights outstripped many of the previous winters in severity, it has been thought better to place the results of the 1894—95 frost in the table in four different periods of duration, namely:—

(a) December 30th to February 20th (53 days). This period contains only one break of mildness, viz., from January 15th to 21st, and as the 1890—91 period, as given in the table, contained only one similar break, this may, perhaps, be considered the fairest standard of comparison. From a perusal of the table it will be seen that the mean of the period was 1.2 degrees higher than in



1890—91, that both the mean maximum and the mean minimum and the absolute maximum temperatures were slightly higher, but that the absolute minimum was 3 degrees lower than in the last named year. The days of minimum temperature below 20 degrees, of continuous frost and of maximum temperature above 40 degrees were nearly identical in each winter, but the days with daily mean 32 degrees or below, and with maximum temperature 32 degrees or below, were in 1890—91 very greatly in excess of those in 1894—95. On the whole, therefore, it may be said that the frost of 1894—95 fell short both in duration and intensity of that of 1890—91, but that it gave three colder nights. With regard to the other winters in the table, it will be seen that 1894—95 outstripped all but one in duration, but the mean temperature was lower in each of the other winters except 1879. The absolute minimum was, however, only equalled in 1838.

(b) January 22nd to February 20th (30 days). This period is inserted for the sake of comparison with the shorter winters in the table, such as 1860—61 and 1881, it having been the coldest period of our recent winter. It will be seen that the mean of this section of the winter was lower than 1860—61, but higher than 1881.

(c) December 30th to February 26th (59 days). This is inserted, because the number of days coincide with the winter of 1890—91. The table, however, shows here, more than under (a) that the recent winter was decidedly the milder of the two.

(d) December 30th to March 5th (66 days).—Owing to the renewal of the snowfall and severe frost at the end of February and early days of March, it is considered by some that the recent winter should be taken to have covered the above period. But the mild break in the third week of February raised the mean to 31.9 degrees, or so much higher than any other in the table that, had it been inserted as alone representing the recent winter, many other seasons should also have been admitted; in fact, the winter of 1813—14 should be extended to March 20th (85 days), as the frost in that year actually lasted from December 26th to March 20th, with a break of ten days in the middle of February.

It should be mentioned that Mr. Harding's table was compiled from observations made in the neighbourhood of London. The temperatures of the frost of 1788—89 were not taken from self-registering thermometers, but from instruments read at 8 a.m. and 2 p.m. daily. All the other observations in the table are from self-registering thermometers.

PROLONGED FROSTS OF THE LAST 100 YEARS.

DATE.	Days' duration.	Mean maximum.	Mean minimum.	Mean of maximum and minimum.	Absolute minimum.	With min. temperature below 50 degrees.	Of continuous frost.	DATE.						Days ground covered with snow.
								Mean maximum.	deg.	deg.	deg.	With daily mean of 33 degrees or below.	With max. temperature 33 degrees or below.	
1788-89, Nov. 26 to Jan. 13	49	deg. 31.3	deg. 27.5	deg. 29.4	deg. 17.5	4	12	33	30	3	deg. 46.0	—		
1794-95, Dec. 18 to Feb. 7	52	31.9	25.3	28.0	7.0	11	12	35	23	3	46.0	—		
1813-14, Dec. 26 to Feb. 5	42	33.0	21.5	27.3	8.0	16	11	32	20	5	41.0	—		
1838, Jan. 5 to Feb. 23	50	32.9	24.9	28.9	4.0	9	13	31	19	5	50.0	—		
1855, Jan. 10 to Feb. 25	47	34.8	24.5	29.7	11.1	12	4	31	15	7	48.0	—		
1860-61, Dec. 15 to Jan. 19	36	34.9	24.8	29.9	8.0	8	3	26	9	4	47.0	—		
1879, Nov. 14 to Dec. 27	44	37.2	24.7	31.0	13.7	4	2	22	6	12	55.0	—		
1881, Jan. 7 to 26	20	31.8	22.1	27.0	12.7	10	9	14	12	1	41.0	—		
1890-91, Nov. 25 to Jan. 22	59	33.5	25.0	29.3	12.0	10	10	41	27	9	44.0	—		
(a) Dec. 30 to Feb. 20	53	36.3	25.7	31.0	4.0	13	3	24	6	7	45.0	47		
(b) Jan. 22 to Feb. 20	30	31.6	22.3	28.4	4.0	11	3	20	5	1	41.2	30		
(c) Dec. 30 to Feb. 26	59	36.8	26.3	31.5	4.0	13	3	24	6	12	45.8	50		
(d) Dec. 30 to Feb. 5	66	37.3	26.6	31.9	4.0	13	3	24	6	15	48.0	56		

## XIII.

## NOTES ON THE GREAT GALE OF 24TH MARCH, 1895.

BY ARTHUR W. PRESTON, F. R. MET. SOC.

*Read 25th March, 1895.*

THE terrible and disastrous hurricane which occurred on the afternoon of Sunday, March 24th, calls for a few remarks supplemental to those on the Great Frost recently given. The fine genial weather which set in on March 10th, and which proved a great and pleasing contrast to the rigorous cold which had prevailed for many weeks, continued with but little intermission until the 23rd day, on the evening of which the barometer fell rapidly, and there were evidences of a change to stormy conditions. During the evening the wind rose and the sky presented a murky appearance, and in the night the wind increased to a gale, heavy rain fell, and a rough morning ensued. At 9 a.m. the sky was clouded, the barometer (corrected and reduced) was 29.28 ins., temperature dry bulb 51.6, wet 51.0. At 1 p.m. the sky cleared and the wind increased. At 2 p.m. the barometer fell to 29.09 ins., and the wind was blowing a fresh gale from nearly due W. At 3 p.m. the hurricane began in earnest, and a few minutes later my garden wall was blown over. At 3.30 p.m. the gale was at its height, the barometer being 28.99 ins. The gusts were something terrific. The water was being blown out of the river like dense clouds of smoke over the adjoining marshes, and the spray could be felt in my garden, sixty feet above it. Rockland and Surlingham Broads were compared to "bonfires," so great and dense were the clouds of spray being blown out of them. Three signal posts on the line were blown down, and roofs were swept of their tiles by the hundred, chimney pots blown over, and in many instances stacks of chimneys fell through the roofs. At Blofield Church the service was suspended, the lead on the roof was rolled up like parchment, many of the trees in the churchyard were uprooted, and the congregation was unable to leave by the usual door owing to the falling masonry. At Strumpshaw a whole plantation of Larch trees

was laid flat, not a tree left standing, and the grounds at Brundall House, noted for the great variety of beautiful trees and shrubs, were left a perfect wreck, large trees being piled one on the top of another. In some parts of Norwich the houses looked as if they had been bombarded, the roofs being stripped of tiles, chimney-stacks fallen through the roofs, and windows blown in. On some estates hundreds, and on others thousands of fine trees were laid flat, and in many cases whole plantations were left with hardly a tree standing. It is no exaggeration to say that in the county of Norfolk, the number of large trees uprooted must have far exceeded 100,000.

But to give anything like a full account of the damage done in the county by this disastrous gale would be beyond the limits of this paper, in fact, the damage done even in a small radius might fill a book. Happily not much injury to life and limb was reported, the most serious case was that of a Nonconformist clergyman at Pulham, who was killed in the pulpit by the falling of the gable of the Chapel. Had the storm occurred in the night, or even in the daytime of an ordinary week day, there is no doubt the list of personal accidents and loss of life would have been a long one. After 3.30 p.m. the barometer rose briskly, and from 4 p.m. the gale gradually abated. At 9 p.m. the barometer had risen to 29.34 ins., the wind was W.N.W. about force 6, and there was much distant lightning.

To arrive at the exact velocity of the most violent gusts of this terrible gale is a matter of difficulty, as no registering instruments seemed adequate to record with exactness the full fury which was experienced. Mr. Willis, at Ipswich Road, Norwich, where a large number of fine trees were blown down, personally recorded a velocity of sixty miles an hour or force 10, and estimated that at the height of the gale the velocity was seventy miles an hour, or force 11. This almost exactly coincides with what was experienced at the Sailors' Home, Great Yarmouth, where Mr. Watson informs me his anemometer recorded seventy miles per hour. There is no doubt, however, that some of the gusts considerably exceeded that velocity. In a discussion on wind forces at the Royal Meteorological Society in 1874, it was said that "a hurricane that tears up trees and throws down buildings" (Rouse) is a velocity of 110.48 miles per hour. If this statement be true it would appear that some of the gusts during the recent gale must have approached at least one hundred miles an hour.

The centre of the storm seems to have passed over Gloucestershire and across the Midland Counties through Norfolk. At Upfield, near Stroud, Gloucestershire, the gale was at its height from noon to 1 p.m. At Easton Maudit Vicarage, Northampton, the Rev. H. A. Boys reports that it was at its height from 1.30 to 2.15 p.m., and that the extreme force there might certainly be put as high as 11 and perhaps even at 12. The damage done in the Midland Counties was quite as serious as in Norfolk. I have recently visited Rugby, and find that a sad havoc is made amongst the magnificent Elms with which the fields attached to the schools abound. At Leamington, Kenilworth, Coventry and neighbourhood, there is much destruction, and the beautiful park of Stoneleigh Abbey (the seat of Lord Leigh) is sadly disfigured. On the other hand in Suffolk the damage is very much less than in Norfolk. A recent visit showed me that although trees are blown down here and there the results are trifling when compared with the devastation wrought in this county.

The effects of the storm prove conclusively that there has been nothing like it in this locality during the present generation. Many trees were uprooted and much damage done by a violent gale on the 14th October, 1881, and many persons recollect the even more disastrous hurricane of the 28th May, 1860; but it is almost unanimously agreed that the results in these cases were nothing to be compared with the recent experience. It has been said that no such violent storm has occurred since 1703. In that year, old records state that it was "the most terrible wind ever known" (November 26th and 27th), "and a great wind which blowed down houses, barns, trees, being Satterday morning, and much harm to the ships at sea" (Winchcourt Parish Register). Mr. Glaisher, however, states that on the last day of the year 1778, "there was a violent storm, supposed by some to have been as violent as that of 1703." In 1839 there was also an exceedingly furious gale on January 7th, when "it was dreadful throughout England, Wales, Ireland, and part at least of Scotland, and abroad; nearly 200 lives were lost by sea and land in the North of England, and at Liverpool and Manchester almost every house was injured, and many people killed by falling chimneys or roofs." Altogether what with the violent gales and floods of December, the almost unprecedented frost of January and February, and the hurricane of March 24th, the winter of 1894—95 is not likely to be soon forgotten.

## XIV.

EXTRACTS FROM A LECTURE GIVEN BY  
WILLIAM LEAN IN BIRMINGHAM, 1856.

(Communicated by Mr. J. H. Gurney.)

THERE is one little incident within my own knowledge, connected with the manifestation of instinct in a bird, not in the construction of her nest, but apparently in the endeavour to preserve the contents of her nest from molestation, and which bears so much of the character of something nearly akin to reason, that I shall venture to narrate it.

This egg of a Kite—of the *Falco milvus*,—is one of the largest and handsomest of our British birds of prey. Some six or seven and twenty years ago, a pair or two of these birds, which are by no means plentiful, used to frequent and breed every year on the Drymma Mountain, which rises over the little town of Neath, in South Wales. At that time my brother, Charles Lean, resided near Neath Abbey, and knowing that the eggs of the Kite would be a prize to me, he determined to endeavour to procure some of them. I may mention, as an indication of the rarity of the egg, that about twenty years ago, when Hewetson was publishing his work on the eggs of British birds, the egg of the Kite was, for a considerable time, mentioned in the list which he issued periodically of those eggs which he had been unable to procure, and which he was consequently unable to figure.

After a great deal of search one spring, and by means of carefully watching a pair of the Kites, my brother at last succeeded in discovering their nest. As was to be expected with such wild and wary birds, the nest was built in a spot very difficult of access, though, at the same time, the nest itself was very much exposed, and could be easily seen, when the spot the birds had chosen had been once discovered. The Drymma in some places presents, towards

its summit, an almost perpendicular face of bare rock, while the ground immediately below the rock slopes away at a very sharp angle, but is generally clothed with wood. In a very tall old Oak, which grew close to the foot of the precipice, the Kites had built their nest. The stem of the tree springing from the very foot of the rock, the head was brought close to the face of the cliff, and therefore any nest built in the higher branches would be completely overlooked by any one standing on the edge above.

On finding the nest, my brother saw that the climb to it would be a difficult and, perhaps, not a very safe one. He therefore wished to be sure that there was something to climb for, before he made the attempt; and for that purpose he went round by another part of the mountain to the top of the cliff, where it overhung the tree. From this place he had a complete view of the inside of the nest. It was lined, and ready for eggs, or nearly so, but appeared to be empty.

Day after day my brother went to the same spot, hoping to see an egg, but was continually disappointed. The Kites were generally sailing round overhead, as if watching their property, but the nest always seemed to be empty. This was puzzling. At last, going up very early one morning, and creeping more cautiously and noiselessly than he had usually done to the edge of the cliff, he succeeded in surprising the female bird on the nest. Instantly, on his looking over, she darted off, and there was an egg, which, of course, my brother supposed the bird had just laid.

Fearing that if he missed the present opportunity, some one else might discover the nest and be beforehand with him, my brother determined, if possible, to secure the one egg at once, rather than wait for more to be laid; with that object, he immediately went round to the foot of the precipice, and succeeded at last in climbing the tree, and reaching the nest. His surprise was great to find that it contained *four* eggs instead of only *one*; and he was, perhaps, still more surprised to find that three of the four were carefully covered over with a piece of old black and red plaided Welsh flannel, about six or seven inches square. The fourth egg, the one he had seen from the top of the rock, would no doubt have been covered also, had not the hen bird been frightened from her home in such a hurry.

The whole matter was now plain enough. The eggs had most

probably been concealed by the flannel almost, if not quite, from the time when my brother first looked for them; and I think there is good ground for supposing that instinct had shown the Kites that their nest in the spot they had chosen, though very secure in all other respects, would be overlooked from the rock above, and that, consequently, the safety of its contents would be endangered; and that instinct had further instructed them to adopt such an extraordinary plan as to convey the piece of flannel to their abode, that it might serve as a covering for their treasures, and, by concealing them, preserve them from molestation. Surely such instinct looks as if it was tinged with a very strong shade of reason.

The flannel was of that kind so commonly worn by the lower orders of Welsh country-women, and of which old waste bits are very likely to be thrown about in the fields. The piece in question I preserved for some years with the Kites' eggs; but, at last, through some mischance, it was lost, which I regret, as it was a memento of a very curious fact connected with natural history.

There are doubtful points also connected with the *habits* of many birds, upon some of which these rambles may chance, very unexpectedly, to furnish us with the means of throwing some light. For instance, our annual visitant, the Cuckoo, whose note, monotonous though it be, everybody seems to welcome as a token of returning spring,—is well known to make no nest of her own, but to entrust her eggs to the care of other birds; but it is not so well known in what manner she contrives to introduce her own egg into the abode of the stranger, whom she has selected to discharge the duties of nurse to her offspring. The Cuckoo generally chooses for her purpose the nests of the Hedge Sparrow, Titlark, Yellow Hammer, or Water Wagtail; perhaps more frequently those of the Hedge Sparrow and Titlark than any others. All these birds are, compared with the Cuckoo, very small birds; and their nests are likewise small, and are, besides, very often constructed in places into which it would be very difficult, if not impossible, for the Cuckoo to introduce her whole body. A question has therefore been sometimes raised whether the Cuckoo deposits her egg at once in the stranger's nest, or whether she first lays it on the ground and then takes it up in her bill and places it in its destined abode.



A good many years ago, in one of those country rambles of the pleasure of which I have been speaking, I met with a little incident which, I believe, throws some light upon this question. We were walking, one afternoon, across Moseley Common, not far from the spot where the Independent College is now building. As we proceeded, a Titlark flew out from under a Furze bush not far from my feet, and on searching the spot we found her nest with, so far as my memory serves me at this distance of time, only one egg in it. The Furze bush was a thick, compact, stunted bush, with the lower branches lying close to the ground; and the nest was made in a slight hole in the ground, two or three inches in, under the outer edge of the bush, and accessible only through a very small opening in the dry grass which grew up among the Furze, which opening had pretty evidently been made by the Titlark herself. We looked at the nest for a short time, and then, leaving both it and its one egg undisturbed, we went on our way.

We had not advanced across the common more than about two hundred yards, when, happening to turn in the direction of the nest, I saw a Cuckoo coming skimming over the tops of the Furze bushes, towards the spot we had just left. We stopped to look at her a moment or two, and presently observed that she alighted on the ground very near to the Furze bush of which I have spoken. The Furze and Fern with which the common was covered now concealed her from our sight; but, thinking her movements worth watching, we stood still to see whether she would rise again from the same spot. In less than five minutes she rose as we expected, and instead of skimming over the Furze again, as she was doing when we first observed her, she flew off towards the fields which bordered that part of the common.

We now hastened back to the Titlark's nest, and on looking in I found, in addition to the egg of the lawful owner of the nest which we had left there, a fresh-laid Cuckoo's egg,—the egg, without any doubt, of the Cuckoo we had just been watching.

But in what manner had the egg been introduced into the Titlark's nest? From what I have already said of the situation of the nest,—that it lay in a small hole, about two or three inches in under the thick-set stiff branches of a Furze bush, which almost rested on the ground,—I think it will be readily inferred that the Cuckoo could not easily have forced herself into the nest.

I believe I may say it was almost impossible for her to have done so. Nor, indeed, was there any appearance of her having attempted anything of the kind. The grass, through which the Titlark had her small opening for ingress and egress, was as undisturbed as when we left it. But it was perfectly easy for the Cuckoo to have reached the nest with her bill, by stretching in her head and neck through the Titlark's opening; and, therefore, observing all these particulars, I came to the conclusion,—and I have never doubted that it was a correct conclusion,—that the egg was first laid on the grass, and then removed by the Cuckoo, by means of her bill, into the place where her instinct told her her future offspring was to be cared for.

[There is no longer the least doubt in the minds of ornithologists that the Cuckoo habitually deposits its egg on the ground, and then takes it in its mouth and drops it into a nest, though the action is of necessity almost impossible to witness. Indeed, no one has ever by ocular proof demonstrated that a Cuckoo sits on a nest to lay its egg, which shows that there are still points remaining open for investigation in the economy of this singular bird. It has indeed been asserted by Herr Müller that, in exceptional circumstances, the Cuckoo will sit on and hatch its own eggs, but his observations are doubted (*cf.* 'Journal für Ornithologie,' 1889, p. 33, and translation of both articles in 'The Zoologist,' vol. xiii. p. 214).—J. H. G.]

---

XV.

*MISCELLANEOUS NOTES AND OBSERVATIONS.*

MAY-DAY CUSTOMS AT LYNN.—A SURVIVAL.—Those of us who, at the present time, are so much interested in the study of Nature, cannot fail to sympathise with such of our fellow-men who, in times long past, actually worshipped various natural objects and phenomena. It is not a little remarkable that the influences of the Christian religion, operating through so many centuries, have not been sufficient completely to eradicate all

traces of the pre-existent pagan worship, yet such is the case. We may take it that this country has been Christian for the past eight hundred, if not one thousand years, and yet certain customs survive to the present time, which, although they may have lost their apparent meaning, are clearly of pagan origin. From a religious point of view such customs, if not baneful, are at any rate useless, and in bye-gone days men were wont to make short work with those with whom they happened to disagree in matters theological, so that their survival is the more remarkable. This fact, however, is suggestive of the parallel case in which we find the survival of apparently useless rudiments in the evolution of plants and animals.

The above remarks have been suggested by the May-day Festivities, which still survive in some places in this vicinity. The "May Pole," and the "Queen of the May," are forms which have long ceased to exist in this part of England, but the custom of carrying garlands of flowers remains much more frequently. As observed in Lynn, this is as follows: On the 1st of May, during the morning, sundry parties of children carry round the town garlands of flowers. The children—girls and boys—are dressed principally in white, with crowns of flowers on their heads, and money-boxes in their hands. They are bare-headed, and their clothing is decorated with brightly-coloured calico, ribbons, or paper. The garlands are to us the most interesting. They are always constructed in a particular manner, namely, of two hoops of wood, fastened together at right angles, and supported on the end of a pole. On these hoops flowers and green foliage are bound. To the centre of the garland a doll is suspended, and from some part of the hoops a string of birds' eggs. The garland is carried by an older child, who is not gaudily dressed, part of whose duty it is to take care of the children. The latter are usually members of one family. It is noteworthy, that although there may be ten or a dozen garlands perambulating the town, they all emanate from one particular district, and from it alone, namely, the quarter occupied by the fishing population. The local appellation of "May Ladies" suggests the May Queen. The birds' eggs and suspended doll have probably a much deeper significance than is at first sight apparent. Nor is it probable that the collection of small coin in the money-boxes is entirely a modern innovation.—  
CHARLES B. FLOWRIGHT, M.D., *President*.

PROPOSAL FOR A FRESH-WATER BIOLOGICAL STATION IN NORFOLK.—The idea of the establishment of such a station in Norfolk waters, first suggested by Mr. Bidgood, revived itself in my mind, after reading a description in 'Natural Science,' a few months ago, of the biological station on the shores of the lakes in Bohemia. This consisted of a portable house, or hut, which could be erected in a short time at any particular spot, and removed when required. The great size of these lakes, and possibility of storms, would render work (microscopical, *e.g.*) almost impossible on a floating craft of any kind. Thus, no doubt, the portable house would be the most convenient for such a district. In the sheltered Broads and waterways of Norfolk, however, such difficulties do not exist. A wherry, fitted up for the purpose of investigation, would answer admirably. That there is important work to be done, of great benefit to science, in the zoology and botany of the Broad district, will be generally acknowledged. The discovery of *Cordylophora* in Heigham Sounds, a few years ago (by Mr. Bidgood), was, I believe, an event hitherto unrecorded for that district. This organism is interesting, as *Cordylophora* is the only member of the order *Corynida* which inhabits fresh water. Mr. Geldart gave us an account of its life-history at the time. I mention this as an instance that the district is not by any means thoroughly explored. In botany, Hickling Broad is the only known habitat, in England, of *Naias marina*, according to Bentham and Hooker. I have searched for it myself, but have not been successful in finding it. Again, *Tolypellopsis stelligera*, found in the Hickling district, is specially interesting, as, according to Mr. Bennett ('Transactions,' vol. iii. p. 382), up to 1882, it had been found nowhere else in Britain. There are several points in its life-history yet to be explained. For the study of the group of *Characeæ*, Norfolk waters offer great inducements, as they contain many species, several of which have not yet been recorded for the county. For the whole of the aquatic flora, Norfolk seems to offer special facilities for clearing up obscure points. To mention only one of these obscure points, the economy of *Stratiotes aloides* (Water Soldier) requires investigation, as, in spring, the plants rise to the surface for flowering, and in autumn sink down into the mud again, for the winter, it is supposed for the purpose of ripening its seeds. The cause of the rising and sinking of this plant has yet to be discovered, though a theory to account for it has





BRÜNNICH'S GUILLEMOT.

been propounded by M. Forel, of which mention is made in the 'Bulletin of the Society for the Protection of Alpine Plants' (Geneva, 1895). It is a matter of doubt whether *Stratiotes* ever does ripen its seeds. Its reproduction may be entirely vegetative.

The preceding are only one or two instances amongst hundreds on which observations are required. We hear a great deal nowadays of laboratory work with scalpel and microscope, all of which is, no doubt, very necessary; but nature must be studied, also, in the open air. Those of us who went to Cambridge in 1893 will remember the speech made by Dr. Hill, the Master of Downing, in which he envied us the facilities we had for going, as it were, straight to nature, watching actual life at work, instead of being cooped up in a laboratory or museum, industriously examining or explaining, perhaps, the structure of the muscles of the eye-ball. In view of the preceding considerations, and though I am aware of many difficulties in the way, I venture to suggest, mainly with a view to obtaining an expression of opinion from members, the desirability of the establishment of a fresh-water biological station in Norfolk. The chief expense would be the purchase and maintenance of a wherry. It would be absolutely necessary to obtain the support of one or two of the leading scientific societies, and perhaps of the universities, to enable the scheme to succeed. As the interest in biology is yearly increasing, there may be some hope of success. A fresh-water biological station would be a complement to the Marine Biological Laboratory at Plymouth, though, I regret to say, the success of the latter hardly comes up to expectations. However, if such an idea is impracticable at present, there can be no harm done in suggesting it. Mr. H. B. Woodward, F.G.S., our President in 1893, in his address, "hoped that some day Norwich might have a university college, where researches might be carried on, and where prominence would be given to the teaching of subjects of special practical importance in East Anglia." If such an institution were established in Norwich, then the fresh-water biological station would be a most valuable adjunct.—W. A. NICHOLSON, *Hon. Sec.*

BRÜNNICH'S GUILLEMOT IN CAMBRIDGESHIRE.—I am pleased to be able to record the occurrence of this Arctic species, if not in the county of Norfolk, at least so near it as to make the cir-

cumstance interesting to the members of this Society. A specimen of Brünnich's Guillemot was sent on January 16th to my friend Mr. Travis, the Bury bird-stuffer, from March in Cambridgeshire on that day my wife was in Bury, and, calling on Mr. Travis, saw the bird in the flesh. Neither she nor Mr. Travis noticed anything particular about it, though he held it up for her inspection remarking that it was a "very fine Razorbill." There were a good many birds in the shop, among them a magnificent old Heron which seemed more interesting than the Guillemot. Three days after, on the 19th, I called on Mr. Travis, saw the bird just mounted, and recognised it; I then went on to Mr. Norgate, he tea with him, looked up *Uria brünnichii* in his 'Yarrell,' and before leaving Bury saw the bird again. Mr. Travis told me he would probably come into his possession, as it came to him with a request to be informed what it would cost to put in a case, and, of course, it is well known that many birds thus sent are left on the stuffer's hands. I had thought of trying to secure it for the Norwich Museum, and had, in fact, written Mr. Southwell to that effect, but having reconsidered the matter, decided if possible to purchase it for my own collection which I was able to do on the 23rd, just one week from the day on which my wife saw it in the flesh. On the way home I took it to Mr. Norgate, who examined it carefully, and while looking at it close to a window, called my attention to some lines on the beak, something like those on the beak of a young Razorbill, but fainter. I was practically able to remount the bird, remove the eyes and insert others, alter the wings, etc., without any difficulty and in doing this noticed that the inside of the mouth was yellow and the legs and toes pale brown, the membranes darker. It is in all intents and purposes a common Guillemot in the plumage of the Razorbill, but the beak is unmistakable. I am sorry to be unable to send the bird for exhibition, but as it took me something like four hours' work to get it into a shape and position satisfactory to me, I am naturally unwilling to risk having it disarranged, and it is not yet nearly dry. It came to Mr. Travis from his agent at March as a "Razorbill," and was shot at Guyhirn, near Wisbech probably about the 12th or 14th. Guyhirn is about five miles west of the Norfolk boundary, and perhaps fourteen or fifteen miles from The Wash, with which it seems to be connected by



the river and canal, and probably the bird passed along the Norfolk coast. Its occurrence in the midst of the present abnormal visitations of Little Auks seems noteworthy, and it would not surprise me to hear of others being met with anywhere on the East Coast between the Tees and the Orwell, so I have put one friend at Aldeburgh and another at Hunstanton on the look out. The accompanying illustration is from a drawing by the late Mr. Gatcombe, of a specimen of Brünnich's Guillemot brought back by the Franklin Search expedition.—JULIAN G. TUCK.

LIST OF COLEOPTERA IN WEST SUFFOLK.—In my field work during 1894, in West Suffolk, I again met with some good Coleoptera. The most interesting capture of the year, however, was made by my neighbour, Mr. F. Fox, who secured a large series of *Scymnus pulchellus* on Fir. This species was supposed to be extinct, and was only admitted to the British list by specimens found in the Kirby collection many years ago. It has now appeared close to the spot where he took it. In the early summer, Mr. Frank Norgate sent me a fine specimen of the rare *Ocypus cyaneus*, which was crawling up a bank near the town of Bury St. Edmunds, and which is new to Suffolk.

The following are worthy of record:—*Carabus arvensis*, *Staphylinus stercorarius*, *Ocypus similis*, *O. compressus*, *Prognatha quadricornis*, *Saprinus rugifrons*, *Necrophorus vespillo*, *N. vestigator*, *N. ruspator*, *Silpha lœvigata*, *Soronia punctatissima*, *Limonium cylindricus*, *Corymbites tessalatus*, *Anthocomus fasciatus*, *Blaps similis*, *Pogonocherus dentatus*, *Saperda carcharias*.

The high gales in October blew down many Fungi growing on the Beech and Birch, from which I discharged a good series of *Dacne humeralis*, *D. rugifrons*, *D. bipustulatus*, *Mycetophagus 4-pustulatus*, *M. multipunctatus*, *Cis bidentatus*, and *Tetramora fungorum*.

From the fens on the Cambridge side came *Carabus granulatus*, *Silpha atrata* var. *brunnea*, *Anthocomus rufus*, *Chrysomela polita*, *C. didymata*, *Phratora vulgatissima*, and *Prasocuris junci*, all beaten from *Eupatorium cannabinum*.

With regard to the Inquilines, my most interesting capture was a fine lot of twenty-four *Metæcus paradoxus* (the Wasp Beetle) in a nest of *Vespa vulgaris* on August 18th, and I took a single

one on September 10th. From the same Wasp I took, at different times, *Cercyon granarius*, *Quedius picipes*, *Choleva grandicollis*, *C. nigrita*, *Atomaria ruficornis*, *Cryptophagus pubescens*, *C. scanicus*, and *Cœliodes 4-maculatus*. From *Bombus muscorum*, I had *Tachyporus hypnorum*, *T. obtusus*, *T. chrysomelinus*, *Stilicus rufipes*, *Xantholinus linearis*, *Stenus speculator*, *Proteinus brachypterus*, *Homalium rivulare*, *H. cœsum*, *Cryptophagus setulosus*, *Antherophagus pallens*; *Stilbus testaceus* from *Vespa germanica*; and *Quedius suturalis* from *Myrmica lævinodis*. Several of these do not appear in the Norfolk list, nor have I obtained them before.—  
W. H. TUCK.

A TRANSPLANTED MULBERRY TREE.—In a garden attached to a cottage on Harfrey's Road, Gorleston, which was built by my great uncle, William Danby Palmer, early in the present century, as a summer resort, and now belonging to myself, stands, at the present time, a Mulberry Tree which, for the last three years has again, after an interval of many years, borne fruit; it is 15 feet in height, and 3 feet 1 inch in girth, and has a somewhat singular history, which, so far as I am acquainted with it, is as follows:—

Prior to 1865 (when my grandfather, the late George Danby Palmer, died, and his executors pulled it down and sold the site for building purposes) there stood, between the present Sailors' Home and Lifeboat House on the Marine Drive, an ancient "Fisherman's Cote," which passed to my great-grandfather, William Danby Palmer, on his marriage, in 1772, with Frances, daughter and co-heiress of William Boulton, its then owner; apparently that family had possessed it for many years previously—C. J. Palmer says from the early part of the eighteenth century ('Perlustration,' vol. iii. p. 123), and in the fore-court attached to these premises the Mulberry Tree, which is the subject of these remarks, was probably planted by one of them.

It was certainly there, and of sufficient growth to allow a seat to be placed under its branches about the year 1825, when the late Mr. T. C. Lake has informed me that he there courted his wife, whose father was then my great-grandfather's tenant, in that position.

The "Cote" being pulled down, as before mentioned, had it not been for the action of my late uncle, Salmon Palmer, this tree

would doubtless have met its fate, but that gentleman caused it to be removed in May, 1866, to his then garden at Harfrey's Road, where it now flourishes; and I quite remember it going there by waggon, with a considerable quantity of its native soil attached to its roots, and it appears to have taken somewhat kindly (although at first it did not bear fruit, and has not greatly increased in size) to the fresh conditions thus imposed upon it.—F. DANBY PALMER.

**WINFARTHING OAK.**—Just twenty years ago (July 7th, 1874) a party of us met under the old Winfarthing Oak, and I read a little paper concerning it, which was published in the 'Transactions.' Up to that date, from 1796, time seems to have injured the fine old tree but little, but between 1874 and the present date much mischief has been done by storms; much of the upper timber has fallen into the interior, nearly filling the great cavity. The foliage this year is black with a 'smut,' and the acorns are small and few. I should state, however, that many other Oaks in the neighbourhood are in a similar unhealthy condition. I visited it on the 5th of last September, and again measured it, finding, to my surprise, that it had lost 18 inches in circumference since 1873. It was then 40 feet, and is now only 38 feet 6 inches. I do not know how to account for this, unless some storm-crash has shivered off a portion of the outer wood; but I hear, on good authority, that the great Cowthorpe Oak, in the West Riding, has also diminished in girth to an even larger extent. The other fine old wreck at Winfarthing, probably but little the junior of our venerable friend, has still a leafy branch, and is but little altered since 1873.—THOMAS C. AMYOT.

**SOLAR HALO.**—This somewhat uncommon phenomenon was observed at Lynn on Friday, 25th May, 1894. The well-marked halo was distinctly visible to the unprotected eye at about eleven in the morning. Possibly it was visible before then, but that is the hour at which it was first noticed by the schoolboys at the Lynn Grammar School. About 1.30 it was very clearly seen by shielding the eye from the intense glare of the sun with a piece of smoked or coloured glass. The circle was complete and of large size. At times, when the sun became a little obscured, parts of the halo were visible to the naked eye. Some observers were of opinion that at the most favourable times prismatic colours were

to be made out. The halo lasted all the afternoon, and was observable as late as five p.m.—CHARLES B. PLOWRIGHT, M.D.

ON THE OCCURRENCE OF THE BLACK VARIETY OF THE WATER VOLE.—In the spring of 1893 a black Vole was caught at Docking, as it was entering a hole in the bank of a field on the Manor Farm. It was brought to me a few minutes afterwards, and appeared to be full grown. Another specimen was killed at Walsingham, in a hayfield, during the latter part of June, 1894. It was sent to Mr. Wilson of Lynn for preservation.—C. T. M. PLOWRIGHT.

PEZOMACHUS CORRUPTOR BRED FROM CIONUS SCROPHULARIE.—Mr. Thouless gave me a female Ichneumon (*Pezomachus corruptor*, Först) which he had bred from the larva of *Cionus scrophularie*, a Beetle which he took at Horsford, August, 1894. This is interesting, as it is seldom that Ichneumons are bred from Beetles; it may be due, in a measure, that Beetles are not bred to the same extent that Butterflies and Moths are. This is the first instance I have met with of any member of the genus *Pezomachus* having been bred from Coleoptera; but I find Herr Brischke records a species which was new to science, and which he named *Pezomachus thoracicus*, bred from a Beetle, and, curiously enough, from the same genus as Mr. Thouless bred his from, viz., *Cionus*, but it was from a different species, *C. verbasci*. It may be that, as a rule, the larvæ of Coleoptera are not favourite hosts of the *Pezomachi*, that the larvæ of *Cionus* are marked exceptions; and I would suggest to those entomologists who breed Coleoptera that they would confer a great kindness on hymenopterists if they would note if they find any of these little ant-like Ichneumons in their case, and, if possible, secure them, and any winged ones they might find at the same time, as these winged ones might turn out to be the males. Of the several hundreds of the apterous female, very few have had their male satisfactorily identified.—JOHN B. BRIDGMAN, F.L.S.

SOME MARINE NOTES FROM YARMOUTH.—Many of my ichthyological finds, which have come to hand during the past two years, have been recorded by Dr. Lowe in the Society's 'Transactions' for 1893—4 (p. 634). A few curious specimens, whose occurrence was not included in that list, may be worthy of mention.

**ALBINO TURBOT.**—A 14-inch specimen was taken in a trawl off Yarmouth on March 1st, 1894. It was white on both sides, with the exception of a small patch of the normal colour surrounding the eyes, which were encircled with thin orange lines. Turbots blotched with white on the upper surface are studded with the bony tubercles only on such portions as retain the normal colour; on the other hand, when coloured on the under surface, spines appear only upon the parts which are abnormally coloured.

**MÜLLER'S TOPKNOT.**—The second recorded for the county was taken in a trawl-net off Smith's Knowle on March 11th, 1894. Length,  $6\frac{1}{4}$  inches; width,  $3\frac{1}{4}$  inches.

**SCORPENA DACTYLOPTERA.**—I am requested by Mr. Southwell to say that the fish recorded on his authority as the Bergylt (*Sebastes norvegicus*) subsequently proved to be this species. It was taken on April 29th, 1894, in a shrimp-net, and sent to him to determine. If those possessing Dr. Lowe's list in Vol. v. of our 'Transactions' (p. 635) will kindly alter the name from *Sebastes norvegicus* to *Scorpena dactyloptera* (Delaroche), Rose Perch, the unfortunate error in the determination of the species, which Mr. Southwell regrets he did not discover until the list in question was printed, will to some extent be obviated. The specimen is now in the Norwich Castle-Museum. See also 'Zoologist,' 1894 (pp. 230 and 431).

**MALFORMED CODFISH.**—A 16-inch example of the variety of Codfish known as a "Bull-dog Fish" was brought into Yarmouth on May 1st, 1894. The lower jaw protruded considerably beyond the upper. The upper part of the head had developed into a "forehead;" the eyes were oval-shaped. A second, exactly of the same length, was landed on January 17th, 1895.

**STING RAY.**—A 30-lb. specimen was taken off Winterton on May 11th or 12th, 1894.

**ROCK GOBY.**—The "black" or Rock Goby may be fairly common on our coast, some turning up every spring-time. A  $4\frac{1}{4}$ -inch specimen was brought in by a shrimper on June 9th, 1894.

**BASS.**—Some small ones, running from 4 to 6 inches long, taken in a draw-net, August 2nd, 1894. Several, 7 inches long, netted on December 30th. Have been numerous of late years.

**GREY GURNARD.**—Unusually numerous round the piers, September 3rd, 1894.

**PORBEAGLE SHARK.**—One, 9 feet in length, taken in a herring net, September 28th, 1894.

**POWER COD.**—Exceptionally fine one taken in a shrimp-net October 13th, 1894. Length, 10 inches.

**SCRIBBLED MACKEREL.**—This variety, at one time thought to be a true species, had not been recorded locally. One, undoubtedly captured with ordinary Mackerel off the coast, was exhibited at the September meeting (1874) of the Society by Mr. Roberts of Norwich. Mr. G. F. D. Preston informs me that, on November 8th, he saw one at Lowestoft, lying on top a heap of Mackerel, placed there as a "speciality."

**RAY'S BREEM.**—A fine specimen of this rare fish was toppled ashore near Caister during a heavy wind on November 23rd, 1894. Length,  $25\frac{1}{2}$  inches; depth, 9 inches; fork of tail,  $8\frac{1}{2}$  inches; length of pectoral fins,  $6\frac{1}{2}$  inches; weight, 6 lbs. 10 ozs. It has been preserved by Mr. W. Lowne for the Yarmouth Museum.

**STURGEON.**—Instances of the Sturgeon taking a hook are sufficiently rare to merit recording. A  $6\frac{1}{2}$ -foot specimen was taken on a hook baited with Herring off the beach on December 7th, 1894. I saw the cut on the mouth made to extract the hook. It was a "slinky" fish.

**LUMP-FISH.**—Several, averaging 2 stones each, were landed in March, 1895. One was washed ashore on March 25th.

**GREENLAND BULLHEAD.**—A beautiful little specimen, 5 inches in length, netted on March 7th, 1895.

**WHITING.**—One,  $22\frac{1}{2}$  inches long, sold on Fish Wharf, March 7th, 1895. This is a large fish for the eastern coast.

**WHITE-BEAKED DOLPHIN.**—An exceptionally fine female was landed on the Fish Wharf by the trawler "Thankful," on June 13th, 1894. It was brought in alive, and afterwards despatched in a fish house. Length, 8 feet 6 inches; weight, possibly about 6 cwt. On being opened, a foetal young one was discovered, which was all but fully developed, the head being slightly blunter than that of the parent. Its length was 3 feet 6 inches; weight, about  $4\frac{1}{2}$  stones.

**GRAMPUS (*Orca gladiator*, or Grampus).**—A 7 feet 5 inch specimen exhibited in the streets, November 14th, 1894. It was landed at Lowestoft by a fishing-boat the day previous. A second was brought in, on November 19th, by a Yarmouth boat.

Length, 7 feet 3 inches. It was an exact counterpart of the one previously landed, and which, no doubt, had formed part of a school hunting the fishing-grounds. (See also p. 58.)—  
A. PATTERSON.

NOTES ON *RALLUS AQUATICUS*.—I have frequently noticed the great difference in size between individual specimens of the Water Rail, but was never more struck with the fact than whilst shooting with a friend at Sutton on November 13th ult. I often-times refrain from killing these birds, but, upon the above date, we had experienced rather a blank day, the waters being too high on the marshes for Snipe, and I had a young Retriever with me that needed encouragement; so, when just before quitting our happy hunting-ground, what I could not help noticing to be a very small variety of the Water Rail, rose in front of me, I dropped it. My companion, who was walking some hundred yards away from me, almost immediately afterwards flushed and killed, what appeared to me at the time when it rose, to be a very large bird of the same species. Below I give the respective dimensions of the two individuals, and enclose two feathers from the axillary plume ( $\frac{1}{2}$  inch difference in these) of each. For further diverse dimensions see 'Zoologist' for 1886, vol. x. pp. 338 and 368.

When comparing the two birds, and looking carefully for any slight difference of plumage, &c., I discovered that the feathers upon the forehead of each, but more especially upon that of the larger individual, were apparently interspersed with little black, horny processes. These, by subsequent examination under the magnifying glass, I found to be the ends or tips of the feathers themselves,—the extreme points or tips of the scapus (rachis), or shaft, without any rami attached. Putting one such feather under the microscope, I found that these terminal points were not merely those of ordinary feathers, abraded by constant contact with vegetation, &c., through which the narrow Rails had threaded their silent ways, but that the rachis was gradually enlarged from where the rami ended and then again contracted, so as to present the appearance of semi-transparent, hollow, brownish Indian club-shaped vessels, after the manner of Fig. 8, plate ii. facing p. 82, in 'Zoologist' for 1879; and reminding one somewhat of the bright orange-scarlet appendages to the heads of nestling

Coots, or the rictal bristles of many other birds, only the feathers on the forehead of the Rails bearing these horny tips are equally recumbent with the rest of the plumage.

In the subjoined measurements, the longest tail and wing feathers were extracted before I measured them.

	Total weight.	Total length.	Carpal to wing-tip.	Expense of wing.	Bare part of tibia.	Tarsus.	Beak tip to gape.	Nostril.	Culmen.	Big toe.	Longest tail feather.	Longest wing feather.
A ...	oz. $5\frac{1}{2}$	in. 12	in. 5	in. $16\frac{3}{8}$	in. $1\frac{1}{2}$	in. $1\frac{1}{2}$	in. $1\frac{1}{8}$	in. $1\frac{1}{4}$	in. $1\frac{1}{2}$	in. $2\frac{3}{8}$	in. $24\frac{1}{8}$	in. 4
B ...	4	$10\frac{1}{2}$	$4\frac{3}{4}$	$14\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$24\frac{1}{4}$	$3\frac{3}{8}$

After dissection, the following measurements were obtained :—

	Sternum, in line.	Keel, greatest depth.	Tarsus.	Tibia.	Fibia.	
A ...	in. $1\frac{1}{2}$	in. $1\frac{3}{8}$	in. $1\frac{1}{8}$	in. $2\frac{3}{8}$	in. $1\frac{1}{8}$	Posterior notches in sternum not so wide as in B.
B ...	$1\frac{1}{8}$	$1\frac{7}{8}$	$1\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{1}{8}$	More abrupt curve in keel towards vent than in A.

A. Chin white, upper part of breast feathers tipped with white, darker and brighter throughout, both in plumage and legs than B, whose chin was rufous; breast and belly leaden grey throughout. Both birds in good condition and plumage.

A had the abdomen more rufous or creamy brown than B; this, and also the white chin, points to A being a bird of the year. It was a male by dissection, and B a female.

The above measurements scarcely represent, on paper, the striking difference which was so apparent in nature. I don't think I ever handled a larger bird than A, but I have weighed one (in good condition)  $\frac{1}{2}$  oz. lighter than B; and I believe I saw an altogether smaller specimen at Catfield on January 29th ult.—  
MAURICE C. H. BIRD.



TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY;

*Presented to the Members for*

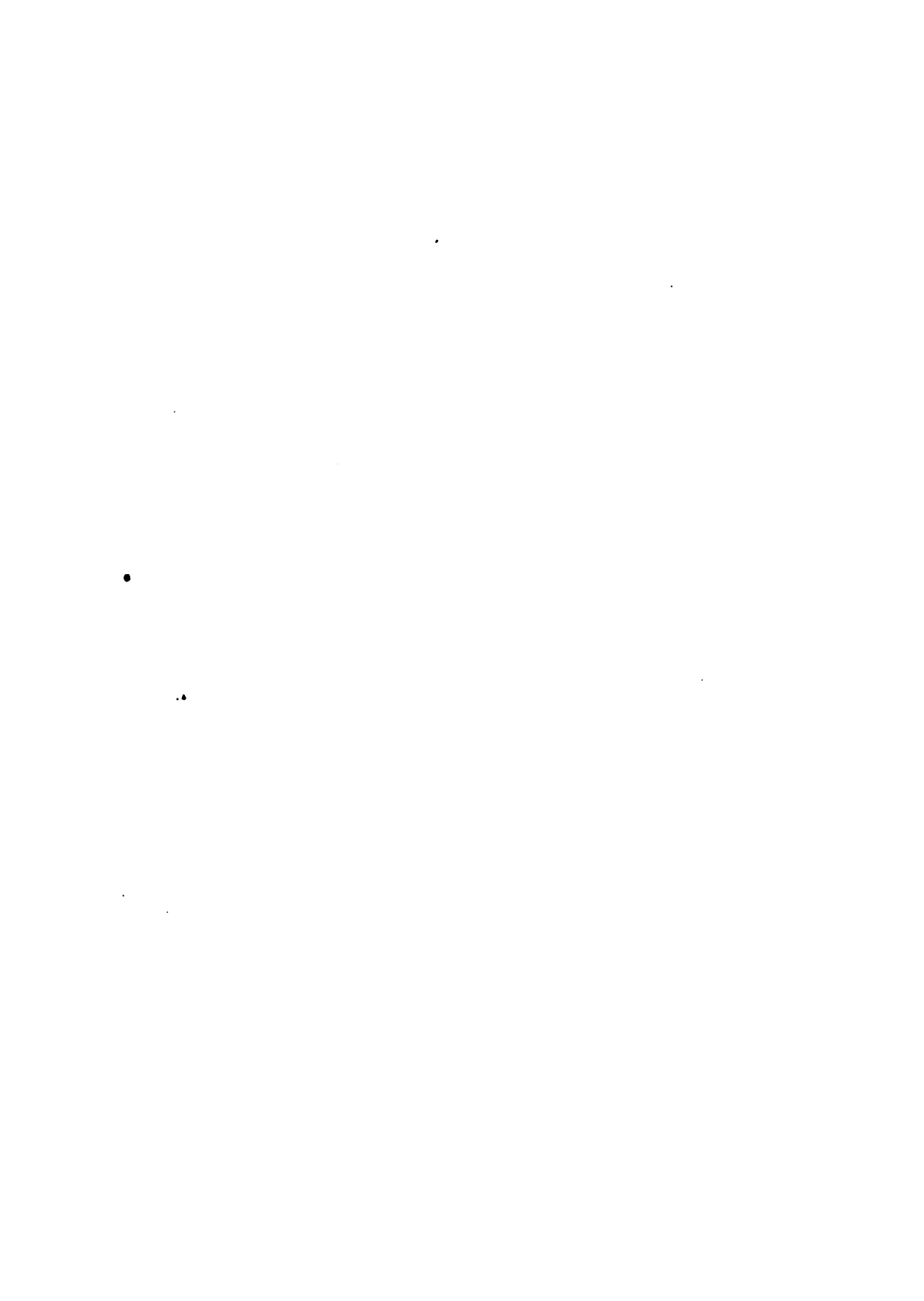
1895—96.

VOL. VI.—PART 2.

Norwich:

PRINTED BY FLETCHER AND SON.

1896.



# Horfolk and Norwich Naturalists' Society.

## OFFICERS FOR 1895—96.

### President.

MR. H. D. GELDART.

### Ex-President.

MR. C. B. PLOWRIGHT, M.D.

### Vice-Presidents.

THE RIGHT HON. THE EARL OF LEICESTER, K.G.  
THE RIGHT HON. THE EARL OF KIMBERLEY, K.G.  
THE RIGHT HON. THE LORD WALSINGHAM, F.R.S.  
THE RIGHT HON. THE LORD AMHERST OF HACKNEY.  
SIR FRANCIS G. M. BOILEAU, BART., F.Z.S., F.S.A.

LAEL BEVERLEY, M.D. COL. FEILDEN, C.M.Z.S.  
BERT D. GELDART. JOHN HENRY GURNEY, F.L.S.  
B. BRIDGMAN, F.L.S. F. W. HARMER, F.G.S.  
T. SOUTHWELL, F.Z.S.

### Treasurer.

MR. W. H. BIDWELL.

### Hon. Secretary.

MR. W. A. NICHOLSON.

### Committee.

G. C. DAVIES. MR. F. DANBY PALMER. MR. J. T. HOTBLACK.  
J. A. LAURENCE. MR. A. PATTERSON. MR. C. F. HINDE.  
J. H. WALTER. MR. E. J. H. ELDRED. MR. A. MAYFIELD.  
C. J. LUCAS. MR. J. MOTTRAM. MR. J. REEVE.

### Journal Committee.

MR. W. H. BIDWELL. PROFESSOR NEWTON.  
MR. JAMES REEVE. MR. A. W. PRESTON.

### Excursion Committee.

MR. C. BUSSEY. MR. J. T. HOTBLACK.  
MR. E. CORDER. MR. A. PATTERSON.  
MR. F. DIX. MR. A. W. PRESTON.

### Auditor.

MR. S. W. UTTING.

### Yarmouth Section.

C. J. LUCAS, *Chairman*. MR. F. DANBY PALMER, *Treasurer*.  
MR. ARTHUR PATTERSON, *Hon. Sec.*

## LIST OF MEMBERS, 1895—96.

\* Members who have compounded for their subscriptions are marked with an asterisk.

- A
- \*Ames Victor  
Bolton Studios, Fulham Road, S.W.  
Amherst Right Hon. Lord, F.Z.S., V.P.  
Didlington Hall
- Anderson Major J. A. Dilham  
Andrew W. H. M. Colney  
Aplin F. C. Bodicote, Banbury  
Aplin Oliver V. Bloxham  
Atmore E. A. Lynn
- B
- Backhouse James, Jun., West Bank, York  
Baker W. E. Tilney All Saints  
Balls F. Sprowston  
Balls J. E. Castle Meadow, Norwich  
Barclay Francis H. Leyton, Essex  
Barclay H. G., F.R.G.S. Colney Hall  
\*Barclay E. High Lee, Hoddesdon  
Barlee Rev. W., M.A. Cringleford Hall  
Bernard Miss A.  
Prince of Wales Road, Norwich  
Barrett C. G., *Hon. Mem.*  
39 Linden Grove, Nunhead, S.E.  
Barwell H. G. Surrey Street, Norwich  
\*Becher Major Edward F., E.A., F.Z.S.  
Grosvenor Chambers, Oxford St., W.  
\*Becher Rev. William Wellow, Notts  
Beckett J. B.  
11 Lancaster Road, Great Yarmouth  
Bennett Arthur, F.L.S. Croydon  
Beverley M., M.D., V.P.  
Prince of Wales Road, Norwich  
Bidwell E. 1 Trigg Lane, E.C.  
Bidwell W. H., *Treasurer*,  
Thorpe Road, Norwich  
Bird Rev. M. C. H., M.A., M.B.O.U.  
Brunstead Rectory  
Birkbeck Sir Edward, Bart.  
Horstead Hall  
Birkbeck E. L. Norwich  
Birkbeck H. Stoke Holy Cross  
Birkbeck W.  
Thorpe St. Andrew, Norwich  
Blake Dr. H.  
25 Hall Quay, Great Yarmouth  
Blake R. Bracondale, Norwich  
Bloomfield Rev. E. N., M.A., F.E.S.  
Guestling Rectory, Hastings  
Boardman E. T. Queen Street, Norwich  
Boileau Sir F. G. M., Bart., F.Z.S., F.S.A.,  
V.P. Ketteringham Hall, Wymondham  
Bolingbroke L. G. Ferryside, Norwich  
Borrer W., F.Z.S., F.L.S.  
Cowfold, Horsham  
Bridgman J. B., F.L.S., V.P.  
St. Giles Street, Norwich  
Brittain Henry, St. Faith's Lane, Norwich
- Broeck Ernest Vanden, *Hon. Mem.*  
124 Rue de Terre Neuve, Brussels  
Brown Rev. J. L.  
Chapel Field Grove, Norwich  
Bulwer W. D. E. Quebec House, East Dereham  
Bunsen L. de Colkirk House, Fakenham  
Burlingham D. Catlin Lynn  
Burn Rev. W. Pelham, M.A.  
The Chantry, Norwich  
Burnard G. B. Worstead  
Burrell W. H. Sheringham  
Burton James Gt. Yarmouth  
Burton Mrs. J. Gt. Yarmouth  
Burton S. H., M.B.  
St. Giles Street, Norwich  
Bussey C. St. Martin-at-Palace, Norwich  
Butcher H. F. Chester Place, Norwich  
Butler Colonel  
Brettenham Park, Bildeston, Suffolk  
Butterfield W. C. J. R. St. Leonards  
Buxton A. F. 50 Cornhill, E.C.  
Buxton C. Louis Bolwick Hall, Norwich  
Buxton E. G. Norwich  
Buxton Geoffrey F., F.Z.S.  
Dunston Hall, Norwich  
Buxton H. E. Great Yarmouth  
Buxton H. G. Catton Hall, Norwich  
Buxton S. G., F.Z.S.  
Catton Hall, Norwich  
\*Buxton Sir T. F., Bart., F.Z.S.  
Warlies, Waltham Abbey
- C
- Candler C. Harleston  
Candler G. Harleston  
Candler Henry  
War Office, Pall Mall, London, S.W.  
Carter W., Free Library, Great Yarmouth  
Chase R. W.  
2 Edgbaston Road, Birmingham  
Christy Miller, F.L.S.  
Pryors, Broomfield, Chelmsford  
Clarke W. G. Thetford  
\*Clifton The Right Hon. Lord  
Dumpton Park, Ramsgate  
Clowes J. E., Hall Quay, Great Yarmouth  
\*Cocks A. H., M.A., F.Z.S.  
Thames Bank, Great Marlow, Bucks  
Collett Professor Robert, *Hon. Mem.*  
The University, Christiania, Norway  
Colman J. J. Carrow House, Norwich  
Colman Russell J. Bracondale, Norwich  
Combe E. H. H.  
Gorleston, Great Yarmouth  
Connop E. M. Bollesby Hall  
Cooke G. F. Thorpe, Norwich  
Cooke M. C., *Hon. Mem.*  
146 Junction Road, Upper Holloway

Cordeaux John Great Cotes, Lincoln  
 Corder O. Brundall  
 Corder Edward London Street, Norwich  
 Crosswell George Lynn  
 Crosswell Rev. S. F., D.D., F.R.A.S.,  
 F.R.G.S. Northrepps Rectory  
 Crook Dr. A.  
 Prince of Wales Road, Norwich  
 Cross J. M. Mile End Road, Norwich  
 Crowfoot W. M., M.B. Beccles  
 \*Crowley P., F.Z.S., F.L.S.  
 Waddon House, Croydon

## D

Davey G. Horningtoft  
 Davies G. C. Town Close Road, Norwich  
 Day Rev. A. G., M.A.  
 Great Melton Rectory, Wymondham  
 Digby A. Fakenham  
 Dix Francis Essex Street, Norwich  
 Dix Miss E. L. Essex Street, Norwich  
 Downson E. T., F.R. Met. Soc. Geldeston  
 \*Dresser H. E., F.Z.S., F.L.S.  
 Topcliffe Grange, Farnborough  
 Duckett Dr. C.  
 St. George's Terrace, Great Yarmouth  
 Du Port Rev. J. M., M.A., Denver Rectory

## E

Eade Sir Peter, M.D.  
 St. Giles Street, Norwich  
 Eaton George C.  
 Cleveland House, Eaton, Norwich  
 Edwards J., *Hon. Mem.*  
 Colesborne, Gloucestershire  
 Eldred E. J. H. Castle Meadow, Norwich  
 Emerson P. H., B.A., M.B. Oulton  
 Everett H. R.  
 Prince of Wales Road, Norwich

## F

Falcon Michael Horstead  
 Fara A. R. Mount Nod, Greenhithe, Kent  
 \*Faulden Col. H. W., V.P., F.G.S., C.M.Z.S.  
 West House, Wells  
 Fitch Rev. H. C. Beeston Regis Rectory  
 Fletcher B. E. Marlingford Hall, Norwich  
 \*Fletcher W. H. B.  
 Chapel Road, Worthing  
 Forrester J. B. Tombland, Norwich  
 Forrester J. S. Tombland, Norwich  
 Foster Charles  
 Thorpe St. Andrew, Norwich  
 Fowler W. Warde, Lincoln College, Oxford

## G

\*Gainsborough The Right Hon. the Earl  
 of Exton Park  
 Gätke H., *Hon. Mem.* Heligoland  
 Geldart H. D., *President*,  
 Thorpe Hamlet, Norwich  
 Geriah W. B. Wormley, Herts.  
 Glamfield W. A.  
 St. George's Terrace, Great Yarmouth  
 Goose A. H.  
 Prince of Wales Road, Norwich  
 Griffiths Rev. H. T. Smallburgh Rectory  
 Gunn T. E., F.L.S.  
 St. Giles Street, Norwich

Gurdon R. T. Letton Hall  
 \*Gurney Gerard H. Keswick Hall, Norwich  
 \*Gurney J. H., V.P., F.L.S., F.Z.S.  
 Keswick Hall, Norwich  
 Gurney Nigel Sprowston Hall, Norwich  
 Gurney R. H. J. Northrepps Hall  
 Gurney R. Sprowston Hall, Norwich

## H

\*Hackblock W. H. Coltishall  
 \*Haigh C. H. Caton  
 Grainsby Hall, Gt. Grimsby  
 Haldinstein Alfred  
 Unthank's Road, Norwich  
 Haldinstein W. 35 Hyde Park Gate,  
 Kensington Gore, S.W.  
 Hall H. Woodbridge  
 Hamblen W. W. Wells  
 Hamond Charles A.  
 Twyford Hall, East Dereham  
 \*Hamond Commander R. H., R.N.  
 Swaffham  
 Harcourt B. W., St. Giles Street, Norwich  
 Harmer F. W., V.P., F.G.S.  
 Cringleford, Norwich  
 Harmer S. F., B.A., B.Sc.  
 King's College, Cambridge  
 Harris G. H., 8 Camperdown, Gt. Yarmouth  
 Harvey E. K. Lowestoft  
 Harvie-Brown J. A., F.R.S.E.  
 Dunipace House, Larbert, N.B.  
 Hastings The Right Hon. Lord  
 Melton Constable  
 Hebbert C. T., F.Z.S. The Rhodron,  
 Hook, Kingston-on-Thames  
 Hector Sir James, M.D., K.C.M.G., F.E.S.  
*Hon. Mem.*  
 New Zealand Institute, Wellington  
 Herring Capt. H. L.  
 Thorpe St. Andrew, Norwich  
 \*Hill Alexander, M.D.  
 Downing College, Cambridge  
 Hinde C. F. Unthank's Road, Norwich  
 Hinde F. C. Thorpe Hamlet, Norwich  
 Hinde G. J., Ph.D., F.R.S., F.G.S., *Hon.*  
*Mem.* Avondale Road, Croydon  
 \*Hoare S., M.P. Cromer  
 Hooker Sir J. D., M.D., K.C.S.I., C.B.,  
 F.R.S., *Hon. Mem.*  
 The Camp, Sunningdale, Surrey  
 Hotblack G. S.  
 Prince of Wales Road, Norwich  
 Hotblack J. T., Newmarket Road, Norwich  
 Howard R. J., M.B.O.U.  
 Hawkhurst, Blackburn

## I

Irby Colonel, F.L.S., F.Z.S.  
 14 Cornwall Terrace, Regent's Park, N.W.

## J

Jarrold W. T. F.  
 Thorpe St. Andrew, Norwich  
 Jickling Rev. F. Smallburgh Hall  
 Jones Sir Laurence, Bart.  
 Craumer Hall, Fakenham

## K

Kimberley The Right Hon. the Earl of,  
K.G., V.P. Kimberley Hall, Wymondham  
King H. A. Exchange Street, Norwich  
Knox A. W., M.D. Smallburgh

## L

Laurence Rev. J. A. Dilham, Norwich  
Laurence R. Norwich  
Leathes Colonel H. M. Dovercourt  
\*Lee Warner Henry Walsingham Abbey  
Lee Warner Henry Swaffham  
Leicester The Right Hon. the Earl of,  
K.G., V.P. Holkham Hall  
Le Pelley Rev. J. L., M.A. Ringland  
le Strange Hamon, F.Z.S. Hunstanton Hall  
\*Lindley The Right Hon. the Lord Justice  
East Carlton  
Long F. Wells  
Long J. Dunton  
Lowe John, M.D., Hon. Mem.  
4 Gloucester Place, Portman Square,  
London, W.  
\*Lubbock The Rt. Hon. Sir John, Bart.,  
M.P., D.C.L., F.R.S. High Elms, Hayes, Kent  
Lucas Rev. C. J., M.A., President, Great  
Yarmouth Section  
Burgh House, Great Yarmouth

## M

Macpherson A. H.  
51 Gloucester Place, Hyde Park, W.  
Manby A. R., M.D. East Rudham  
\*Mann T. J. Hyde Hall, Sawbridgeworth, Herts  
Manning Rev. C. R., M.A., F.S.A. Diss Rectory  
Marshall Major Rippon Hall  
Mayfield A. 88 Stafford Street, Norwich  
Middleton C. Holkham  
Miller Henry, Jun. Bosmere House,  
Norwich Road, Ipswich  
Morley Claude London Road, Ipswich  
Mottram James Bank House, Norwich

## N

Newcome E. C. Feltwell  
Newcome F. d'Arcy Feltwell Hall  
Newton Professor, M.A., F.R.S., Hon.  
Mem. Magdalene College, Cambridge  
Newton Sir Edw., K.C.M.G., C.M.Z.S.,  
F.L.S. Lowestoft  
Newton E. T., F.R.S., Hon. Mem.  
H.M. Geological Survey Office,  
28 Jermyn Street, London  
Nicholson F., F.Z.S. 81 Major Street, Manchester  
Nicholson W. A., Honorary Secretary  
3 Oxford Street, Norwich

## O

\*Ogilvie F. M. Sizewell House, Leiston  
Owen Rev. J. R. B. Tofts

## P

Page G. W. Fakenham  
Paget Sir James, Bart., F.R.S., Hon. Mem.  
5 Park Square West, Regent's Park,  
London, S.W.  
Palmer F. Danby, M.S.A. Hall Quay, Great Yarmouth  
\*Parkin Thomas, M.A., F.Z.S. High Wickham, Hastings  
Parry A. Lound, Lowestoft  
Partridge Rev. W. H., M.A. Caston Rectory, Attleborough  
Patterson A., Hon. Sec. Great Yarmouth  
Section 273 Southtown, Gt. Yarmouth  
Pattin Dr. H. Cooper Norwich  
Peake E. 36 Earham Road, Norwich  
Pigott T. Digby, C.B., F.E.G.S. 5 Ovington Gardens, S.W.  
Plowright C. B., M.D., Hon. Mem. Lynn  
Power F. D. 299 Cold Harbour Lane, London  
Preston A. W., F.R. Met. Soc. Bradstone  
Purdy R. J. W. Woodgate House, Aylsham  
Pycraft W. University Museum, Oxford

## R

Ray Rev. H. Unthank's Road, Norwich  
Reeve J., Clarence Road, Thorpe, Norwich  
\*Reid Clement F.L.S., F.G.S. H.M. Geological Survey Office, London  
\*Reid Capt. Savile G., R.E. Yalding, Maidstone  
\*Ringer Sidney, M.D. Cavendish Square, W.  
Ripley Rev. W. N. Earham Hall, Norwich  
Roberts E. T. Castle Meadow, Norwich  
Robinson H. S. St. Giles Plain, Norwich  
\*Rosebery The Right Hon. the Earl of,  
K.G. Berkeley Square, W.  
Royal Microscopical Society, President of  
the, Hon. Mem. 20 Hanover Square, W.

## S

Saunders Howard, F.I.S., F.Z.S. 7 Radnor Place, London, W.  
Savill-Onley C. A. O. Boxfields, Galleywood, Chelmsford  
Sharman W. Cobholm, Great Yarmouth  
Shaw Eland, F.E.S. Fakenham  
Shiplew W., Jun. Southtown, Great Yarmouth  
Sillis T. W. 63 York Road, Great Yarmouth  
\*Singh Prince Frederick Duleep White's Club, London  
Smith W. R. Harleston  
\*Southwell C. Gurrey Lodge, Childs Hill, N.W.  
Southwell Miss Janet Norwich  
Southwell T., F.Z.S., V.P. 10 The Crescent, Norwich  
Spelman W. W. Brundall  
Sutton Francis, F.C.S. St. Faith's Lane, Norwich

- T**
- Thouless H. J., 48 Grove Avenue, Norwich  
 Todd J. T. Chapel Field Gardens, Norwich  
 Tuck Rev. J. G. Tostock Rectory, Bury St. Edmunds  
 Tuck W. H. Tostock House, Bury St. Edmunds  
 Tyler Rev. W. W. Kenninghall
- U**
- Upcher H. M., F.Z.S. Feltwell  
 Utting S. W. Thorpe, Norwich
- V**
- Vaughan Matthew Haileybury College
- W**
- \*Walsingham The Right Hon. Lord.  
 F.R.S., V.P. Merton Hall, Thetford  
 Walter J. H. Drayton  
 \*Watling E. A. Scraby Hall, Ormesby,  
 Great Yarmouth
- Watson A. Q. Thetford  
 Watson C. Stacy Caister Road, Great Yarmouth  
 Watson Mrs. Stacy Caister Road, Great Yarmouth  
 Wheeler F. D., M.A., LL.D. St. Giles' Road, Norwich  
 \*Whitaker Joseph, F.Z.S. Rainworth Lodge, Mansfield  
 White B. W. St. Giles' Road, Norwich  
 Whitty C. B., M.D. Hunstanton  
 Williams C. Prince of Wales Road, Norwich  
 Wilson H. F. Chiswick Mall  
 Winter J. J. Drayton, Norwich  
 Woodward H. B., F.R.S., F.G.S., Hon. Mem  
 8 Inglewood Road, West Hampstead,  
 London, N.W.  
 Wright C. A., Knight of the Crown of  
 Italy, F.L.S., F.Z.S. Kayhaugh House, Kew
- Y**
- Young John, F.L.S., F.Z.S.  
 64 Hereford Road, London, W.

## The Treasurer in Account with the Norfolk and Norwich Naturalists' Society, Year ending 30th March, 1896.

	Dr.	£ s. d.	Cr.	£ s. d.	
To Balance from last year	...	0	8	0	
To Subscriptions:—	...	2	5	0	
9 for 1894—95	...	44	15	0	
179 " 1895—96	...	1	5	0	
5 " 1896—97	...	0	5	0	
1 " 1897—98	...	48	10	0	
Additional payments for monthly notices	...	0	11	0	
Sale of <i>Transactions</i>	...	1	3	6	
Grant from Life Membership Fund	...	10	0	0	
		£80	12	6	
		By Fletcher and Son, for Printing <i>Transactions</i> , 1893—94	85	16	6
		Stationery, Printing Circulars, and Postage	7	10	9
		Bookbinding	1	16	6
		Advertisements	0	7	0
		Insurance	0	3	0
		Memor of the late F. Kitton	0	2	0
		Year Book of Scientific Societies	0	6	0
		Gratuity to Doorkeeper	1	0	0
		Rent of Room	1	1	0
		Assistant Secretary's Salary	5	0	0
		Balance at Messrs. Gurney	7	9	9
			£60	12	6

### LIFE MEMBERSHIP FUND.

To Balance from last year	£	88	18	6
Interest for 1894	2	9	7	
" 1895	2	8	10	
	£98	16	11	
	By Transferred to General Account	10	0	0
	" Balance in Post Office Savings Bank	88	16	11
		£98	16	11

Norwich, April 1st, 1896.

Examined and found correct,

STEPHEN WM. UTTING, Auditor.



*List of the Publications received by the Society as Donations  
or Exchanges from March, 1895, to March, 1896.*

- 
- ASHETON (Richard).** Studies in the development of the Rabbit and the Frog. [Reprinted from the 'Quarterly Journal of Microscopical Science' for December, 1894.] 8vo. Lond., 1895.  
*From Col. Feilden, F.G.S.*
- BARROW** Naturalists' Field Club and Literary and Scientific Association. Annual Reports and Proceedings; vol. v. for the years 1883 to 1890, and vol. x. for the year ending March, 1895. 2 nos. 8vo. Barrow-in-Furness, 1895. *From the Club.*
- BATH** Natural History and Antiquarian Field Club. Proceedings, Vol. viii. no. 2. 8vo. Bath, 1895. *From the Club.*
- BELGIUM.** Annales de la Société Belge de Microscopie. Tome 19 et 20. 8vo. Bruxelles, 1895—96. *From the Society.*
- BENNETT (Arthur, F.L.S.).** Notes on British Plants. [Reprinted from the 'Journal of Botany' for December, 1894.] pp. 5. 8vo.  
*From the Author.*
- Records of Scottish Plants for 1894, additional to Watson's 'Topographical Botany,' second edition, 1883. [Reprinted from 'The Annals of Scottish Natural History,' April, 1895.] pp. 5. 8vo.  
*From the Author.*
- *Carex Fusca*, Allioni, in Scotland. [Reprinted from 'The Annals of Scottish Natural History,' October, 1895.] pp. 3. 8vo.  
*From the Author.*
- Contributions towards a Flora of the Outer Hebrides. No. 2. [Reprinted from 'The Annals of Scottish Natural History,' October, 1895.] pp. 8. 8vo. *From the Author.*
- Notes on the Potamogetones of the Herbarium Boissier. [Extrait du Bulletin de l'Herbier Boissier, Juin, 1895.] pp. 12. 8vo. *From the Author.*
- BERWICKSHIRE** Naturalists' Club. Proceedings. Vol. xiv. no 2, and vol. xv. no. 1. 8vo. Alnwick, 1894—95. *From the Club.*
- BRITISH** Association. Report of the sixty-fifth Meeting of the British Association for the Advancement of Science held at Ipswich in September, 1895. 8vo. Lond., 1895.  
*From the British Association.*
- Notes and Queries on Anthropology. Drawn up by a Committee appointed by the British Association. sm. 8vo. Lond., 1874. *From Col. Feilden, F.G.S.*

- CARDIFF Naturalists' Society. Reports and Transactions. Vol. xxvii. parts 1 and 2. 8vo. Cardiff, 1895. *From the Society.*
- "CHALLENGER" (The) Expedition. Papers by Sir Wyville Thomson, Mr. Murray, Mr. Moseley, Mr. Buchanan, and the late Dr. Von Willemöes-Suhm, communicated to the Royal Society, and printed in their Proceedings. 8vo. Lond., 1876.  
*From Col. Feilden, F.G.S.*
- CROWLEY (Philip). Catalogue of Birds' Eggs in the Collection of Philip Crowley. 8vo. 1883. *From Col. Feilden, F.G.S.*
- CROYDON Microscopical and Natural History Club. Proceedings and Transactions, 1894—95. 8vo. Croydon, 1895. *From the Club.*
- CUVIER's Animal Kingdom; abridged by H. M'Murtrie. [No title page.] 8vo. 1834. *From Col. Feilden, F.G.S.*
- EASTBOURNE Natural History Society. Transactions. New Series. Vol. iii. part 1. 8vo. Eastbourne, 1895. *From the Society.*
- EDINBURGH Geological Society. Transactions. Vol. vii. part 2. 8vo. Edinburgh, 1895. *From the Society.*
- EDINBURGH. Royal Physical Society of Edinburgh. Proceedings. Vol. xiii. part 1. 8vo. Edinburgh, 1895. *From the Society.*
- GÄTKE (Heinrich). Heligoland as an Ornithological Observatory: the result of fifty years' experience. Translated by Rudolph Rosenstock. roy. 8vo. Edinburgh, 1895. *From the Author.*
- GLASGOW. Andersonian Naturalists' Society. Annals. Vol. ii. part 1. 8vo. Glasgow, 1896. *From the Society.*
- HARTLAUB (Dr. G.). System der Ornithologie Westafrika's. 8vo. Bremen, 1857. *From Professor Newton, F.R.S.*
- HERSCHEL (Sir John F. W., Bart.). A Manual of Scientific Enquiry. sm. 8vo. Lond., 1851. *From Col. Feilden, F.G.S.*
- HINDE (George Jennings, Ph.D., F.R.S.) and FOX (Howard, F.G.S.). On a well-marked Horizon of Radiolarian Rocks in the Lower Culm Measures of Devon, Cornwall, and West Somerset. [From the Quarterly Journal of the Geological Society for November, 1895, pp. 609—668.] 8vo.  
*From Dr. G. J. Hinde, F.R.S.*
- HOWORTH (Sir Henry, M.P., F.R.S.). Some Casual Thoughts on Museums. [Reprinted from "Natural Science;" August and November, 1895.] pp. 11. roy. 8vo. *From Col. Feilden, F.G.S.*
- IBIS (The), a Quarterly Journal of Ornithology. Edited by P. L. Sclater, Ph.D., F.R.S., and Howard Saunders, F.L.S. Seventh Series, vol. i. nos. 2—4; vol. ii. no. 1. 8vo. Lond., 1895—96.  
*From Mr. G. F. Buxton, F.Z.S.*
- KITTON (Frederic). A Memoir. With a Portrait and Bibliography. 8vo. Lond., 1895. *Purchased.*
- Catalogue of Scientific Publications (chiefly microscopical) in the library of the late Frederic Kitton. pp. 20. 8vo. St. Albans, 1895.

- LINNEUS** (Carl). A General System of Animals, Birds, Amphibia, and Fishes, systematically divided into classes. Translated by William Turton, M.D. 8vo. Lond., 1806.  
*From Col. Feilden, F.G.S.*
- LIVERPOOL** Geological Association. Journal. Vol. xv. 8vo. Liverpool, 1895.  
*From the Association.*
- LONDON**. British Museum (Natural History). A Guide to the Exhibition Galleries—Departments of Geology and Palaeontology, Mineralogy, and Botany. 8vo. 1884.  
*From Col. Feilden, F.G.S.*
- LONDON**. British Museum (Natural History). Guide to the Galleries of Mammalia. 8vo. 1887.  
*From Col. Feilden, F.G.S.*
- LONDON**. Geological Society. Quarterly Journal, nos. 202—205. 8vo. 1895—96.  
*From Col. Feilden, F.G.S.*
- LONDON**. Royal Geographical Society. The Geographical Journal, including the Proceedings of the Royal Geographical Society. 1895. 2 vols. Lond., 1895. *From Mr. H. G. Barclay, F.R.G.S.*
- LONDON**. Royal Microscopical Society. Journal of the Royal Microscopical Society; containing its Transactions and Proceedings, etc. April, 1895 to February, 1896. roy. 8vo. Lond., 1895—96.  
*From the Society.*
- LONDON**. Royal Institution of Great Britain. Proceedings. Vol. xiv. part 2. 8vo. Lond., 1895. *From the Royal Institution.*
- LONDON**. South London Entomological and Natural History Society. Abstract of Proceedings for the Year 1895. 8vo.  
*From the Society.*
- MANCHESTER** Literary and Philosophical Society. Memoirs and Proceedings. Fourth Series. Vol. ix. nos 3—6. 8vo. Manchester, 1895—96.  
*From the Society.*
- MANCHESTER** Microscopical Society. Transactions and Annual Report, 1884. 8vo. Manchester, 1895. *From the Society.*
- MARINE** Biological Association of the United Kingdom. Journal. Vol. iii. nos. 4, 5; and vol. iv. no. 1. roy. 8vo. Lond., 1895.  
*From Professor Newton, F.R.S.*
- NEW ZEALAND**. Transactions and Proceedings of the New Zealand Institute. Edited and published under the authority of the Board of Governors of the Institute, by Sir James Hector, K.C.M.G., M.D., F.R.S. Director. 8vo. Wellington, 1895.  
*From the Institute.*
- NORTH STAFFORDSHIRE** Naturalists' Field Club and Archæological Society. Annual Report and Transactions. Vol. xxix. Stoke-upon-Trent, 1895. *From the Society.*
- NOVA SCOTIA**. The Proceedings and Transactions of the Nova Scotian Institute of Science, Halifax, Nova Scotia. Second Series. Vol. i. part 4. 8vo. Halifax, N.S., 1895.  
*From the Institute.*
- PATTERSON** (A.). Man and Nature on the Broads. sm. 4to. Lond., 1895.  
*From Mr. J. H. Gurney, F.Z.S.*

- RAY Society's Publications. Reports on Zoology for 1843, 1844. 8vo. Lond., 1847. *From Col. Feilden, F.G.S.*
- RUSSIA. Bulletin de la Société Impériale des Naturalistes de Moscou. Année 1895. nos. 1—4. 8vo. Moscou, 1895. *From the Society.*
- SHARPE (R. Bowdler, LL.D., F.L.S.). A review of recent attempts to classify Birds; an Address delivered before the Second International Ornithological Congress on the 18th of May, 1891. roy. 8vo. Budapest, 1891. *From Col. Feilden, F.G.S.*
- STACY-WATSON (C.). Clupea harengus. The Silvery Hosts of the North Sea. With a Sketch of "Quaint Old Yarmouth." sm. 8vo. Lond., 1884. *From Col. Feilden, F.G.S.*
- SWAINSON (William). Taxidermy; with the Biography of Zoologists, and notices of their Works. sm. 8vo. Lond., 1840. *From Col. Feilden, F.G.S.*
- SWANN (H. Kirke). A concise Handbook of British Birds. fcp. 8vo. Lond., 1896. *From Mr. J. H. Gurney, F.Z.S.*
- TEALL (J. J. Harris, F.G.S.). The Potton and Wicken Phosphatic Deposits, being the Sedgwick Prize Essay for 1873. pp. 44. 8vo. Cambridge, 1875.
- UNITED STATES OF AMERICA. Annual Report of the Smithsonian Institution for the year ending June 30, 1893. Report of the U.S. National Museum. 8vo. Washington, 1895. *From the Smithsonian Institution.*
- Proceedings of the United States National Museum. Vol. xvii. 1894. Washington, 1895. *From the Smithsonian Institution.*
- Bulletin of the United States National Museum. No. 48. 8vo. Washington, 1895. *From the Smithsonian Institution.*
- No. 48. Contribution toward a Monograph of the Insects of the Lepidopterous Family Noctuidæ of Boreal North America. By John B. Smith.
- Bulletins of the United States Geological Survey. Nos. 118—122. 8vo. Washington, 1894. *From the U.S. Geological Survey.*
- Fourteenth Report of the United States Geological Survey, to the Secretary of the Interior. By J. W. Powell, Director. In two parts. imp. 8vo. Washington, 1894. *From the U.S. Geological Survey.*
- Monographs of the United States Geological Survey. Vols. xxiii. and xxiv. 4to. Washington, 1894. *From the U.S. Geological Survey.*
- Vol. xxiii. Geology of the Green Mountains in Massachusetts. By Raphael Pumpelly, J. E. Wolff, and T. Nelson Dale. 1894.
- Vol. xxiv. Mollusca and Crustacea of the Miocene Formations of New Jersey. By Robert Parr Whitfield. 1894.
- North American Fauna. Published by authority of the Secretary of Agriculture. No. 10. 8vo. Washington, 1895. *From Col. Feilden, F.G.S.*

- UNITED STATES OF AMERICA.** United States Department of Agriculture. Report of the Ornithologist. C. Hart Merriam, M.D., for the year 1887. 8vo. Washington, 1888. *From Col. Feilden, F.G.S.*
- United States Department of Agriculture. Hawks and Owls from the Standpoint of the Farmer. By A. K. Fisher, M.D. 8vo. Washington, 1895. *From Col. Feilden, F.G.S.*
- United States Department of Agriculture. The Crow Blackbirds and their Food. By F. E. L. Beal. 8vo. Washington, 1895. *From Col. Feilden, F.G.S.*
- Bulletins of the United States Department of Agriculture. Division of Ornithology and Mammalogy. Nos. 2, 6, 7. 8vo. Washington, 1888—95. *From Col. Feilden, F.G.S.*
- No. 2. Report on Bird Migration in the Mississippi Valley in the years 1884 and 1885. By W. W. Cooke. 1888.
- No. 6. The Common Crow of the United States. By Walter B. Barrows and E. A. Schwarz. 1895.
- No. 7. Preliminary Report on the Food of Woodpeckers. By F. E. L. Beal. 1895.
- American Museum of Natural History. Annual Report for the year 1894. 8vo. New York, 1895. *From the American Museum.*
- Bulletin of the American Museum of Natural History. Vol. vii. 1895. 8vo. New York, 1895. *From the American Museum.*
- Thirteenth Annual Report of the Board of Trustees of the Public Museum of the City of Milwaukee. 1894—95. 8vo. Milwaukee, 1895. *From the Board of Trustees.*
- WOODWARD** (Dr. Henry, F.R.S.). Address delivered at the Anniversary Meeting of the Geological Society of London, on the 15th of February, 1895. 8vo. Lond., 1895. *From the Author.*
- YEAR-BOOK** of the Scientific and Learned Societies of Great Britain and Ireland; comprising lists of the Papers read during 1894. 8vo. Lond., 1895. *Purchased.*
- YORKSHIRE** Naturalists' Union. Transactions. Part 19. 8vo. Leeds, 1896. *From the Union.*
- YORKSHIRE** Philosophical Society. Annual Report for 1895. roy. 8vo. York, 1890. *From the Society.*
- ZOOLOGIST** (The): a Monthly Journal of Natural History. April, 1895, to March, 1896. 8vo. Lond., 1895—96. *From Mr. G. F. Buxton, F.Z.S.*



## ADDRESS.

*Read by the President, MR. H. D. GELDART, to the Members of the Norfolk and Norwich Naturalists' Society, at their Twenty-seventh Annual Meeting, held at the Norwich Castle-Museum, March 30th, 1896.*

LADIES AND GENTLEMEN—I come before you to-night in a unique position, as being the first person you have honoured by making him your President for the third time ; and I assure you that I feel a great compliment has been conferred on me by your doing so, and hope that you will place some others of our members who have already served the office twice in the same position, feeling sure that they will be able to perform its duties better than I have done.

The year now ended has not been a very eventful one to our Society ; it has been marked especially by the large number of deaths among our more distinguished members, and to this cause, principally, we owe a slight diminution in our numbers. We began the year with 270, we have lost by death and other causes 19, and have now 264, having elected 13 during the year. Our finances, as you have heard from the Treasurer, are in a sound and good condition. Ten pounds have been drawn from the Life Membership Fund ; but, as you see by the Balance Sheet, very little of it has been spent, and there is no occasion for any further draft from that fund for the coming year.

At the meeting in April, Mr. A. W. Preston sent us an account of the Great Storm of March 24th, which will appear in the 'Transactions.' ; and, on the same evening, Mr. Clement Reid was elected our representative to the meeting of the British Association at Ipswich. It turned out, however, that he was unable to represent us. Mr. H. B. Woodward was asked to take his place ; but a

difficulty arising at the last moment, Mr. F. W. Harmer very kindly consented to act for us.

In May, Mr. G. H. Harris read us a capital paper, "Notes on the Flora of the Yarmouth District," which we published. Mr. Nicholson gave us an account of the High Tide of the 18th May, and Mr. Patterson read his interesting notes for February, March, April, and May; indeed, throughout the year he has been most kind in contributing notes, a selection from which will appear in the 'Transactions.'

On June 18th, Mr. Nicholson and myself, as President and Secretary, representing our Society, attended the Opening Ceremony of the Yarmouth Museum, and afterwards were present at a very handsome and hospitable reception, held by the Mayor and Mayoress of Yarmouth, at the Town Hall.

On June 27th, the North Staffordshire Naturalists' Field Club, numbering about thirty members, who were staying at Yarmouth for a summer excursion, visited Norwich, and were received by our Committee at the Castle Museum. They spent a pleasant afternoon, and appeared much interested in the Castle Building and Museum Collections.

On July 31st we had the only Excursion of the year, to Hunstanton, where Mr. le Strange most kindly threw open his fine old moated Hall, allowing us to see the interior of this charming house, also his fine collection of Mexican birds, and afterwards to go over the quaintly arranged and most interesting gardens; from thence we went by the beach to the town, and after lunch at the Sandringham Hotel, spent the remainder of our time wandering about on the pier and under the cliffs. Everything about this excursion was most satisfactory with one exception, the attendance, for only nine went. The best thanks of the Society are due to Mr. le Strange for his kindness to us. I only regret that more of our members did not take advantage of it.

In September, Mr. F. W. Harmer read to us two papers, one on "The Derivative Shells of the Red Crag," and the other on "The Southern Character of the Molluscan Fauna of the Coralline Crag, tested by an analysis of its characteristic and abundant species."



In the latter, he showed by careful analysis and by calculation of the percentages of species, that the fauna of this Crag is southern in character, and closely resembles that of the Mediterranean and West European province, inferring therefrom that there was at some time, subsequent to the coming into existence of the present fauna, a more direct and open communication between the Mediterranean and the seas of Great Britain than exists at present.

In October, Mr. Southwell read some notes on remarkable Birds in the Castle Museum collection, confining himself on that occasion to the Megapodes or Mound-builders, and to the Apteryxes or wingless birds of New Zealand; and, in November, he continued his observations, taking the Crows, Birds of Paradise, Rifle Birds, and Bower Birds; then the South American Bell Bird and the Hornbills, concluding with the Parrots, especially the Nestors and the Owl-Parrot. On this latter evening the Members of the Norwich Science Gossip Club were present by invitation, a departure from the ordinary routine of our Society which it is to be hoped may serve as a precedent, and be frequently repeated.

Dr. Emerson also, in October, sent us some notes from Lowestoft, concerning the birds which he had observed on the north hills and dunes near that town.

In January, Mr. Stacy-Watson addressed us on the "Herring Fishery of 1895, Yarmouth and Lowestoft," with valuable statistics of the season's fishery which we print. Mr. J. H. Gurney read a paper on "The White-faced Owl of New Zealand," now supposed to be nearly extinct. Professor Newton sent an interesting note of the breeding of the Spoonbill in Norfolk, extracted from the Patent Rolls of King Edward I., A.D. 1300; and Mr. W. H. Tuck sent a list of additions to the Aculeate Hymenoptera from Suffolk, found in 1895. These are valuable contributions to our 'Transactions.'

In February, Colonel Feilden read us two papers: "The Flowering Plants of the Island of Kolguev," and "The Flora of part of Russian Lapland." The former contains important additions—about thirty species—to one of the least known floras of the European Arctic regions; and the latter described some of the plants of a not very frequently visited portion of the Kola peninsula. We ought to

feel grateful to him for reserving these important papers for our Society.

Mr. A. W. Preston sent his *Meteorological Notes for 1895*, and Mr. A. Mayfield a list of *Norfolk Mollusca*, with several additions to the list already published.

On March 17th, the Yarmouth Section of the Society held their Second Annual Meeting, under the presidency of the Rev. C. J. Lucas, at which several good papers were read. Many objects of interest were exhibited, and judging by the numerous attendance, this section seems in prosperous condition.

You will observe that the past year has witnessed two new departures from the usual order of our proceedings: the visit and reception of a kindred Society, the North Staffordshire from the Midland Counties; and the presence, by invitation, at one of our meetings, of another scientific club belonging to our own city. It is much to be hoped that these will not be isolated instances of intercourse between ourselves and other societies with similar objects to our own.

We lose by death this year,—

Frederic Kitton, Hon. F.R.M.S., one of our oldest members, who died on the 22nd of July, and of whom we print a short memoir, written by Mr. James Mottram.

Henry Seebohm, F.L.S., F.Z.S., who died on the 26th of November. He was President of this Society for the session of 1890—91, and Mr. Howard Saunders has kindly contributed the following notice of him.

“Henry Seebohm, who died at his residence in South Kensington, on the 26th November, 1895, was the son of a well-known member of the Society of Friends, and was descended from a family which, though associated with Germany for about two centuries, was of Swedish origin. His elder brother is Mr. Frederick Seebohm, of Hitchin, author of ‘*Lives of the Oxford Reformers*,’ ‘*Village Communities*,’ &c. Henry Seebohm, who was born at Bradford, in 1832, displayed from his boyhood a strong taste for natural history, and to this he devoted all the time that he could spare from business; but it was not until about 1872 that he was able

to make any long excursions abroad. His first ornithological expedition was to Greece and Asia Minor; while in the summer of 1874, his collecting-ground was Northern Norway, whither he was accompanied by Dr. R. Collett, of Christiania. In the latter year, Mr. J. A. Harvie-Brown, who had recently returned from Archangel and the Lower Dwina, brought back valuable information respecting the land still further east; and in the early spring of 1875, he and Seebohm made an expedition to the valley of the Lower Petchora, in North-eastern Russia, where they obtained eggs of the Grey Plover, the Little Stint, the Petchora Pipit, and other rare species. Accounts of this expedition appeared in 'The Ibis,' and in Seebohm's 'Siberia in Europe.' In 1877, Seebohm accompanied Captain Wiggins to the Yenesei, much further east, in true Siberia, and made some important collections which were described in 'The Ibis,' and 'Siberia in Asia.' Several visits were also made to Heligoland, where the migrations of birds were studied under the auspices of the veteran ornithologist, Herr Gütke. Henceforward Seebohm devoted considerable attention to the subject of migration, and even made a trip in winter to South Africa, in order to obtain information suitable for his important quarto on 'The Geographical Distribution of Plovers, Sandpipers, and Snipes.' Before this, however, he had produced vol. v. of 'The Catalogue of Birds in the British Museum,' treating of the Thrushes and Warblers (*Turdidae*), on which he was an acknowledged authority; while in 1885, he completed his 'History of British Birds, with Coloured Illustrations of their Eggs.' These works were followed by 'The Birds of the Japanese Empire,' 'The Classification of Birds,' and several minor treatises, not to enumerate many interesting papers in 'The Ibis,' and elsewhere. It will be remembered that Seebohm contributed to these 'Transactions' a valuable abstract of Dr. A. Bunge's observations on the birds of the Lena Delta, and another on Mr. Murdoch's Report on the birds of Point Barrow, Alaska while in 1891, he delivered an excellent address, as President of this Society. Up to the spring of 1895 he was working with remarkable energy, but an attack of influenza, followed by congestion of the lungs, enfeebled his constitution, and although he managed

to attend to his duties at the Royal Geographical Society (of which he was one of the Secretaries) and elsewhere, it was clear that his health was broken. His illustrated 'Monograph of the Thrushes' remains unfinished. Seebohm was a constant attendant at the monthly meetings of the British Ornithologists' Club, and it was there that most of his friends saw him for the last time on October 23rd. During his life-time he was a frequent and liberal donor to the British Museum (Natural History), and to that Institution he has bequeathed the remainder of his magnificent collection of birds (about sixteen thousand specimens) and eggs. His loss is much felt."

Thomas Edward Amyot, F.R.C.S., of Diss, died on the 15th of December, aged 78 years. He was the son of Thomas Amyot, F.R.S. V.P.S.A., Treasurer of the Society of Antiquaries, Private Secretary to the Right Hon. William Windham, Prime Minister and editor of his speeches, also one of the founders of the Shakespeare, Percy, and Camden Societies. Born in London, he was educated at Westminster School, and came to Norfolk early in life, practising first at Scole, and then for fifty years at Diss, with distinguished ability and the highest esteem. He was well-known as a Microscopist, took great interest in Astronomy, Botany, and Geology, was a great lover of Chess, and for many years was President of the Diss Chess Club.

Mr. Amyot became a member in 1871, and in 1874 he gave us a charming account of the Winfarthing Oak: this was read on the spot on the occasion of the Society's excursion on July 7th. Many of us must remember how much trouble he took that day to make the excursion a success, and to promote the pleasure of all who joined in it. A thoroughly scientific man, and the kindest of doctors, his memory will be long held in affectionate remembrance and regret by his friends and acquaintance.

The Rev. E. W. Dowell died on the 14th of February, at Duntor near Fakenham, of which parish he had been vicar since the year 1854. Mr. Dowell had been all his life a keen sportsman and naturalist and his practical acquaintance with the birds of the shore was very considerable. The information thus attained he carefully recorded.

in his note-books, which in the most liberal manner he placed at the service of both Mr. Stevenson and Mr. Southwell, who repeatedly acknowledge their indebtedness to him in the 'Birds of Norfolk.' In later life he gave his attention to the cultivation of Roses, in which he was very successful; he was also interested in the botany of his neighbourhood, and often sent wild flowers to me for identification. Mr. Dowell had been a member of our Society since the year 1878.

When I laid before you in 1894, "Notes on some Plants collected in Spitsbergen by Colonel Feilden," I ventured on a few general remarks on the distribution of flowering plants in the Arctic regions, and expressed a hope that I might some day return to the subject from a wider base, and in greater detail, and I take this opportunity of doing so—the great interest to those who study the flora of our own country of the Arctic element (what H. C. Watson calls partly the Highland and partly the Scotch element in it) being my excuse.

The largest factor in producing the present distribution of the Arctic flora, and the greatest agent in determining its present limits, we must believe to have been the Glacial Epoch. But in considering the matter from a botanical point of view, we happily are not concerned with the vexed question of the causes of that epoch, and need not pause to attempt to arrive at any decision whether the hypothesis which is known as the astronomical or that called the physical is the more likely, or to try to understand the complicated theory lately revised and published in an English\* dress, that past changes of climate have been due to variations in the heat given off by the sun, a variable star, once white, now yellow, later on to become red, and finally dark, and we may be content to accept Professor Neumayr's criticism of this last supposition, which indeed covers the whole of them, † "for this or any other assumption there is no proof forthcoming."

Neither need we try to weigh the evidence for or against the occurrence of Interglacial Periods, for the sum of the influence

\* Eug. Dubois, 'The Climates of the Geological Past' (1895).

† M. Neumayr, "Climates of Past Ages," 'Nature,' vol. xlii. (1890) pp. 148 and 175.

exerted by the ice and cold on vegetation will be expressed by the effect produced at the climax of the Ice Age, not by that of time of lesser action which may or may not have intervened during its continuance. What we have to do is to state as shortly as possible first, the views of some leading geologists as to this climax, its extent and effect on phænogamous vegetation, and then to advert to the alterations of land surface, which must in their opinion have taken place to produce the present distribution, and their views on the migration of plants.

The term "migration" is somewhat unfortunate as applied to plants. It is so often and so commonly used as applied to the periodic movements of individual animals in search of food, shelter, or breeding-places, and conveys with it a sense of individual volition, certainly not possessed by plants, which as individuals scarcely ever move from their original position at all, and as species travel only as they are forced by circumstances entirely beyond their own control.

And here let me say, once for all, that I do not in the least wish to put any views before you as either final or dogmatic, but a suggestions which, by contrasting different hypotheses and citing facts as at present presented to us, may induce you to think about and better still, if it may be so; to study the great problem of Arctic distribution of flowering plants, which seems to me to admit of a simpler explanation than that proposed by some very eminent authorities both at home and on the Continent, and also to bring before you views which have been published in Denmark.

What is the extremest hypothesis of the Arctic Glacial Epoch and its effect on the distribution of flowering plants in Europe and Greenland? This will be found in Professor James Geikie's 'Prehistoric Europe,' shown by a map (plate D), which has been virtually republished so lately as 1891, by Dr. Nathorst, in 'Nature,' and again by Dr. Wright, in 1893, in 'Man and the Glacial Period' (p. 184). This map shows the whole of Scandinavia, Northern Russia, Denmark, a great part of Germany, Scotland, Ireland, and England, down to the valley of the Thames, as covered with con

\* 'Nature,' vol. xlv. (1891) p. 273.

tinuous ice, and the effect of this ice-sheet is thus stated with the enormous weight in its favour (in part) of Sir J. D. Hooker's approval.\* "Even if Iceland were not entirely buried under an icy covering, yet the climatic conditions of the last glacial epoch must have sufficed to *destroy* such a flora as it now possesses. And the same must have been the case with Greenland. Indeed, I do not see how it is possible to resist the conclusion that the floras of all these high latitudes must have been introduced since the close of the Glacial Epoch. And as the plants *could only* have migrated over a land surface, we are compelled to infer that in post-glacial times the Færoe Islands, Iceland and Greenland, and Spitsbergen also, must have been united to the European Continent."

The passage quoted clearly states two things (which I have italicised), viz., that an ice-sheet *destroys* the flora, and that a land surface is *necessary* for the immigration of plants. Surely we are justified in reasoning from existing circumstances which we can study, rather than in relying on hypotheses of which we can have no proof.

There are three conditions of cold and hardship which we may suppose to be very detrimental to the flora of any country:—

An ice-sheet.

Extensive glaciation by glaciers.

Intense cold, with comparatively little shelter for plants.

Let us inquire how these conditions affect floras in Arctic regions at the present time.

First—Ice-sheet. Greenland is now covered by an ice-sheet, how thick in the centre of that country no one knows, probably some thousands of feet; but even in such severe glaciation as this, there is in many places a margin left uncovered near the sea, and there are also rocks—"Nunataks—" protruding through the ice, and in these situations a not inconsiderable flora holds its own.

Professor Warming, of Copenhagen, having visited Greenland, has gone in great detail into the question of Arctic distribution. Publishing in 1888 † tables in which he traces the flora known

\* 'Prehistoric Europe' (1881) p. 519.

† 'Tabellarisk Oversigt over Gronlands, Islands, og Færoernes Flora' (Kjøbenhavn, 1888).

up to that date to be found in Greenland, Iceland, and the Færoes, all round the Pole, he divides the west coast of Greenland into seven, and the east coast into three districts, and from these tables we learn that in District D, from 67° to 71° N. Lat., which may be regarded as the centre of the western coast, there are no less than 252 species of flowering plants and vascular Cryptogams; and even in the most northerly district of the west coast, from 76° to 83° N. Lat., there are 88 species; and even at the most northern latitude which we know to have been visited by civilised man, about 83° N., near Lockwood Island, there must be considerable vegetation, for\* "this camp proved prolific in animals, thus indicating a luxuriant vegetation near." Ice-sheet then does not "destroy" phænogamous vegetation.

Second—Glaciation by Glaciers. Probably nowhere in the Northern Hemisphere is more severe glaciation of this kind to be met with than in Alaska. From Mount Elias descends to the Pacific Ocean the mighty group of glaciers, which at last unite in the † "Malaspina Glacier." It covers an area of 1500 square miles, and where it reaches the sea terminates in cliffs sometimes 300 feet in height; surrounded by it is "Blossom Island," a Nunatak. The ice here surrounds a considerable area of fertile land, which is covered with dense forest, and beautified by a brilliant assemblage of flowering plants. In other places considerable vegetation is found upon the surface of moraines, which are probably still in motion with the underlying ice.

Southward from the Malaspina, and descending from Mount Fairweather, is the "Muir Glacier," a charming account of which is given by its discoverer in the 'Century Magazine' of June, 1895. A broad, gently undulating prairie contains as much ice as (probably) all the 1100 Swiss glaciers; it is fifty miles long, and just below the confluence of tributaries is twenty-five miles wide. Some of the ice remains buried for a century or more, as shown by the age of trees growing above it. The lower summits above the glacier are

\* Greely, 'Three Years of Arctic Service,' vol. i. p. 330.

† Bonney, 'Ice Work' (p. 68), and Wright, 'Man and the Glacial Period' (p. 30).



richly adorned and enlivened by beautiful flowers, lines and flashes of bright green appear on the lower slopes, and a fainter green tinge may be noticed on the subordinate summits at a height of 2000 or 3000 feet. The lower are made mostly by Alder bushes, and the topmost by a lavish profusion of flowering plants, Cassiope, Vaccinium, Pyrola, Erigeron, Gentiana, Campanula, Anemone, Larkspur, and Columbine, with a few grasses and ferns.

Clearly the most acute glaciation by glacier action in this Northern Hemisphere does not "destroy" the flora.

In connexion with these Alaskan glaciers there is a curious effect of glaciation on vegetation lately observed in that country which must not be overlooked. In 1883,\* Professor Thomas Meehan, while examining the glaciers in South-east Alaska, found reason for believing that plants do not merely advance in the wake of retreating glaciers, or push into growth from material brought down in their advance, but that when caught under the mass of flowing ice would remain for an indefinite period retaining vitality, and push again into growth when the ice retreated. He was led to this conclusion by finding no annual plants among those collected in the immediate wake of retreating glaciers, while the actual number of species of perennials would be as great as if much time had been given for a final advance, . . . these and some other facts led to the hypothesis that the plants were not migratory, but had held their position through the whole icy period. In 1892, William E. Meehan (son of the above) was acting as botanist to the expedition sent to the relief of Lieutenant Peary in West Greenland. He also paid great attention to this question of suspended vitality of plants under ice, and claims to have strengthened his father's observations. As to *Salix arctica*, he writes in a paper read at Philadelphia: "In Inglefield Bay, there were found large old plants within twenty feet of a receding glacier, and in a spot which had certainly been covered by ice less than two years before. There were no lateral or medial moraines to bring the plants, and all the facts on the spot led to the conclusion that the Willows had been buried when the glacier flowed over the spot, and had been dormant until the ice

\*"Contributions to the Flora of Greenland," William E. Meehan, Proc. Acad. Nat. Sciences, Philadelphia, April, 1893, p. 205.

receded." This opens quite a new field for inquiry as to the distribution of plants in a severely glaciated country, and deserves much further investigation. If perennial woody plants can remain dormant for an indefinite time while covered by ice, that portion of the flora stands in little risk of "destruction" during a glacial period, and this may throw some light on the conclusions arrived at in a paper by Dr. Nathorst, to be alluded to presently.

Third—Extreme cold in a comparatively bare country with but little snow. This at first sight appears likely to be the most fatal form of cold and hardship to flowering plants. What are the facts? In Grinnell Land, Lat. 82° N., General Greely found large tracts of a comparatively bare country.\* In Discovery Bay, "ten Musk Oxen were feeding, the adjacent brook slopes and margins were clothed with vegetation, thick beds of *Dryas*, clusters of *Saxifragas*, varied with *Sedges*, *Grasses*, or *Buttercups*. Higher up, countless Arctic *Poppies* of luxuriant growth dotted the landscape." In September, †Greely watches two Musk Oxen feeding, their food was almost entirely *Dryas* and *Saxifraga*, the *Grasses* and *Lichens* were almost entirely lacking, and in no case did he note the Musk Ox "feeding on the latter vegetation, although in many places the ground was covered with scanty minute *Lichens* for acres in extent." This matter of the Musk Ox food is important to our subject, for it marks the fact that herbage must be plentiful, for Greely's party saw between 200 and 300 Musk Oxen, and actually killed 80 of them in one year. Again he writes:‡ "To right and left on the southern shore of Lake Hazen, low rounded hills, bare, as a rule, of snow, extended far to east and west. Numerous tracks of Hare and Ptarmigan were seen in the vicinity of our camp." Greely found no less than sixty-nine species of flowering plants in Grinnell Land, and he records the very curious fact that, in that country, "elevation above the sea makes little or no difference to the plants."§

\* Greely, 'Three Years' Arctic Service,' vol. i. p. 81.

† *Loc. cit.* p. 104.

‡ *Loc. cit.* p. 276.

§ For additional particulars of part of Grinnell Land see "Botany of the British Polar Expedition of 1875-6, by H. C. Hart, Naturalist to H.M.S. 'Discovery,'" 'Journal of Botany,' 1880.

The next point is the assertion that land communication is *necessary* for the immigration of plants. What we now know of the geology and botany of the Island of Kolguev, of which Colonel Feilden gave us an account at our last meeting, appears to disprove this assertion. This island, although shown in both Geikie's and Nathorst's maps as covered with ice in the Glacial Epoch, is now ascertained not to have been in existence then at all, but to be entirely post-glacial, and probably very recent. There is no proof that it has since its upheaval ever been connected with the mainland; yet on so small an island, very insufficiently examined, we already know of nearly 150 flowering plants. How did they get there? Probably some drifted by current, possibly on ice; others were carried by wind, and the remainder by birds, on mud attached to their beaks and feet, or as undigested seeds; at all events, there they are, without any land communication past or present to account for them.

To account for the return of the flora after expulsion from Greenland, Geikie and others suppose a bridge from Scotland to the Færoes, Færoes to Iceland, Iceland to Greenland. But is there any proof of any such bridge having ever existed? True, there are shoals which, if they were all elevated at the same time, might make such a communication, though between Iceland and Greenland the water is much deeper than in the other two cases. What says Warming to this? "In my opinion, Greenland has not been united to Europe since, nor even during, or immediately before, the glacial period; in any case not to Scotland by the hypothetical bridge between Iceland, the Færoes, and Scotland." And although he acknowledges the *possibility* of such a communication having existed between Scotland, the Færoes, and Iceland, he denies that any such thing could have taken place between Iceland and Greenland, citing the depth of water between these two latter countries, and the difference in their geological structure, as his reasons.

Sir J. D. Hooker throws the great weight of his opinion into

\* 'Sur la Vegetation du Groenland' par M. Eug. Warming, French Summary of his Work in Danish (Kjobenhaven, 1888).

the scale in favour of the retention of European species in high Arctic latitudes during the Glacial Epoch, for in 'Appendix to the Voyage of the Isbiorn' (1881), he writes, regarding the differences between the floras of Novaya Zemlya, Spitsbergen, West Greenland and Smith's Sound (Lat. 71° to 82° N.): "Whereas there is no difficulty in assuming that Novaya Zemlya and the American Polar Islands have been peopled with plants by immigration from the south, no such assumption will explain the European character of the Greenland, and especially of the high northern Greenland vegetation, the main features of which favour the supposition that it retains many plants which arrived from Europe by a route that crossed the Polar area itself, when that area was under geographical and climatal conditions which no longer obtain." This opinion coincides in part with that of Warming: "It is, perhaps, not only possible, but even probable, that at a very remote period before the Glacial Epoch, there existed around the North Pole a great continent to which Europe and America were then united and which would explain the numerous agreements which the vegetation presents." And I understand him to say elsewhere, it is not Smith's Sound which is the separation between the present floras of America and Europe, but Denmark Strait, between Greenland and Iceland. This land connexion must have been in existence, if it ever did exist, before the commencement of the Glacial Epoch, for North Greenland has never yet emerged from that epoch even up to the present time, and we can hardly suppose much immigration of a European flora under the conditions that still obtain there.

But you may think it useless to spend so much time on a flora so far removed from our own as that of Greenland. The reason for doing so is, that by consideration of what is now taking place in that country under glacial conditions, we may hope to obtain a glimpse at what probably happened to the flora of our own country under similar conditions. It will hardly be unfair to compare a space of four degrees of latitude in the centre of the coast of West Greenland, with a space of the same number of degrees in Great Britain, which may be said to contain the greater part of what

was once the most severely glaciated portion of our own islands. From 67° to 71° N. Lat. of the West Greenland Coast constitutes the Belt D, the Disko Belt of Warming's Tables, and from 54° to 58° N. Lat. the Belt of Great Britain, with which we will roughly compare it. The southern limit of this Belt, 54° N. Lat., passes approximately through Driffield, York, Harrogate, Skipton, and Lancaster; and the northern limit, 58° N. Lat., includes the whole of the mainland of Scotland, excepting a very small portion of the county of Ross, almost all Sutherland, and the whole of Caithness, and also all the Hebrides, except the northernmost third of the Long Island. One of the greatest differences between these belts is that the coast of West Greenland is swept by a cold Polar current bearing much ice, while that of Scotland is bathed by the warm water of the Gulf Stream; but both have a western coast studded with islands, and indented by deep fiords.

Surely it will hardly be contended that the west coast of Scotland was ever more severely glaciated than is the coast of the Disko Belt at the present time, especially if it be true, as\* Mr. Bulman thinks from the evidence of fossil shells, and the greater southern extension of ice-sheet in America than in Europe, that the Gulf Stream was in existence during the Glacial Epoch. Comparing Warming's list of the flora of the Disko Belt with that of the British Belt (54° to 58°) as given in *Top. Bot.*, ed. 2, we find that the former has 252 species, of which 157, more than half, are common to both, and that among these is included a very large proportion of what is commonly called the Arctic or Alpine Flora of Great Britain. Now, if these 157 species can hold their own under the present condition of the Disko Belt, why should they not have held their own in the Scotch Belt during the Glacial Epoch, and what need is there of any hypothesis of "destruction" and subsequent "re-immigration" to account for their presence?

The actual state of things at Disko is thus described in the voyage of the "Alert" :—"July 7. The flowers by this date were fast bursting into bloom. The white-blossomed *Cassiope tetragona* gave quite a heathy look to the fells, *Azulea procumbens*, the

\* 'Natural Science,' vol. iii. p. 261 (Oct. 1893).

Arctic Poppy, the bright yellow *Pedicularis*, and several Saxifrages were common, and in sheltered clefts of the basalt ridges Ferns were unfolding their bright green fronds."

In 'Nature,' in 1891,\* Nathorst published an important paper on Distribution of Arctic Plants during the Glacial Epoch, showing how he and others had found remains of Arctic plants in many localities south of the supposed ice-sheet to which they were driven. It will be sufficient for us to quote as an example one of these finds by Pengelly at Bovey Tracey in Devonshire, consisting of *Betula nana*, *Salix myrtilloides*, *S. cinerea*, and another Willow undeterminable. But I would ask: Is this southern extension of Arctic forms incompatible with their also holding their own in more northern localities? Is it not exactly what we should expect, that such plants would have a much more extended range during the lower temperature of the Glacial Epoch?

Nathorst concludes his paper thus: "The theory advanced by E. Forbes so far back as 1846, that the Alpine Flora of Europe, so far as it is identical with the flora of the Arctic and sub-Arctic zones of the old world, is a fragment of a flora which was diffused from the north, and that the termination of the glacial period in Europe was marked by a recession of an Arctic fauna and flora northwards—may now be regarded as definitely proved." Forbes views were first set out in a paper read before the British Association at Cambridge in 1845,† and those who remember what happened to them at the pen of the author‡ of 'Cybele,' the most accurate authority on British topographical botany of our day, may feel a little surprise at their resuscitation half a century afterwards at all events, Forbes and Nathorst, as they hold irreconcilable views as to the distribution of the British flora cannot both be right. Forbes divided the British flora into five parts, which he arranged in order of age, and of which the Alpine flora of Wales the North of England, and Scotland was the fourth. The first and oldest flora he describes thus:—1. West Pyrenæan Flora confined to

\* 'Nature,' vol. xlv., p. 273.

† Abstract in 'Literary Gazette' said to be by Forbes himself.

‡ 'Cybele Brita,' vol. i. Appendix.

the West of Ireland, and mostly to the mountains of that district. Though an Alpine flora it is quite distinct from No. 4. Its very southern character, its limitation and its extreme isolation, are evidences of its antiquity, pointing to a period when a great mountain barrier extended across the Atlantic from Ireland to Spain."

Nathorst's paper is accompanied by a map. This map does not show the glaciation of Ireland, because Bovey Tracey being his most western point it was not necessary to go further in that direction; but as the lines of extent of ice-sheet are practically the same as those of Geikie's map, we may assume that the lines further west would be the same also, and Geikie's map shows the whole of Ireland as covered by ice-sheet. What, in that case, would become of a "West Pyrenean Flora of southern character"? What possible chance of survival would there be for such plants as *Erica mediterranea*, *Menziesia polyfolia*, *Saxifraga umbrosa*, and *S. geum*, or *Pinguicula granuliflora*, or of such a Fern as *Trichomanes radicans*, if with Forbes we grant their survival we must deny the extent of glaciation shown in Geikie's Map, or if we grant their extinction we must infer for their return by land over Forbes' Barrier between Ireland and Spain a trifling alteration in the elevation of the Atlantic sea-bed of not less than 12,000 feet (3000 fathoms) since the termination of the Glacial Epoch.

Whilst the two maps already cited do not allow of any chance of this flora remaining during the glacial period, that of Professor Carvel Lewis, embodying his views of the extension of the ice-sheet, does leave a sufficient portion of Southern Ireland uncovered to afford a possible asylum for at least a portion of it. You will find the two contrasted in a map in Professor Bonney's 'Ice-work Past and Present' just published.

The "Skandinavian" Flora—a name to which Warming strongly objects, as he regards Greenland as quite as much if not more "the mother country" of it than Europe—is the most extensively distributed at the present day of any flora in the world, and as Sir J. D. Hooker writes: "Regarded as a whole, the Arctic Flora is decidedly Skandinavian." Ought not this sentence to be reversed,

and to read "The Skandinavian Flora is decidedly Arctic"! May not the facts be something like these? Before the Glacial Epoch a flora having its origin in Polar regions, which then presented a more extensive land surface and enjoyed a milder climate than they do now, had, radiating from the pole as centre, established itself very widely over the earth. As the cold and harshness increased, many species in high latitudes perished under them; but others, possessing greater powers of resistance, such as we find growing now to the north of the Arctic circle, and in the mountains of Continental Europe, and of our own islands, held on just about where they were and never "migrated" at all. Some of them, such as the Willows alluded to by Nathorst, increased vastly, and then died away as the cold diminished again, leaving their semi-fossilised remains behind them.

There are many anomalies—such, for instance, as the absence of *Caltha* and almost entire absence of Leguminosæ as an order from Greenland to which Sir J. D. Hooker alludes, or that of *Salix polaris*, once so widely distributed, from Greenland and Iceland—which seem inexplicable; but do we know enough of the life-histories, or of the necessary life-conditions of these, or indeed of any of our present Arctic plants, to form even a doubtful "hypothesis" on any such subject?

This theory of plants holding their own in their old localities, in spite of ice and cold, may appear dull and stupid beside the attractive and showy hypothesis of migration to and fro from north to south and back again, but is it not more consistent with the facts which we know now exist? Remember, it was the slow but steady Tortoise that won the race at last, and not the brilliant but eccentric Hare, and that, in this race, the goal at which we want to arrive is fact and not hypothesis.



I.

FLORA OF GREAT YARMOUTH DISTRICT.

By G. H. HARRIS.

*Read 27th May, 1895.*

In the remarks I am about to make, I purpose giving a few observations on the changes in the flora of my own district. Seeing that these remarks will have as their basis the list of Sir James Paget, compiled in 1834, and that I have not had an opportunity of comparing my result with the flora of Kirby Trimmer, I am rather afraid you will often find me anticipated by that later list. I must therefore ask for your forbearance if my short paper is sometimes of the nature of a *crambe repetita*. I will also premise that I confine myself to the Phanerogams, as I have no acquaintance with the field botany of the Cryptogams.

It will, I think, suit the plan of the paper best, if I first run through Paget's list, taking the natural orders in his sequence, and commenting on whatever species presents points of interest by reason of its increase, decrease, or change of habits. The district that I have explored—at present quite cursorily and ineffectively—a district that Mr. Geldart was kind enough to map out for me—corresponds in the main pretty closely with that in which Paget worked. Towards the north my bounds run further, as Paget's limit in that direction seems to have been Winterton, omitting the interesting country between Winterton and Happisburgh; whilst out west he occupied country, St. Bennet's Abbey, &c., on which I do not touch; towards the south our boundaries coincide, as they necessarily do towards the east.

Amongst the Ranunculaceæ *Anemone nemorosa* is, according to Paget, very rarely, if ever found. Now this is extraordinary in

itself, and when we put together a list of the woodland plants characterised in 1834 as rare or wanting, and which are now easily found, our wonder is not likely to diminish. *Anemone nemorosa* can hardly have been overlooked, for the remark, "Mr. Turner used to find it in the plantations at Gunton Hall," shows that the district that now produces it plentifully, was known to produce it then, although in small quantities. Gunton Hall plantations I do not know, but I know plantations close by at Lound, and in certain of those the flower is abundant. Again, Oulton Broad had been botanised by Sir J. Paget, for we find a mention of it in the list. But quite close by that sheet of water is Carlton Colville, with its plantations white with this beautiful flower. Running my eyes down the numerous Buttercups, an incident which happened in the quite early days of my botanical experiences recurs to me; an incident, perhaps, worth telling, as it shows how certain flowers, though apparently allied, never permit the one to encroach on the other's preserves, or to put it in more scientific language, it shows in a rather forcible way, how one of two plants which are alike in every other particular, may have so specialised a certain organ that it becomes unable to exist outside its own environment, even though the other environment, similar in almost every particular, adjoins it. Along Breydon Water are high banks, built up out of river mud, in order to stop the encroachment of the tide. These banks or walls are, in some places, superimposed on the marsh land which runs down to the water's edge, and the soil of this marsh land, whatever it may have been in days gone by, has, by the processes of draining and farming, become just rich enough to support a fresh marsh vegetation. So here were two contiguous soils, the chemical constituents of which did not very materially differ. Nor, to a casual observer, was the vegetation supported by the soils dissimilar. Both were bright with the shining yellow of the Buttercup. Yet a closer examination revealed not only that *Ranunculus repens* and *Ranunculus bulbosus* were present, but that each confined itself in the strictest way to its own soil; *R. repens* growing on the wall and down to the foot of it, but never crossing over to the marsh, whilst *Ranunculus bulbosus* restricted itself to, and never passed beyond the confines of the marsh.

*Ranunculus arvensis* is reported by Paget, on the authority of

Mr. Turner, to have been found at Ormesby ; I have not yet found it nearer than Hickling.

*Ranunculus hederaceus* is easily found in the ditches on the North Denes, of which there are more now than in Paget's time.

Amongst the Papaveraceæ the most notable thing is the disappearance of *Glaucium luteum*. I have never seen it by the south pier, nor anywhere on the coast between Hasbro' and Lowestoft. North and south respectively of these places, it grows, I believe, plentifully enough. Its extermination at the pier, is, perhaps, due to visitors, who would almost certainly carry away the pods as mementoes of their visit.

Amongst the Cruciferae, *Cheiranthus cheiri* is, of course, abundant, and I should not mention it, were it not for a fact perhaps worth recording. Up to five years ago or thereabouts, Winterton Church was ablaze with this flower. It grew from the top of the tower to the foundation, rooting itself, of course, in the mortar of the crevices of the stonework. The sexton told me that as it took all the virtue, (as he expressed it), out of the mortar, it would have to be removed, and that has been done, probably at no small expense. But a few plants now remain, and the church is shorn of a dangerous glory which was its weakness, and not its strength. It is more of a Samson without its golden locks than it was with.

One may be always certain of finding *Tresaltia nudicaulis* on the North Denes. Paget says it is uncertain. It is very local, restricting itself to certain spots, and never crossing over to the South Denes, but it is perfectly regular in its appearance.

Of the Caryophyllaceæ, I must confess to a great difficulty in determining whether a very humble little *Cerastium*, flowering in many places, should call itself *Semidecandrum* or *Tetrandrum*. This is the earliest flower on the Denes, flowering before and in the closest company with *Draba verna*, and being from its inconspicuousness, often confounded with *Draba*. The habitats of *Tetrandrum* and *Semidecandrum* incline me to the former name ; but on the other hand, whilst recognising the variability of *Tetrandrum*, I find the flower on the Denes far more often possessing five stamens than four, and this fact inclines me to *Semidecandrum*. Paget calls it *Tetrandrum*. The fact that the plant is so very early—flowering at the latter end of March in

fine seasons—also leads me to think that *Semidecandrum* is the correct name.

We now come to *Oxalis acetosella*, another woodland plant of the same habit as *Anemone nemorosa*. Paget particularises it as now lost, having at one time been found in a small wood at Lound. I still find it growing in abundance also in a small wood, and also in Lound.

The Portulacaceæ is a natural order to which another species must be added. *Claytonia perfoliata* is now, I believe, accepted as a well naturalised plant. It was introduced into this country about 1825, by a botanist named Clayton, who brought it from Virginia. Since that time it has slowly spread and seems to have reached Gorleston, where it now grows, about 1860. If the species can boast a Cecil Rhodes amongst its numbers, it has not brought him to Gorleston, for it seems to find colonising a difficult matter. At present I have only found this Virginian exile in a hedge-bank opposite Gorleston cemetery, with scattered individuals for a length of about  $\frac{1}{4}$  mile along the road. It then turns down a lane, where it grows fairly abundantly. The lane opens out on the Beccles Road, and on this road it has its only other locality, at the cross road leading to Belton. *Montia fontana*, characterised by Paget as rather rare, is plentiful enough about the damp places on the North Denes.

Of the Crassulaceæ, *Sedum anglicum*, which grows fairly abundantly on the North Denes, has gradually disappeared from the South Denes. This will be found to be not the only example of a flower apparently unable to exist in the isolation of the South Denes.

Of the Saxifragaceæ, Paget reports that *Parnassia palustris* is common at Gorleston. I have not yet had the pleasure of recognising this elegant flower amongst our nearer neighbours. It grows quite plentifully around Barton Broad, but I know of it nowhere else. It is probable that draining operations have driven it from Gorleston. Gorleston Common in particular, seems in days gone by to have been quite a happy hunting-ground; but since then the sanitary officer has arisen, by whom no flower is allowed to blush unseen unless it can give a satisfactory account of its why and wherefore. *Tempora mutantur et flores mutantur cum illis*. *Saxifraga granulata* is plentiful at Cromer, but is rare enough in my neighbourhood to have escaped me at present. *Saxifraga*

*tridactylites*, Paget says, grows on town walls, but is becoming rare; he reports it as common at Burgh. It is easily found on the Burgh walls, but I cannot find it on those at Yarmouth.

Of the Leguminosæ, *Melilotus officinalis* has lately appeared on the South Denes. Its arrival there is due to the heaps of river mud the Port and Haven Commissioners have caused to be deposited on the river bank,—heaps that are full of seeds of flowers common to the river bank, and marshes higher up the river. I am inclined to think that some of the Trifolia are becoming scarce, both on the Denes and in the marshes.

*T. subterraneum* and *scabrum* are still abundant on the South Denes, and *fragiferum* is fairly plentiful in the marshes; but *suffocatum* and *glomeratum* must be much less abundant than they were years ago, for they are by no means easy to find. It should be remembered that since Paget's time much of the South Denes has been enclosed by the government, and the original turf, to a great extent, converted by covering it with a richer soil containing the seeds of ordinary pasturage. Even on the unenclosed space a very different turf is gradually taking the place of the older sort. This is inevitable—for the encampments, shows, and races that are now held there every summer, leave their mark in the shape of bare places of considerable extent, which during the winter, on such a loose and sandy soil, tend to increase rapidly under the powerful action of high winds. In order that the whole place may not be turned into a Sahara, it is necessary every spring to dump down a quantity of soil, and re-sow it with ordinary hay seed. I think I may say, without exaggeration, that three-quarters of the South Denes now needs to be subjected to that treatment. It will therefore easily be seen that the rare Clovers run a very poor chance of perpetuating their kind.

It may be noticed that the natural order of Onagraceæ does not contain the species *Epilobium roseum*. This species, well known about London, does not occur at all in this district as an indigenous species. I know of one case, however, where it has been introduced into a foundry yard in sand used for foundry purposes, which is brought from Erith on the Thames. As the seeds of *Epilobium* are furnished with a pappus, it is a flower that would easily multiply if the conditions were favourable, but outside the foundry yard I have been able to find no traces of it.

Of the Violacæ I have not much to say, except to agree with your President that in all probability Paget made an oversight when he included *Viola lutea*. At the same time one often wonders whether the Dog Violet that grows on the Denes ought not to be elevated to the dignity of a variety. Its leaves are never cordate, but always oblong-lanceolate, a characteristic of *Viola lutea*. I think, too, its stipules will not be found to correspond closely with those of *Viola canina*, though that most important part, the fruit, shows, so far as I can see, no essential difference. The fact that it not only grows on a sandy soil, but favours it, flourishing best on those parts of the Denes which are least rich, lends countenance to the view that it is a variety.

The mention Paget gives of *Circea lutetiana* would lead one to think that in his time the plant was uncommon. "Lanes, Browston, Mr. Turner," his notice runs, so apparently he had never seen it himself. It is of quite frequent occurrence now in the district. Amongst the rarer Umbelliferæ, *Pencédanum officinale* is becoming distinctly uncommon, owing to the draining of the salt marshes. *Crithmum maritimum*, said to have been found by Mr. Wigg, is buried in the region of myth. It is extremely unlikely it ever occurred, as reported, amongst the Hemsby marrams. Its distribution, and the fact that rocks are necessary to its growth, make the sandy soil of the warren, near Hemsby, one of the most unlikely places in which to find it. *Feniculum vulgare* is still, as Paget says, not uncommon. *Bupleurum tenuissimum* I have not seen. *Smyrnium olusatrum*, which Paget reports as rare, has spread in an extraordinary manner in the neighbourhood of Gorleston, where in many hedge-banks it is, in its season, the most prominent flower. This is, I think, the most remarkable instance of increase I can put on record. *Eryngium maritimum*, although still common about Caister, has lost a good deal of ground on the South Denes, owing to the devastations of visitors. *Sanicula europæa*, chronicled by Paget as "rather rare," is another instance of a woodland plant easy enough to find in certain woods, though evidently regarded by Paget as uncommon.

The natural order Rubiaceæ, to which Paget gives the name of *Stellata*, is represented on the North Denes by *Galium verum* and *Galium saxatile*. Of these two the former is quite common on the South Denes; but the latter has become extinct within the

last ten years, affording another instance, with *Sedum anglicum*, of the gradual extirpation of typical Denes flora which is taking place there. The *Caprifoliaceæ* include a plant, *Sambucus ebulus*, of which I am rather anxious to inquire whether it is common about Norwich. I found one luxuriant specimen of this handsome shrub growing near Stalham, but that is the solitary instance. Paget cites it as occurring at Gorleston and Acle, but, apparently, it had not come under his own observation. Of the *Compositæ* I think *Solidago virgaurea* is more common than it was fifty years ago. *Cineraria palustris* has not come under my notice, though it may very likely still grow in some of the more remote marshes. *Achillea ptarmica* is common at Beccles; but decidedly rare in this district. *Helminthia echioides* is another instance with *Smyrnium olusatrum* of a plant that has pushed itself to the front since Paget's time. Quoted as rare, and growing in fields near Bradwell in his 'Flora,' it is now much more profuse, and may be found in great abundance on North Breydon Walls. Of the *Solanaceæ* it would seem that *Atropa belladonna* was too rare even in Paget's time to have been seen by him. I cannot say I have seen it; but I was told that on the excursion last year of the Yarmouth Branch of the Naturalists' Society to Ormesby, a specimen was found near the Broad. As a good deal of uncertainty seemed to exist in my informant's mind, perhaps I may be able to find a corroboration of his statement from some of those gentlemen belonging to the mother Society, who were present at that excursion, if any are here to-night. It is a great pity that *Hyoscyamus niger*, a curious and handsome, though somewhat dangerous, plant should have been smothered by the mud heaps of the Port and Haven Commissioners. Just that locality where the Commissioners pitched their mud on the South Denes was its last retreat. It used to grow, according to Paget, plentifully on the North Denes, but no trace of it is to be found there now. These rubbish heaps are being gradually cleared away, so there is just a hope that a resuscitation of *Hyoscyamus niger* may occur.

Amongst the *Labiatæ*, the very local distribution of *Salvia verbenaca* is, perhaps, worthy of remark. Given by Paget as growing in Gorleston churchyard and cliffs, it is now also to be found growing plentifully in St. Nicholas' churchyard. On Gorleston cliffs it is fairly abundant, but certainly does not grow with the

freedom that characterises it in Gorleston churchyard, from which it is, perhaps, an escape. If that is so, we should have a plant confined in its habitat to two churchyards. The question, of course, arises,—was *Salvia verbenaca* planted in times gone by in burying-places for any particular reason? Plants, possessing medicinal virtues, such as *Aristolochia* were, we know, grown near monastic establishments, and are, at the present day, confined almost entirely to these spots. The flower in question must, at one time, have been highly prized for certain curative properties; for its name, *Salvia*, is derived from the Latin verb *salvo*, to heal. There were large monastic foundations both at Gorleston and Yarmouth. I would suggest that the plant was grown by the monks in the monastic precincts, and also, owing to the luxuriance of vegetative life, in the churchyards. The sites of all the convents in both places being now entirely covered by houses, would leave the two churchyards as the only surviving habitats of the *Labiatae*.

But, on the other hand, if this is so, Paget should have seen it growing in St. Nicholas' churchyard, a locality it would have been more natural for him to mention than Gorleston.

*Hippophaë rhamnoides*, belonging to the natural order *Elaeagnaceæ* is, perhaps, becoming more limited in range, as I know of it only as growing immediately opposite Hemsby, on the cliffs. Paget locates it in Caister also, and calls it abundant.

The difficult family *Chenopodiaceæ* has probably finally lost *Atriplex portulacoides* and *A. laciniata*. Last summer your President wrote me, asking me to obtain for him a dozen specimens of *Atriplex pedunculata*, which, he said, were to be found in the damp, salt marshes in Cobholm and Runham in profusion. Unfortunately, in both Cobholm and Runham, the number of marshes has been considerably reduced, large spaces, originally vacant, having been covered with houses; many marshes which are left are not half so damp as they were; and of these marshes which are still in their pristine dampness, hardly one is salt, the result of the assiduous draining and river wall building of the last fifty years. So, although I hunted the river banks and inquired of marshmen the way to the most saline spot, my search was futile. I did not find a single specimen. And at Herne Hill, Lowestoft, a locality I regard as a typical survival of the salt-



marsh proper, the same lamentable deficiency was observable. Now, I do not say this plant has become extinct; on the contrary, I think it highly probable that it still perpetuates its kind in some lonely and inaccessible marsh. It must, however, have become very rare, and for this reason: I have already mentioned that the Port and Haven Commissioners some years ago took to dumping down their dredgings at the South Denes, on the east bank of the river. And, I have said that this, which was sport to them, was the death of *Hyoscyamus niger*. But, although this process buried one rare and curious flower under a heap of refuse, it, nevertheless, brought quite a new flora to the bereaved South Denes. The mud from the bed of the river contains seeds of all the plants that grow on the banks and marshes on the higher reaches. So we have had quite a crop of plants entirely alien to Denes flora. *Cochlearia anglica*, *Melilotus officinalis*, *Apium graveolens*, *Tussilago farfara*, *Aster trifolium*, the commoner *Rumex* and *Atriplex*, and many other plants common to a more or less saline and clayey soil have taken root and flourish in the rubbish. So it at once occurred to me that if *Atriplex pedunculata* were so very common, it could not fail to be represented in this colony which had come down the river. But again I spent some interesting hours in a vain search.

Now that I am on this subject of the rubbish heaps on the South Denes, it may be, perhaps, worthy of a passing comment, that, although so many plants of the higher reaches are represented, *Glauz maritima*, one of the commonest, and from its proximity to the water, one of the most likely to deposit its seed in the river mud, has, up to the present, exhibited not a single specimen.

The interesting family of *Orchidee* are poorly represented in this district. With the exception of the genus *Orchis* none are plentiful. Paget mentions as not uncommon, *Listera ovata*, *Epipactis palustris*, *Gymnadenia conopsea*, and *Malaxis paludosa*. *Listera ovata* is to be found at Carlton Colville, but I know of it as growing no nearer. Ormesby Common is held, by Paget, to account for *Epipactis palustris* and *Gymnadenia conopsea*. Ormesby Common must, I think, have greatly changed its nature. Paget makes frequent reference to it, but in no single instance can I follow him, and I believe I know the common fairly well. *Malaxis paludosa* may still grow, as Paget says it does, in Ashby

Warren. That is a locality with which I have no acquaintance. *Habenaria bifolia*, said, by Paget, to be extinct, is very plentiful in the copses about Carlton Colville. *Spiranthes autumnalis*, which Paget makes no mention, grows near Lound. Of the *Asphodelaceæ*, *Ornithogalum umbellatum* found in 1820 near St. Bennet's Abbey, was found in the spring of 1894 at Burg and *Leucojum aestivum* of the *Amaryllidaceæ*, a flower first chronicled in Paget, was found about the same time at Lound. Both were probably escapes. When I have mentioned that one plant of *Armeria vulgaris*, and an occasional specimen of *Linum usitatissimum* has appeared on the South Denes, all of which were probably escapes, I think I have particularised everything worth mentioning.

I dare say it will not have escaped the notice of my hearers that the general trend of my remarks leads up to the fact that in the flora of Yarmouth, as in both the fauna and flora of many other places, the tendency is towards a dead level of uniformity. There is very little doubt that under the new influences that engineering and scientific agriculture bring to bear on waste places, such specialised and peculiar flora as the salt marshes and the Denes support must give way to the ordinary flora of the pasturage and corn-land. New flowers, such as *Claytonia perfoliata* are not often introduced and so the botanist that undertakes the duty of chronicler, must content himself with the melancholy task of recording the gradual disappearance of an interesting flora.

It is rather a strange thing that the South and North Denes although so similar in soil and originally connected as one continuous strip of land should be gradually diverging from each other in the matter of flora. It is an undoubted fact that within the last ten years *Sedum anglicum* and *Galium saxatile* have both disappeared entirely from the South Denes. Other changes I have mentioned. It is to be remembered that the South Denes are now entirely isolated from any kindred soil, bounded as it is by the town, and surrounded by the river and high lands of Gorleston.

The disappearance of woodland plants in Paget's time, and their re-appearance since, is another feature characterising the interval of fifty years. *Anemone nemorosa*, *Oxalis acetosella*, and *Sanicula europaea* have already been mentioned. The *Moschatel*, another

flower of exclusively woodland habit, finds no place at all in the old lists, although it grows plentifully enough in the Lound woods. Some sentences in Paget's introduction, alluding to the scantiness of timber in his time, lead me to think that some of the copses which are now fairly frequent about Lound and the neighbourhood have been planted since. Hoping that I have not encroached too much on the valuable time of this Society, with these few bare facts, and thanking you for according me so patient a hearing, I will bring my paper to a conclusion.

---

## II.

### NOTES ON THE HERRING FISHERY OF 1895.

By C. STACY-WATSON.

*Read 27th January, 1896.*

In presenting these notes, I purpose deviating slightly from the limits hitherto observed, and to touch upon some contingent occupations in order to indicate the wide-spreading nature of the interests involved in this important industry.

We will begin with the boats, and fishing implements, and gear. The original value of a Herring Fishing-boat fully equipped for sea is from £800 to £1000, and her nets and gear £300; now, estimating the 338 local boats, old and new, at an average value of £500, and their nets, &c. at £200, we have a total of £700 each boat, or a capital sum of £236,600; to this add value of the 200 Scotch boats and their fishing gear at £500 each, a total of £100,000, we have then a total capital of £336,600 employed in catching the Herrings landed at Yarmouth and Lowestoft from the North Sea and Home fishing this year, to which must be added the wages of some 5000 fishermen who are mostly paid on the share system,

based upon the earnings of the boat. There is the manufacture of the nets and ropes, which alone gives employment to thousands of men, women, and children in the large steam factories of distant towns, as well as the humbler rope-walks and beating chambers at home, entailing an outlay of large capital.

In addition to this there are a multitude of men and women, boys and girls, engaged locally in various branches connected with the fishing, to whom it is a veritable harvest when the provident lay up for the proverbial "rainy day." For instance, the amount paid out for labour in transferring the catches from the boats to the buyers' premises this year amounted to over £8000, apart from incidentals too numerous and complex to apportion and describe.

There is also the value of materials, packages, and labour used in curing, which involved an outlay of £50,000 to £60,000 on the year's catch, to which must be added the value of the fishing premises and utensils, estimated at £76,000.

Thus it will be seen that this industry is of great importance to the inhabitants of Yarmouth and Lowestoft, and should be carefully fostered by their respective Corporations.

The Spring catch, which began from Yarmouth in March, and Lowestoft in April, shows an increase upon 1894 of 131 lasts, although fewer boats were employed, only 16 against 19 last year; 4 of these sailing from Yarmouth and 12 from Lowestoft. The Yarmouth men captured 54 lasts, whilst the Lowestoft men secured 818, an average of  $13\frac{1}{2}$  lasts for Yarmouth, and 68 lasts per boat for Lowestoft. The greatest catches were made in April and May; Yarmouth 50 lasts, Lowestoft 793 lasts. Why there should be this difference in the quantities caught by the Yarmouth and Lowestoft men I cannot at present understand, inasmuch as they fish over the same grounds.

The Midsummer fishing was less productive this year than last but the quality was about the same, and, the demand being good prices were well sustained. From Yarmouth there sailed 70 local and 18 Scotch, and from Lowestoft 190 local and 22 Scotch boats in search of these fat, plump, delicate morsels. There were landed at Yarmouth 1063 lasts; and at Lowestoft 1113 lasts; a total of 2176, showing a deficiency of 601 lasts; Lowestoft being responsible for 580 lasts, Yarmouth 21 lasts.

The destination of these fish was chiefly confined to home

markets, the experimental speculation of last year proving too disastrous to tempt curers to repeat their ventures in the Mediterranean markets again.

The North Sea and Home fishings are so intimately connected that it is not possible accurately to define them separately, I shall therefore not divide them in the text.

The Midsummer fishing was scarcely completed before a few venturesome spirits launched their craft and hied away to the far-off Scotch fishing-grounds, intent upon the capture of the silvery tribes of those clearer waters, where tides are strong and waters deep, producing a large fish, sound in flesh, fat, full-roed, the longed-for palate-tickler of the Germans and Russians. Other boats quickly followed, but shot their nets at less distant grounds; thus this fishing, favoured by fine weather and favourable breezes, was in full activity at an early date, and Herrings were landed at Yarmouth in the middle of July, the quality, however, was not equal to the previous year. Nevertheless, the demand for the Continental market being good, sales were easily effected at good prices; many of the boats sailing from Yarmouth, however, ran into Scarborough, Grimsby, &c., and disposed of their catches whilst in a fresh state, bringing only their sea-salted Herrings to Yarmouth, as circumstances favoured them.

The Scotch boats, of which 142 made Yarmouth their rendezvous, began to put in an appearance early in September; during their stay they landed 3900 lasts of good medium, bright, well-scaled fish, which realised, on days of heavy delivery, as low as £5, but average deliveries from £8 to £12. These boats made good catches during their short stay, some of them capturing as many as 8 and 13 lasts a night; their best catches were made between the 10th of October and the 8th of November, the heaviest delivery being on October 29th, when 117 boats landed 502 lasts. The prices obtained were from £5 to £11 per last; but, reckoning the average at £8, our Scotch friends earned about £4000 that night—a very fair night's work. On the whole these boats did very well, and returned home well satisfied with the result of their southern venture. They did not, however, escape unscathed, many of them losing nets, and in one case the lives of the crew were in great jeopardy. On the 11th of October, a sight of desperate effort to regain the sheltering waters of Yarmouth Roads and

Harbour was witnessed. On the previous day, the weather being fine and apparently propitious, nearly the whole Scotch fleet put to sea, but, during the night, one of these sudden storms of wind and blinding rain, for which the North Sea has such an unenviable reputation, sprang up; nets were hauled, and the boats headed for the shore; on they came, wildly careering towards the harbour, which they entered in such quick succession as to endanger their new gained safety; not all, however, returned, for one, the "Star of Bethlehem," a Banffshire boat, making for the coast, struck the Cross-sands, the furious waters of which, dashing with relentless fury over the frail craft, soon overwhelmed her and she went to pieces; the brave fellows on board, with great presence of mind, in the few minutes left to them, constructed a fragile raft composed of small spars, oars and hatches, to which they lashed the bladder-net-buoys; trusting themselves to this, were tossed about in the sea for several hours with their heads only just above water. The accident had been witnessed from the lightships, whose signal-guns drew the attention of tug and lifeboat-men, who promptly responded to the call, and sailed in the direction of the Sand in search of survivors, whom they eventually discovered and rescued almost dead with long immersion and fight for life.

The loss of nets and gear amongst these boats was heavy; the nets of some, getting too full of Herrings, sunk; others were destroyed by bad weather; early in November they began to return homeward, all having disappeared by the 20th of that month. Their catch was 1327 lasts in excess of the previous year.

The 147 local Yarmouth boats, of which four are steamers, were not so successful, and their deliveries show a considerable decrease upon the previous year, viz., 2263 lasts, from which deduct the increase Scotch boats thus:

Yarmouth, decrease	.	.	Boats	2263
Scotch, increase	.	.		1327

Net deficiency remaining of 936

Lowestoft comes well to the front with an increase of 2379 last thus:

	YARMOUTH. Local and Scotch Boats	LOWESTOFT. Scotch Boats
1894 .	17,407	3,515
1895 .	16,471	5,894
Net deficiency	936	Increase 2,379

The total catch of the North Sea and Home fishings was as follows: 22,364, against 20,921, showing a net increase of 1443 lasts.

There were 538 boats engaged in these fishings, viz. :

Out of Yarmouth	Boats	Local	Boats	Scotch
	147		142	
,, Lowestoft	191	,,	58	,,
	338		200	

employing about 5000 men and boys.

The highest catch by a local boat was just over 18 lasts, and its arrival created quite a flutter of excitement for awhile.

November, in spite of the stormy weather, was productive of the largest catches :

For the week ending November 1st,	2297 lasts
,, ,, ,, 8th,	2295 ,,
	4592 ,,

*i.e.*, 4592 lasts were landed from local boats at Yarmouth, equal to 60,614,400 fish, or about 8,000 tons; allowing five tons to a railway wagon, this fortnight's catch would occupy 1607 wagons or fifty-three trains of thirty wagons each.

The prices realised during this season varied much in the month of September, but became firm in October and continued so to the end; during November they had advanced, until fresh Herrings reached £25 per last; Bloater "stuff," £15; Salt £10; and one day over-day Fresh realised £27 10s.

The earnings of the boats have been fairly good throughout, the highest reaching £1300, and several £800 to £1000. The average for local boats is estimated to be £650, this is somewhat less than last year. The Scotch fishermen also returned home with well-lined purses, the exceptionally fortunate ones having earned over £300.

For the first part of the season the weather was very fine, but from the date of the storm on the 10th of October, it continued fickle, sometimes very fine, and then developing sudden energy, so that the loss of property was great.

Yarmouth has this year seen a revival of the old Dutch practice of sending their vessels and buyers here for Herrings. It was a quaint sight to see these fishermen in their long bright-coloured hose worn outside of their trousers, and white wooden shoes, the

costume of their own country ; comments were freely made upon their singular appearance.

The Dutch fleet had missed the fish, consequently their buyers were compelled to come to Yarmouth and Lowestoft to supply their needs. They bought large quantities during the months of November and December, from catchers and curers, thus giving a special firm tone to this market.

Thinking it might be of interest to you to know somewhat of their craft, and fishing, I will very briefly allude to them. I am able to do so through the kindness of my friends, Messrs. Betz and Van Heyst of Vlaardingen. The Dutch Herring fishing vessels are comprised of luggers similar to ours but larger, and boms, which are flat bottom boats for hauling up on the beach in winter. The luggers carry fourteen to fifteen, and the boms eight to nine men each. This year there were fishing from the various ports of Holland 557 luggers and boms. Their catch is reckoned by the barrel, and at the close of the season it was discovered that there was a deficiency of 65,957 barrels as compared with the previous year's catch ; this was such a serious decrease that their merchants were compelled to buy on this side to supply their requirements.

The total deliveries at Yarmouth and Lowestoft of the four fishings for the year are :

Yarmouth	.	.	.	Lasts	17,588
Lowestoft	.	.	.		7,826
					<u>25,414</u>

Covering the same period in 1894, they were :

Yarmouth	.	.	.	Lasts	16,184
Lowestoft	.	.	.		8,158
					<u>24,342</u>

An increase for the year of 1072 lasts.

It is not possible to accurately ascertain the actual average price which the fish have realised throughout the season ; but estimating it at £9, which I believe to be under the mark, the value of the North Sea and Home fishing would be over £200,000.

Again I have pleasure in acknowledging the kindness of Mr. W. J. Nutman, the Borough Accountant of Great Yarmouth and the Harbour Master of Lowestoft, for supplying me with the following statistical table of the catches for the year.



AMOUNT OF HERRINGS LANDED AT YARMOUTH AND LOWESTOFT FISH-WHARVES IN 1895.

	YARMOUTH.			LOWESTOFT.		
	Lasts (18,000)	Thousands (1800)	Hundreds (182)	Lasts (18,000)	Thousands (1800)	Hundreds (182)
January . . . . .	—	—	—	—	—	—
February . . . . .	—	—	—	—	—	—
March . . . . .	—	—	—	25	6	8
April . . . . .	3	4	0	447	4	4
May . . . . .	50	4	4	345	7	7
June . . . . .	565	6	1	778	2	9
July . . . . .	497	6	3	335	4	6
August . . . . .	1259	2	1	52	2	5
September . . . . .	2179	3	2	51	9	1
October . . . . .	3281	0	7	1992	0	8
November . . . . .	4189	1	4	3060	5	7
December . . . . .	1356	3	1	737	3	3
Yarmouth . . . . .	13,682	1	3	7826	7	8
Yarmouth Boats . . . . .	3905	9	0			
Lowestoft . . . . .	17,588	0	3			
Lowestoft Boats . . . . .	7826	7	8			
Total . . . . .	25,414	8	1			

DETAILS OF HERRINGS LANDED AT YARMOUTH AND LOWESTOFT FISH-WHARVES IN 1895:

	YARMOUTH.			LOWESTOFT.		
	Lasts	Thousands	Hundreds	Lasts	Thousands	Hundreds
Spring Herrings . . . . .	53	8	4	818	8	9
Summer „ . . . . .	1063	2	4	1113	7	5
North Sea „ . . . . .	3738	5	3	104	1	6
Home Fishing . . . . .	12,732	4	2	5789	9	8
Yarmouth . . . . .	17,588	0	3	7826	7	8
Lowestoft . . . . .	7826	7	8			
Landed . . . . .	25,414	8	1			

NUMBER OF BOATS ENGAGED:

	LOWESTOFT. Boats	YARMOUTH. Boats
In Spring Herring Fishing . . . . .	4	12
„ Midsummer „ . . . . .	88	212
„ North Sea and Home Fishing . . . . .	289	271

Estimated value of catch for North Sea and Home Fishings, 0.

## III.

THE NEW ZEALAND OWL  
(*SCELOGLAUX ALBIFACIES*, GRAY)  
IN CAPTIVITY.

By J. H. GURNEY, F.L.S.

Read 27th January, 1896.

IN March, 1895, Sir Francis Boileau, who was visiting New Zealand, obtained from Mr. H. B. Coles, a taxidermist at Christchurch, through the intervention of Dr. Moorhouse, a living example (which afterwards proved to be a male) of the White-faced or Laughing Owl (*Sceloglaux\* albifacies*, Gray) of that country, now said to be, for lack of its natural food, nearly extinct, together with a well-preserved skin and an egg of the same.

This food was, in the opinion of Sir Walter Buller ('Birds of New Zealand,' vol. i. p. 199) and Mr. R. J. Kingsley (Proc. New Zealand Institute, 1890, p. 190) the "kiori maori," or native Rat but Hutton thinks there is no proof that an indigenous Rat ever existed (Proc. New Zealand Institute, vol. v. p. 230), and so, for the present, the matter remains undecided between these authorities.

Meanwhile, the bird is admitted on all hands to be extremely rare and local. It probably became extinct long ago in the little Chatham Islands (Forbes, 'Ibis,' 1893, p. 544) and, if it quite died out in New Zealand, there will be only the common 'Morepork' left there. The chance, therefore, of studying a living *Sceloglaux* in England and enabling some competent anatomist to examine its internal structure afterwards, was one which might never happen again.

\* *Sceloglaux*, which my father puts at the commencement of the *Strigida* and next to *Scelostrix*, was named *Athene albifacies* by G. R. Gray in 1844, and afterwards transferred by Dr. Kaup to his genus *Ieroglaux* (written at first *Hierocoglaux*) and subgenus *Sceloglaux*, where it remains admitted on all hands to be a strongly differentiated, insular form,—a relic perhaps, of a far-distant time when a giant bird of prey, *Harpagornis*, half as large again as the Golden Eagle, also inhabited New Zealand.

Sir Francis' Owls had been procured near Timaru in the south island, a previously known locality for them, and he was informed by Mr. Coles that the live one had already been about four months in captivity. Rare as *Sceloglaux* is, this is, nevertheless, the third time that it has been brought to England alive, Mr. D. Rowley having had two, and Mr. W. Rothschild one in confinement at Cambridge, now, with six others, preserved in the rich museum at Tring.

Having lately had an opportunity of examining this series at Tring, all of them apparently adult birds, I notice considerable differences in plumage, which Mr. E. Hartert, of the Tring Museum, had also observed. These consist, not only in the general tint of the Owls which may fade, but in the shape of the brown spots and blotches, particularly on the under-surface, which may mean age and sex, or may mean something more. These brown spots, which form the centre of the feather, are in some examples of *Sceloglaux*, short, broad, and rounded, suggesting the probability that *Sceloglaux* moults its body feathers, not by shedding them, but by attrition, and the dropping off of the "barbicels." There is also another respect in which Sir Francis Boileau's pair differ from our old Museum specimen, given as long ago as 1854 (and thought a great prize by my father even then),—on the scapular feathers the white spots are longer and narrower. The under-parts are also more tawny, but, no doubt, our bird has faded. (One of the examples in the museum at Tring has three or four white feathers (albinistic) on the top of the head; and the bird which Mr. Rothschild had in confinement is less rufous than the others, and altogether darker and smaller, the result, no doubt, of confinement.

The *Sceloglaux* in captivity at Ketteringham was tame, but not tame enough to eat comfortably when any one was by; but he had an appetite almost too good for a captive, and ejected the feathered portions of his meals in the customary pellets. With two toes on either side of the perch he sat contented enough in the darkest corner, where his flat-crowned and rather square-shaped head, and prominent dark eyes, watched with Minerva's wisdom for what was coming; viewing visitors with apathy, but the approach of a dog with some perturbation. The accompanying sketch, taken from a small photograph, shows him in his usual position, though not quite enough puffed out. The pectoral feathers are extremely thick and downy at

the roots, slate-coloured at the base, and for two-thirds of their length, and, perhaps, it was one result of prison life, that I observed they slightly over-lapped and crossed. It was also noticeable that the dark facial bristles did not lie flat against the white feathers which form the disk, but stood out a little. This Owl had a penchant for small birds which, it was found, he preferred to Mice or Rats, dainties he was not accustomed to get in New Zealand. He was



in good health when he arrived in Norfolk, but felt the cold of an English November very much,—though, in its own country, said to brave the icy blasts of snowstorms,—crouching in a corner, although the cage was in a conservatory, and, on November 9th, died, but not from want of food, as he was, if anything, too fat. Like Mr. Dawson Rowley's, he had always been provokingly mute; but, in New Zealand, Sir Walter Buller had one which barked in the night like a dog, and Mr. Potts writes of their "doleful yells." The carcass was sent to Mr. W. P. Pycraft, of the Oxford Museum, to investigate its anatomy, which has never been described, and may possibly prove of great interest, but as it was divested of its skin the feather tracts could not be described.

I should call the eyes of *Sceloglaux* very dark brown, large and rather prominent; beak and nostrils, which are a good deal raised, or, as Gould says, swollen, as gray horn colour; claws, which are not in the least pectinated, the same, with dark tips. Its toes have

long bristly hairs on the upper surface, and the outer toe is easily reversible half-way, as I observed when the Owl was both dead and alive. The eyelid is gray, and the toes and soles of the feet are reddish-brown, the latter covered with numerous small spicules as in *Pandion haliaetus* and *Bubo ignarus*. The ears are very low in the head, in fact, placed beneath the eyes, and appear, from external examination, to be quite symmetrical; but after the bird was skinned, I could see, by looking at the skull from the back, that the hind angle of the inferior mandible was lower on one side than the other. This, however, may not affect the actual ear, the external orifice of which measures about  $\frac{1}{12}$  inch, and is of an elongated shape. Mr. F. Beddard, who has examined the skull of *Sceloglauc*, considers that it comes nearer to that of *Strix* in its relative proportions than do the skulls of many other genera, confirming the position assigned to it in our Museum by my father, but he does not say anything about the ear.

I could not measure the dead bird exactly, as it had lost its tail; but from the beak to the toes was fourteen inches, and from tip to tip of the two wings about twenty-eight, which is not a small spread for an Owl. Mr. Gould speaks of its small Accipitrine head, but the head is as large in proportion to its body as in *Syrnium aluco*, and the eye cavity is rather exceptionally large. The oil gland (*Glandula uropygialis*) is single and pointed, with no tuft of feathers at its extremity, as in other Owls.

The tongue is the size and shape of the annexed drawing, No. 1, taken the day after the death of the bird; and, for the sake of comparison, No. 2, the tongue of the American Eagle Owl (*Bubo virginianus*, Gmel.), has been added by Mr. R. Holding, to whose handiwork I owe the cuts.

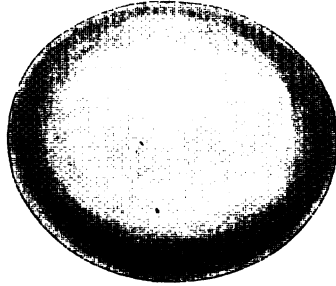


No. 1.



No. 2.

The egg which Sir F. Boileau brought home, and presented to the Norwich Museum, measures  $1\cdot45 \times 1\cdot23$ , and is here figured to



show the size and exact shape. There is no need to colour the cut- as, like all Owls' eggs, it is pure white, and is about the size one might expect from such a bird as *Sceloglaux*.

---

IV.

EARLY NOTICE OF SPOONBILL BREEDING  
IN NORFOLK.

BY PROFESSOR ALFRED NEWTON, F.R.S.

*Recd 27th January, 1896.*

A FEW weeks since, my friend Mr. John E. Foster, of Trinity College, kindly drew my attention to a passage in the lately published Patent Rolls of King Edward I.\* (p. 546) as follows:—

\* Calendar of Patent Rolls preserved in the Public Record Office. Prepared under the superintendence of the Deputy Keeper of the Records. Edward I. A.D. 1292—1301. London: 1895.

"1300.

MEMBRANE 24 d.

March 22. Commission of oyer and terminer to William Haward, Westminster. William de Hanyngfeld and William de Sutton, touching the persons who entered the park of Hugh de Bardolf in Whynebergh and his free warren there and in Wyrmegeye, Westbrigg, Rungeton, Stowe Bardolf, Fynchham, Cauntele, Strumpshagh, Castre by Jernemuth, and Scrouteby, hunted therein and carried away deer, hares and rabbits; carried away his eyries of sparrow-hawks, herons, spoonbills (*poplorum*) and bitterns in his several woods in Whynebergh, Cauntele and Wyrmegeye, his swans at Wyrmegeye, and his goods there and at Shuldham and Castre by Jernemuth, and assaulted his men at Shuldham, Whynebergh and Castre, co. Norfolk."

This additional evidence of the Spoonbill's breeding in Norfolk is perhaps the oldest on record, and therefore it is not surprising to find the bird mentioned by its ancient and often over-looked name "Popeler"\*; Latinized of course to suit the language of the document. The word is evidently cognate with or corrupted from the Dutch *Lepelaar*, and I have often thought it may survive in the name of Poppylot, part of Feltwell Fen, which was still undrained in 1852, and would perhaps even then have afforded suitable harbour for a company of Spoonbills had any been left in the country.

I would venture to suggest that any member of this Society who might have the opportunity of consulting the original document summarized in the passage I have extracted, would do well to use it, as some other matter of interest to a naturalist may occur in it.

ALFRED NEWTON.

Magdalene College, Cambridge,  
14th January, 1896.

[Acting on the suggestion of Professor Newton, and with the kind assistance of the Rev. William Hudson, F.S.A., I obtained a literal copy of the document referred to, and the latter gentleman added still more to our indebtedness by making an extended copy of the cramped and abbreviated original in fair Latin, which he accompanied by a translation. The passage referred to by Professor Newton is here printed *literatim*, also the translation of the whole document, which, although it does not add any new fact, is still interesting as a record of the lawless proceedings of the times, and of the mode of obtaining redress.

\* See 'Promptorium Parvulorum,' ed. Albert Way, part 2, p. 408, and part 3, p. 448 (Camden Society).

't feras in pco ðdco 't lepores 't cuniculos in Warena ðdca 't  
 aerios spuarioꝝ heyronum poploꝝ 't bittoꝝ in boscis suis sepabit in  
 Whynebergh Cauntele 't Wyrmegeye 't cignos suos apud Wyrmegeye  
 't bona 't catalla sua ibidem apud Shuldam 't Castre iuxta Jernemuth  
 inventa ad valenciā Centū libraꝝ ceperunt 't apportaſūt.

## PATENT ROLLS.

28 Edward I—Membrane 24 dorse [at the back].

Concerning Oyer and The King to his beloved and faithful William  
 Terminer of Trespasses Haward and William de Hanyngfeld and William  
 de Sutton greeting

Know that we have assigned you as our Justices to enquire by the oath of  
 good and lawful men of the County of Norfolk through whom the truth of  
 the matter may the better be known what evil doers and disturbers of our  
 peace into the park of our beloved and faithful Hugh Bardolf in Whyneberg  
 and his free warren there and in Wyrmegeye Westbrigg Rungeton Stow  
 Bardolf Fyncham Cauntele Strumpshagh Castre by Yarmouth and Scrouth  
 by force and arms entered and in them without his license and will chase  
 the wild animals in the aforesaid park and the hares and rabbits in the  
 aforesaid warren and the eyries of sparrow-hawks herons spoonbills and  
 bitterns in his several woods in Whinebergh Cauntele and Wyrmegeye and  
 his swans at Wyrmegeye and his goods and chattels found there at Shuldam  
 and Castre by Yarmouth to the value of £100 took and carried off and upon  
 his men at Shuldam, Whynebergh and Castre by Yarmouth made assault and  
 beat wounded and evil entreated them and inflicted other enormities upon  
 them to the heavy damage of the said Hugh and contrary to our peace and  
 to hear and determine these trespasses according to law, &c. And further  
 we command you that if you cannot all conveniently be present at the fixed  
 days and places which you shall have thereto provided then you the aforesaid  
 William Haward and William de Sutton without waiting for the presence  
 of the aforesaid William de Hanyngfeld do make that enquiry and do hear  
 and determine the aforesaid trespasses in form aforesaid with a view  
 making &c.—saving &c. We have also commanded our Sheriff of the County  
 aforesaid that he cause to come before you at the fixed &c. of which you all  
 you the aforesaid William Haward and William de Sutton shall inform him  
 so many and such &c. from his bailiwick through whom &c. in the premises  
 [the truth] may the better be known and enquired into. In (testimony)  
 whereof &c. Witness the King at Westminster the 22d. day of March—Ed.]—



## V.

A CONTRIBUTION TO THE FLORA OF  
RUSSIAN LAPLAND.

BY COLONEL H. W. FEILDEN AND MR. HERBERT D. GELDART.

*Read 24th February, 1896.*

**T**HE small collection of plants from the Kola peninsula, exhibited **this evening**, was made last June, by Feilden, in the vicinity of the **Ukanskoe** river, which empties into the Bay of Sviatonoskaia on **the west side** of Sviatoi Nos, that prominent headland of Russian Lapland which marks the entrance to the White Sea, when **approaching** it from the westward.

The beacon on Sviatoi Nos is in Lat.  $68^{\circ} 9' 50''$  N., and **Long.**  $39^{\circ} 47' 40''$  east of Greenwich. The Ukanskoe river flows **from a lake** of the same name into the south-west angle of **Sviatonoskaia** Bay, between the high, steep, dark bluff Tolstoi, and **the small islet** of Ust Vokanski, where it is about half a mile **in width**. There are five fathoms depth at the entrance, and **not less than two and a half fathoms** are found for two **miles up the river**, which affords safe navigation for vessels **drawing fifteen feet**. At three and a half miles up, the rapids **commence**, and it is no further navigable, even for small **boats**. From the mouth of the river to the rapids, it is **more** correctly speaking a fiord, flanked on either side by the **granite** and gneissoid granite rock formations, which are the **prevailing ones** in this area. The proper right bank of the river is **the steeper**, the granite slope rising to a height of 210 to 300 feet, **before** it attains to the level of the tundra land. This slope is

clad with coppice wood rising to a height of twelve to fifteen feet, and is chiefly composed of Birch, *Betula intermedia*, and Willows, *Salix lanata* with *S. phyllicifolia*. *Betula nana* is very plentiful, but nowhere larger than a shrub; *Pyrus aucuparia* and *Juniperus communis* are intermixed; but the predominant feature of the woods is Birch. The undergrowth is chiefly *Empetrum nigrum*, *Vaccinium*, Mosses, Lichens, and plants of various kinds which generally hide the rock surface. As we look up the Ukanskoe to the south, it appears beyond the rapids, as a brawling river not unlike one of our Scottish Highland streams. The banks are edged with high accumulations of immense boulders, which are also spread broadcast over the shallow river-course, the clear water rushing and foaming between them. There are brown Trout, Salmon Trout, and Salmon in the stream. Nowhere is the vegetation very profuse along the river course, but several species of *Viola* showed, with *Gnaphalium dioicum* and *Pedicularis sudetica*, here and there *Taraxacum dens-leonis*, *Sedum rhodiola*, *Lychnis alpina* and *Phyllodoce cœrulea*. Looking closely, we meet with *Trientalis europea*, and *Bartsia alpina* is not uncommon. In the dell leading from the river to the upland, vegetation is richer, gurgling rills trickle down most of them, and the Birch woods screen the flowers from the bitter winds, which come on so suddenly that in a few minutes there may be a change from what seemed tropical heat, with myriads of mosquitoes in attendance, to a temperature at the freezing-point, and the disappearance of one's tormentors. In these sheltered gullies and on the slopes *Anthriscus sylvestris* grows abundantly, but from the water's edge to an elevation of 150 feet *Veratrum lobelianum* is the representative plant. Yellow-blossomed *Trollius europæus* waved all around; this last flower proved a valuable aid in collecting insects. When a sudden change took place in the temperature, the Globe-flower closed its petals into a tight ball, but not before the flies, diptera, beetles, and many other species of insects had fled for refuge to these sheltering bowers. With a camel's hair brush and deft fingering, many minute insects were transferred from these retreats to the collecting tubes. *Myosotis sylvatica* and *M. palustris* grew by the edges of the rills, with *Nardosmia frigida*, *Saussurea alpina*, *Archangelica officinalis*, *Cornus suecica*, and *Adoxa moschatellina*.

*Ranunculus sylvaticum* was common enough, but was hardly in flower, and the same with *Cardamine pratensis*, at the time of our visit, whilst *Caltha palustris* brightened the rivulets with a border of yellow, as did *Ranunculus acris* on the drier knolls.

On ascending to the uplands from the valley of the Ukanskoe river, at a height of 300 feet or so, we see stretching around us not an absolutely flat country, but a sombre, grey, monotonous, dreary expanse of ice-worn land. There are undulations and hollows, the former in many places occupied by lakes and tarns, and by broad surfaces of Lichen-covered peat, with patches of *Triphorum*. We find in some places still deeper hollows concealing lakes or fair-sized sheets of water, and around these are grouped Birch woods, and the same may be seen in a few sheltered dells; but as the eye travels far and wide over this dreary-looking land, these favoured localities are generally hidden from view, and the grey slopes and ice-abraded surfaces predominate. The entire country is covered with erratic boulders, all clad in shaggy coats of Lichen-growth.

These boulders are spread far and wide in countless thousands, scattered over the tops of the rounded eminences, which do not rise higher than 500 to 600 feet. They accumulate in far greater numbers in the hollows and undulations of the rock surface. It is difficult to walk over them, as progression is a series of leaps and bounds, with the danger of falling into the yawning gaps between the boulders. Some of them are of great size, and in places they take the most singular positions. One can easily conjure up the impression that you see around, altars and monoliths, and the work of some departed race of Titans, and this adds to the weird feeling of a solitary ramble in that dreary land.

The result, however, is that one learns from these surroundings the most important lesson in glacial geology. We are standing on a surface that has once been covered with an ice-sheet, and as the area of Russian Lapland has been planed down to a very general level, on the melting and recession of the superincumbent ice its contained erratics have sunk to the level of the land on which it rested. The greater accumulation of the boulders in the undulations would probably arise from the retreating and melting ice-sheet drifting them into the depressions and troughs of

the rock surface. Except by the borders of lakes, or in some of the undulations of the land where there are accumulations of peat, little or no humus rests on the surface of this glaciated country. The flora, however, is richer than one might expect from the surroundings. The lovely little *Diapensia lapponica* with its bosses of white bloom grows everywhere on the bleakest and most exposed situations, where apparently only a few grains of earth and triturated rock hold its roots together. *Ledum palustre*, growing as a small bush in damp spots and on peaty soil, is one of the most striking plants of the tundra. *Arctostaphylos alpina*, *Vaccinium vitis-idaea*, *V. myrtillus*, *Calluna vulgaris*, this last rarely, with *Phyllodoce cærulea*, *Andromeda polifolia*, conspicuous by its pink waxen blossoms; *Loiseleuria procumbens*, and *Empetrum nigrum* are a representative group of the tundra plants.

In one or two of the dells on the tundra where we met with a thick layer of peaty soil, *Pinguicula alpina* was found, but it is not widespread. The Saxifrages are represented by few species. *S. cæspitosa* was growing on the small gneissoid islands at the mouth of the Ukanskoe, and *S. nivalis* in the ravines of the tributary streams of the main river. Four species of *Papilionaceæ* are common on the barer parts of the tundra, their hard, strong, tap-roots work into cracks and crannies of the rock. These are *Astragalus alpinus*, *Phaca frigida*, *Oxytropus sordida*, and *Hedysarum obscurum*. Of the Rosaceæ, very beautiful is *Rubus arcticus*, *Rubus chamaemorus* is dotted over all the damp peat lands; *Rubus saxatilis* is not uncommon in the Birch woods amongst boulders. *Geum rivale* and *Comarum palustre* are scarce, whilst *Alchemilla vulgaris* var. *alpestris*, is abundant amongst the boulders of the river side. The only *Draba* met with was *D. incana*. The flora of this part of Russian Lapland is of interest, as Sviatoi Nos has been accepted as the meeting-ground of two botanical provinces.\*

The plants collected in Russian Lapland on the Kola Peninsula in the vicinity of the Ukanskoe river at Sviatoi Nos present no

\* Note by Mr. Arthur Bennett:—Sviatoi Nos is the meeting-point of the botanical provinces of *Lapponia ponojensis* and *Lapponia murmanica*, the latter extending to the westward along the coast to the eastern edge of an island to the right of Cape Teriberskoi where the province of *Lapponia inarensis* commences.

particular features ; they are ninety-six in number ; and were all determined, with his usual great kindness, by Mr. Arthur Bennett.

- RANUNCULUS ACRIS var. PUMILUS, Whlb.  
 TROLLIUS EUROPEUS, L.  
 CALTHA PALUSTRIS, L.  
 DRABA INCANA, L.  
 CARDAMINE PRATENSIS, L.  
 VIOLA CANINA var. MONTANA, L.  
   " SYLVATICA, Fr.  
   " STAGNINA, Kit.  
   " EPIPSILA, Ledeb.  
   " BIFLORA, L.  
 LYCHNIS ALPINA, L.  
 CERASTIUM ALPINUM, L.  
 GERANIUM SYLVATICUM, L.  
 PHACA FRIGIDA, Rich.  
 ASTRAGALUS ALPINUS, L.  
 OXYTROPIS SORDIDA, Willd.  
 HEDYSARUM OBSCURUM, L.  
 ALCHEMILLA VULGARIS var. ALPESTRIS, Schmidt.  
 POTENTILLA COMARUM, Nestl.  
 GEUM RIVALE, L.  
 RUBUS SAXATILIS, L.  
   " CHAMÆMORUS, L.  
   " ARCTICUS, L.  
 PYRUS AUCUPARIA, Goertn.  
 SAXIFRAGA CÆSPITOSA, L.  
   " NIVALIS, L.  
 SEDUM RHODIOLA, D. C.  
 MYRŒOPHYLLUM ALTERNIFLORUM, D. C.  
 ANTHRISCUS SYLVESTRIS, L.  
 ARCHANGELICA OFFICINALIS, Hoppe.  
 CORNUS SUECICA, L.  
 ADOXA MOSCHATELLINA, L.  
 GALIUM sp. possibly G. TRIFIDUM, L.  
 ARTEMISIA sp.  
 COMPOSITE (Incognit).  
 SAUSSUREA ALPINA, D. C.

- GNAPHALIUM DIOICUM, L.  
 TARAXACUM DEN-LEONIS, Des.  
 NARDOSMIA FRIGIDA, Hook.  
 LEDUM PALUSTRE, L.  
 ARCTOSTAPHYLOS ALPINA, Spr.  
 ANDROMEDA POLIFOLIA, L.  
 CALLUNA VULGARIS, Salis.  
 PHYLLODOCE CERULEA, Bab.  
 LOISELEURIA PROCUMBENS, Desv.  
 PYROLA MINOR, Sw.  
 VACCINIUM VITIS-IDÆA, L.  
     "    MYRTILLUS, L.  
 DIAPENSIA LAPPONICA, L.  
 TRIENTALIS EUROPÆA, L.  
 MYOSOTIS PALUSTRIS, Rel.  
     "    SYLVATICA, Hoffm.  
 VERONICA sp. SINE FLORE.  
 BARTSIA ALPINA, L.  
 PEDICULARIS SUDETICA, L.  
     "    LAPPONICA, L.  
 PINGUICULA ALPINA, L.  
 POLYGONUM VIVIPARUM, L.  
 OXYRIA DIGYNA, Hill.  
 BETULA INTERMEDIA, Thomas.  
     "    NANA, L.  
 SALIX PHYLICIFOLIA, L.  
     "    LANATA, L.  
     "    LAPPONUM, L.  
     "    SERPYLLACEA, Willd.  
 EMPETRUM NIGRUM, L.  
 JUNIPERUS COMMUNIS, L.  
 ALLIUM SCHÆNOPRASUM, L.  
 VERATRUM LOBELIANUM.  
 LUZULA MULTIFLORA, Lej.  
     "    CONFUSA (HYPERBOREA).  
     "    WAHLENBERGII, Rup.  
 SCIRPUS CÆSPITOSUS, L.  
 ERIOPHORUM ANGUSTIFOLIUM, Roth.

- ERIOPHORUM VAGINATUM, L.  
,, SCHEUCHZERI, Hoppe, CAPITATUM, Host.  
CAREX HALOPHILA, F. Nyl.  
,, AQUATILIS, Whlb.  
,, VAGINATA, Tausch.  
,, GLAREOSA, Ley.  
,, RARIFLORA, Sm.  
,, AMPULLACEA, F. PLANIFOLIA, Norman.  
,, SALINA var. FLAVESCENS, F. Nyl.  
,, RIGIDA, Good.  
ANTHOXANTHUM ODORATUM, L.  
HIEROCHLOE BOREALIS (ODORATA, Vahl).  
,, ALPINA, L.  
POA PRATENSIS, L.  
LYCOPDIUM ANNOTINUM, L.  
,, ALPINUM, L.  
,, SELAGO, L.  
EQUISETUM ARVENSE, L.  
,, PRATENSE, Ehr.  
,, SYLVATICUM, L.  
LASTREA SPINULOSA, Presl.  
POLYPODIUM DRYOPTERIS, L.
-

## VI.

## A CONTRIBUTION TO THE FLORA OF KOLGUEV.

BY COLONEL H. W. FEILDEN AND MR. HERBERT D. GELDART.

*Read 24th February, 1896.*

AN expedition, organised by Mr. H. J. Pearson, left England in the end of May, 1895, with the intention of visiting Novaya Zemlya. The members of the party were Mr. H. J. Pearson, Mr. C. E. Pearson, the Rev. H. H. Slater, and Colonel H. W. Feilden. Leaving Vardö in the Steam Yacht "Saxon," June 14th, a course was laid for Novaya Zemlya. The ice conditions in Barents Sea were found to be extremely unfavourable. Impenetrable pack-ice was met with about eighty miles from the west coast of Novaya Zemlya, trending towards the north-west, and several days were spent in cruising along the edge of that ice to the south-east. Every likely bight in the pack was entered, and in some cases these indentations were followed up for twenty to thirty miles, but invariably heavy compact ice barred further progress, and the yacht had to return to open water. Recalling Milton's lines :

"Mountains of ice that stop the imagined way,  
Beyond Petsora easterly, to the rich  
Cathaian coast."

Coal running short, the little vessel bore up for Vardö to refuel. The members of the expedition were landed on the Murman Coast of Russian Lapland, near Sviatoi Nos, where they went into camp. A week was profitably spent there in ornithological, botanical, and geological investigations. On the return of the yacht from Vardö a second attempt was made to reach Novaya Zemlya. The ice-pack was again met with in about the same meridian as before, but the lead showing, the vessel ran some forty miles through the ice-field and reached within eight or ten miles of that part of Novaya Zemlya known as Goose Land. There again, an impenetrable pack eight to ten miles in width, was wedged against the shore. Every attempt to find a way through this failed, and after running many risks another retreat had to be attempted. This was very fortunately



effected, and after passing through some forty miles of ice, open water was reached. The yacht then ran down to the island of Kolguev, with the ice in sight all the way, on the port side. As the "Saxon" had to return to Vardö for a fresh supply of coal, Mr. H. J. Pearson determined, if the weather permitted, to land on Kolguev. This was effected July 5th, and the members of the expedition went into camp near the mouth of the Gobista river, on the south-west side of Kolguev. The yacht returned from Vardö and took the party off on July 16th. A third attempt was then made to reach Novaya Zemlya which proved successful.

The island of Kolguev lies between  $68^{\circ} 43'$  and  $69^{\circ} 30'$  N. Lat., and Long.  $48^{\circ} 15'$  to  $49^{\circ} 55'$  east of Greenwich. It is about fifty geographical miles in length, and some forty in width. It possesses no harbour for a sea-going craft drawing any depth of water, and none of its rivers are navigable. It is surrounded by shoals and sand-banks, and often during summer by ice. In winter it is completely ice-bound, and indeed during the whole year, the ice-fields seem to remain on its eastern shore. Its western coast during the short summer is freer, but even in the month of July, 1895, when Colonel Feilden passed ten days on that side of the island, the ice-pack came down from the northward, and for three days enveloped the coast. The climatic conditions of Kolguev are very severe. Professor Saweljew, who with Dr. Ruprecht (conservator of the Botanical Museum of the Imperial Academy of Science, Russia) visited Kolguev, in 1841, makes the following remarks about the climate: "During the sixteen days which we spent at various spots on (or off) the island in July and August, the thermometer never rose above  $9^{\circ}$  R., and even this but once, at mid-day. Usually it stood at  $4^{\circ}$  or  $5^{\circ}$ , and fell at times to  $2^{\circ}$ , or even to  $1^{\circ}$  R.; while before this, on Kanin (*i.e.* on the mainland), a warmth of  $10^{\circ}$  to  $12^{\circ}$  prevailed, which, immediately after our departure from Kanin, mounted (there) to  $15^{\circ}$  R. It is to be remarked that the soil of this island . . . does not thaw in the course of the year more than two feet deep. Further down all remains in a frozen state—a thing which we have not found to occur either on the Kanin peninsula or on the coast of Timan."\*

Mr. A. Trevor-Battye, who paid an adventurous visit to Kolguev in 1894, has told his experiences in a delightful volume, 'Ice-bound

\* Archiv für Wissenschaftliche Kunde von Russland, 1852, A. Erman, x. 313—316.

on Kolguev,\* to which we shall frequently have to refer in this paper, especially to his excellent appendix on the Botany of the island. He tells us, "that the Russians have a great dread of being compelled to pass the winter on Kolguev. They told him that only one Russian to their knowledge had ever done so. He describes the winter as terribly severe; and the Samoyeds all agreed in saying that it was far worse than on the mainland." Mr. Trevor-Battye gives the following as the result of his meteorological observations "The average shade temperatures for the twenty-four hours during June were, max. 40° F., min. 33° F., the thermometer twice falling to 31° F., and twice rising to 50° F. On June 24th it registered in the sun at mid-day 62° F. The average for July was decidedly higher, though more than once it fell to freezing-point. On August 28th, my thermometer was broken during a gale, but up to that date it varied from 42° F. at noon to 76° F. This, the highest reading, was on August 16th, and on that day it was 86° F. in the sun. The thermometer never fell below 42° F. during August up to the 28th. After this the weather got rapidly colder, and by September 16th, the ground was covered with snow, and the lake were beginning to freeze. Kolguev is exceedingly subject to fog and gales of great duration. The prevailing wind is northerly, either N., N.E., or N.W." †

The experiences of Mr. Pearson's party were quite as unfavourable. July 5th, the day on which they landed near the mouth of the Gobista river, was warm and oppressive, with heavy rain showers, the wind from the south and south-west, and accompanied by thunder and lightning. The next day the wind shifted to the north and north-west, with fog, and intermittent snow showers, remaining bitterly cold till the 16th July, when the party left the island.

During the whole of their stay, the temperature seldom rose above 35° F., whilst at times it fell to 32° F. Several experiments were made by Feilden to test the heat of the earth at the roots of plants in flower. At a depth of five to six inches below the surface, it was found that the temperature varied but little. Several readings of the thermometer taken on different days, worked out to 40° F., the observations on no occasion showing a difference more than one degree. Though these observations on earth

\* 'Ice-bound on Kolguev' (London, 1895).

† Trevor-Battye, *op. cit.* pp. 445—46.

temperature in Kolguev are of a somewhat perfunctory nature, yet they may be compared with those of our own country. At the Royal Botanic Society Gardens in London for 1895, we find that the mean temperature of the earth at six inches below the surface, during the months of March and November, approximate very closely with the earth temperature of Kolguev at the same depth in July.

We have referred to the subject of earth temperature at the roots of flowering plants more as a suggestion, that fuller experiments be made on this interesting subject in frozen regions. It is evident that some species of plants can survive intense cold. For instance, at Floeberg Beach in Grinnell Land, where 70° below zero of Fahr. was recorded, and 40° to 50° below zero was a common winter temperature, some twenty-nine or thirty flowering plants exist. A covering mantle of snow as a protection does not seem to be necessary, for it is mentioned by Feilden that the pink mountain Saxifrage, *S. oppositifolia*, growing on bare spots, entirely denuded of snow throughout the winter, blossomed luxuriantly on the return of summer. We cannot doubt that under such circumstances the roots as well as the leaves of these plants must be completely frozen during the winter; it would therefore be interesting to learn at what temperature the revivifying process takes effect. We all know how rapidly a dark surface absorbs the heat rays, and judging by the crude observations recorded from Kolguev, it is probable that in the Polar regions, the earth exposed to the sun's heat may for some inches retain a temperature sufficiently high to enable the plant to fulfil its function of flowering, though the atmospheric temperature be much below freezing.

The geological structure of Kolguev is of special interest, when taken into consideration with the flora. The island is composed entirely of sedimentary beds of glacio-marine origin, without any bottom or basement rock, of an older series, showing throughout its entire extent. Its geology has been described by Mr. Trevor-Battye,\* and also by one of the writers,† and their determinations of its structure coincide with the map of the Russian Geological Survey, on which Kolguev is laid down as consisting of "marine boreal beds." Though the distance of the island from the nearest part of the mainland of Russia is only fifty miles, and the soundings

\* *Op. cit.* pp. 392, 395.

† Feilden, Q. J. G. S. Lond. 1896, pp. 52—65.

between are under thirty fathoms, yet the evidence is entirely opposed to Kolguev having been connected with the Continent since its elevation above the sea. The present Kolguev is doubtless part of what has lately been the bottom of Barents Sea, and probably fairly represents the floor of the ocean for a considerable area around. The recent emergence of Kolguev gives to its floor an interest which otherwise it might not possess. As there is no evidence throughout the entire length and breadth of the island, or any older rock formation showing through its glacio-marine bed which might have been the mother-earth of some of the plants now growing there, we are entitled to assume that its present floor is derived entirely from immigration, and that within a comparatively recent period. That the transport of plants or their seeds may readily be effected by floating ice, cannot be doubted by those who have noticed the large quantities of earth and debris resting on the ice-floes which float in summer from the White Sea, and the estuary of the Petchora river, into Barents Sea. This ice-pack drifts around and is at the present day pushed up on the shores of Kolguev, and a similar process must have been going on since the period when the island first commenced to emerge as a sand-bank from the sea.

It is, therefore, only what we might expect to find, that the flora shows closer affinity with that of the mainland than with Novaya Zemlya. Probably birds have contributed as well to the transportation of seeds, and it may not be out of place to mention that three species of freshwater Mollusca were found in the swamps of the Gobista valley—

*Planorbis borealis*, Loven.

*Limnæa palustris*, Muller, var. *terebra*

„ *ovata*, Draparnaud, var. *kolguevensis*, E. A. Smith.

This fog-environed, wind-tormented island of Kolguev is exceptionally dreary and desolate-looking. There is not one redeeming feature in its scenery. No mountains, no brawling streams, no woods, no rocky cliffs to ennoble the view. The entire western side of Kolguev, from the mouth of the Gusina river to that of the Gobista, is a long straight line of bluff running nearly due north and south. At intervals, ravines and gullies made by streams issuing from the interior break the coast-line. These bluffs rise to a height of about a hundred feet at the north-west end of the island, but sink by an almost imperceptible dip from north to south

until at the mouth of the Gobista they are not more than forty feet above sea-level ; and this dip continues in the same direction, for at the mouth of the Kriva river the land almost merges with the sea, the coast-line being only a few feet above the sea-level.

The aspect of the interior of the island is not more inviting, the brown, sad-looking tundra, patched here and there with snow and dotted over with shallow meres and lakes, stretches a dreary flat, mile upon mile, embracing the south end, or about one-third of the area of the island. The northern part of the island is more elevated ; and from the west coast the land is to be seen rising to the north and north-east, and culminating in rounded hills, which reach an altitude of 200 to 250 feet. An interesting description of this elevated part of the island is given by Mr. Trevor-Battye.\*

Walking over the tundra in Kolguev is weary work. When the sun comes out, and there is a definite rise in the temperature, the traveller is assailed by myriads of mosquitoes. The constant stepping from one Lichen-covered peat-mound to the next, in order to clear the *sphagnum*-covered swamps, is exhausting. There is no change in the view ; the horizon, bounded by the level tundra, is always the same. The flora is uninteresting. One gets tired of seeing the swamps covered with the white blossoms of the Cloud-berry with fluffy-headed *Nardosmia frigida* interspersed. Now and again one passes a red or yellow Louse-wort (*Pedicularis*), and, looking more closely, *Saxifraga stellaris* is to be seen. Frequently one stumbles through a growth of downy Willow (*Salix lanata*) not higher than the knee, from which, at times, a Willow Grouse rises, wild as any hawk. The flora of the tundra proper is not rich in species nor in colouring. The typical plants are :

*Rubus chamæmorus*  
*Empetrum nigrum*  
*Salix lanata*  
*Betula nana*  
*Nardosmia frigida*  
*Sedum rhodiola*  
*Pedicularis hirsuta*  
 „ *lapponica*  
*Saxifraga stellaris*  
*Polemonium pulchellum*

\* 'Ice-bound on Kolguev.'

Whilst around the pools and wet spots are found

*Ranunculus pallasii*

*Hippuris vulgaris*

*Eriophorum angustifolium*

„ *scheuchzeri*

Sedges and a few *Luzulæ*

Each peat hag and mound is Lichen-covered, and probably the Lichen flora is the richest of all, it is quite the distinguishing feature of the tundra.

The Gobista river, which rises at the base of Mount Siekherhe in the interior and elevated part of the island, then flows west as a shallow, muddy stream, but when it reaches the tundra, or flat portion of the island, it has excavated through the soft clay and mud-beds a valley quite out of proportion to the river as it now runs. This valley is, in parts, as much as a mile and a half wide, decreasing in places to half a mile across. On either side it is bounded by bluffs, forty to ninety feet in height. At angles where the present river abuts, and erosion is in process, the mud walls are perpendicular; but as the stream has shifted its course from one side of the valley to the other, miles of bluff have been left to moulder, and these now descend with more or less abrupt slopes. The bottom-lands through which the Gobista river winds is dotted over with meres and pools of water, around which *Ranunculus pallasii* and *Hippuris vulgaris* are two of the commonest plants. It is in these localities that the wild Swallow *Cygnus bewickii*, makes its nest on a mound of moss, built up by the birds for that purpose, whilst on the drier slopes, the Little Stint, *Tringa minuta*, was found depositing its four eggs in a artless nest. On the slopes of this valley and facing south, the greatest abundance of flowering plants was met with. Many kinds that dare not face the bleak tundra with its cutting winds, there nestle in warm corners, or on sheltered banks. The beauty of the flowers in some of these favoured nooks is difficult to describe without laying one's self open to the suspicion of exaggeration. If it is remembered that the traveller sees them under exceptional circumstances. For days before, he may have been sailing through fog, and surrounded by ice; or he lands on some bleak and inhospitable shore, where only a few dwarfed and struggling plants are to be met with; or, driven from the monotonous tundra by

sharp wind or snow showers, he seeks shelter in the valley. Turning some corner his eyes are greeted with a floral display, quite unexpected, and in marked contrast with the scenes lately passed through, which cannot fail to make a lasting impression. The following is a record of such a bank, noted on the spot. Here are masses of blue Gentian (*Gentiana verna*), of superb colour, with a wealth of Forget-me-nots (*Myosotis alpestris*), intermingled with *Polemonium caeruleum*. Contrasting with these lovely shades of blue, are yellow twin-flowered Violets (*Viola biflora*), in dense beds, patches of Buttercups (*Ranunculus acris*), with Potentilla, Marsh-marigold, and Globe-flower (*Trollius europæus*), waving highest of all, *Silene acaulis* in clumps, with its pink mass of bloom, *Sedum rhodiola* scattered broadcast, with Alpine Milk-vetch, *Oxytropis sordida*, *Hedysarum obscurum*, Wood Geranium, Valerian, and Veronica, Willow bushes, a carpeting of grasses, and large beds of our common Lady's-mantle.

It is apparent from these observations by Feilden that the flora of the western side of Kolguev is richer than that of the east coast where the ice clings to the shore throughout the year. This is shown by a comparison of the list of plants obtained chiefly in the valley of the Gobista, with that made by such a competent botanist as Mr. Trevor-Battye on the eastern side of the island and the elevated interior. The much earlier date on which flowers blossom on the western side is also noticeable. This difference in favour of the western side may be accounted for by the shelter afforded in its valleys, and the tempering influence of the Gulf Stream which extends as far eastward as the Sea of Barents.

Our previous knowledge of the flora of Kolguev is confined to two authorities, the first being the celebrated botanist Ruprecht, who, as already mentioned, made his memorable visit to Kolguev in 1841. The list of flowering plants collected by him on the island is given in his work entitled *Flores Samoyedorum Cisuralleusium*. The other is Mr. Trevor-Battye, who in 1894 found ninety-six flowering plants on Kolguev, and in his work\* gives a list of twenty-one others recorded by Ruprecht, and which Mr. Trevor-Battye did not meet with himself, bringing up the total number of flowering plants then known from Kolguev to one hundred and seventeen.

\* 'Ice-bound on Kolguev,' pp. 396 - 415.

## VI.

## A CONTRIBUTION TO THE FLORA OF KOLGUEV.

BY COLONEL H. W. FEILDEN AND MR. HERBERT D. GELDART.

*Read 24th February, 1896.*

AN expedition, organised by Mr. H. J. Pearson, left England in the end of May, 1895, with the intention of visiting Novaya Zemlya. The members of the party were Mr. H. J. Pearson, Mr. C. E. Pearson, the Rev. H. H. Slater, and Colonel H. W. Feilden. Leaving Vardö in the Steam Yacht "Saxon," June 14th, a course was laid for Novaya Zemlya. The ice conditions in Barents Sea were found to be extremely unfavourable. Impenetrable pack-ice was met with about eighty miles from the west coast of Novaya Zemlya, trending towards the north-west, and several days were spent in cruising along the edge of that ice to the south-east. Every likely bight in the pack was entered, and in some cases these indentations were followed up for twenty to thirty miles, but invariably heavy compact ice barred further progress, and the yacht had to return to open water. Recalling Milton's lines :

"Mountains of ice that stop the imagined way,  
Beyond Petsora easterly, to the rich  
Cathaian coast."

Coal running short, the little vessel bore up for Vardö to refill. The members of the expedition were landed on the Murman Coast of Russian Lapland, near Sviatoi Nos, where they went into camp. A week was profitably spent there in ornithological, botanical, and geological investigations. On the return of the yacht from Vardö, a second attempt was made to reach Novaya Zemlya. The ice-pack was again met with in about the same meridian as before, but a lead showing, the vessel ran some forty miles through the ice-fields, and reached within eight or ten miles of that part of Novaya Zemlya known as Goose Land. There again, an impenetrable pack, eight to ten miles in width, was wedged against the shore. Every attempt to find a way through this failed, and after running many risks another retreat had to be attempted. This was very fortunately



effected, and after passing through some forty miles of ice, open water was reached. The yacht then ran down to the island of Kolguev, with the ice in sight all the way, on the port side. As the "Saxon" had to return to Vardö for a fresh supply of coal, Mr. H. J. Pearson determined, if the weather permitted, to land on Kolguev. This was effected July 5th, and the members of the expedition went into camp near the mouth of the Gobista river, on the south-west side of Kolguev. The yacht returned from Vardö and took the party off on July 16th. A third attempt was then made to reach Novaya Zemlya which proved successful.

The island of Kolguev lies between  $68^{\circ} 43'$  and  $69^{\circ} 30'$  N. Lat., and Long.  $48^{\circ} 15'$  to  $49^{\circ} 55'$  east of Greenwich. It is about fifty geographical miles in length, and some forty in width. It possesses no harbour for a sea-going craft drawing any depth of water, and none of its rivers are navigable. It is surrounded by shoals and sand-banks, and often during summer by ice. In winter it is completely ice-bound, and indeed during the whole year, the ice-fields seem to remain on its eastern shore. Its western coast during the short summer is freer, but even in the month of July, 1895, when Colonel Feilden passed ten days on that side of the island, the ice-pack came down from the northward, and for three days enveloped the coast. The climatic conditions of Kolguev are very severe. Professor Saweljew, who with Dr. Ruprecht (conservator of the Botanical Museum of the Imperial Academy of Science, Russia) visited Kolguev, in 1841, makes the following remarks about the climate: "During the sixteen days which we spent at various spots on (or off) the island in July and August, the thermometer never rose above  $9^{\circ}$  R., and even this but once, at mid-day. Usually it stood at  $4^{\circ}$  or  $5^{\circ}$ , and fell at times to  $2^{\circ}$ , or even to  $1^{\circ}$  R.; while before this, on Kanin (*i.e.* on the mainland), a warmth of  $10^{\circ}$  to  $12^{\circ}$  prevailed, which, immediately after our departure from Kanin, mounted (there) to  $15^{\circ}$  R. It is to be remarked that the soil of this island . . . does not thaw in the course of the year more than two feet deep. Further down all remains in a frozen state—a thing which we have not found to occur either on the Kanin peninsula or on the coast of Timan."\*

Mr. A. Trevor-Battye, who paid an adventurous visit to Kolguev in 1894, has told his experiences in a delightful volume, 'Ice-bound

\* Archiv für Wissenschaftliche Kunde von Russland, 1852, A. Erman, x. 313—316.

float on the surface. They have a delicate and pleasant scent, somewhat akin to that of an almond.

*RANUNCULUS HYPERBOREUS*, Ruprecht. Rare, only observed in a few mossy pools, on the tundra and in the valley of the Gobista. Its aquatic mode of growth at once attracts attention.

*RANUNCULUS SAMOYEDORUM*, Ruprecht. This diminutive plant was detected by seeing its bloom like minute yellow seeds, scattered over the wet moss of small pools on the tundra. It is of aquatic habit like the preceding species, and its comparatively long roots pass between the moss into the water below.

*TROLLIUS EUROPEUS*, L. Common in some parts of the Gobista valley, generally on banks facing south. We found it well in flower during July. This plant was so abundant at one spot in the Gobista valley, some five miles from the sea, that we named it Trollius Point.

*DELPHINIUM*? A Larkspur in bud, not in blossom, was met in the Gobista valley. Probably *D. elatum*, L.

*CARDAMINE PRATENSIS*, L. Quite common, and spread over the bottom lands of the Gobista. Lilac-coloured blossoms were met with as well as white ones, though Mr. Trevor-Battye's experience is the reverse.

*ARABIS ALPINA*, L. Rather uncommon. Grows on the banks which slope down from the tundra to the Gobista valley.

*VIOLA BIFLORA*, L. One of the most abundant flowers on the banks of the Gobista valley. Fully in flower during July, and equalling in strength and size of blossom the finest Norwegian specimens.

*VIOLA EPIPSILA*, Ledeb. Not at all uncommon on the banks of the Gobista valley. Out of hundreds of plants looked at, all had well-developed leaves, which is quite the opposite to Ruprecht's experience.

*SILENE ACAULIS*, L. Very common in the vicinity of the Gobista. The clumps of blossom varied from deep pink to a pure white colour.

*ARENARIA PEPOIDES*, L. Common enough on the great sand and gravel terraces which bar the estuaries of the Kriva and Gobista rivers.

*GERANIUM SYLVATICUM*, L. Common enough in the Gobista valley, just opening into flower the middle of July.

*HEDYSARUM OBSCURUM*, L. Common in the Gobista valley, or coming into flower the middle of July.

*RUBUS ARCTICUS*, L. This lovely flower was not uncommon either in the Gobista valley, or in gullies along the coast. We did not meet with two forms as recorded by Mr. Trevor-Battye.

*RUBUS CHAMÆMORUS*, L. Perhaps the most widely distributed and abundant plant of the tundra land.

*POTENTILLA COMARUM*, Nestl. Not at all common. Growing by the side of pools on the tundra.

*ALCHEMILLA VULGARIS*, L. Very abundant. Just commencing to flower the middle of July.

*SAXIFRAGA CÆSPITOSA*, L. Common everywhere.

*SAXIFRAGA DECIPIENS*, Ehr. Uncommon. Only a few plants found which grew in clumps.

*SAXIFRAGA CERNUA*, L. Common everywhere, and of remarkably fine growth.

*SAXIFRAGA RIVULARIS*, L. Common in damp spots, both on the tundra and in valleys.

*SAXIFRAGA STELLARIS*, var. *COMOSA*, Poir. Common; especially on the tundra.

*SAXIFRAGA HIRCULUS*, L. Common; when growing on dry and exposed situations of a stunted character, but in damp places retaining its normal size as we meet with it in Britain.

*SAXIFRAGA HIERACIFOLIA*, W. & K. A striking plant when seen growing on the tundra, as it is usually isolated, and attains a height six or seven inches.

*PARNASSIA PALUSTRIS*, L. Common in the swamps of the Gobista valley.

*SEDUM RHODIOLA*, D. C. Very common, especially on the bluffs overhanging the sea.

*HIPPURIS VULGARIS*, L. Abundant in the pools and meres, both on the tundra and in the valleys.

*PACHYPLEURUM ALPINUM*, Ledeb. Common on the slopes of the Gobista valley.

*ARCHANGELICA OFFICINALIS*, Hoffm. Very common by the seaside and the estuary of the Gobista.

*ERIGERON UNIFLORUS*, L. Common.

*GNAPHALIUM SUPINUM*, L. Common; not in flower up to the middle of July.

*MATRICARIA INODORA*, var. *PHŒOCEPHALA*, Rup. Very common along the west coast, in some sheltered spots it grew abundantly, with blossoms the size of a penny-piece.

*SAUSSUREA ALPINA*, D. C. Common; but not fully in flower by the middle of July.

*VACCINIUM ULIGINOSUM*, var. *MICROPHYLLUM*, Lange. Common on the peaty lands of the tundra.

*VACCINIUM VITIS-IDÆA*, L., var. *PUMILUM*, Horn. Common on the peaty lands of the tundra.

*ARCTOSTAPHYLOS ALPINA*, Spreng. Common; flowering in July.

*PYROLA MINOR*, Sw. Not common, but found flowering in some of the side ravines of the Gobista valley, and more abundantly in a ravine five miles to the northward.

*GENTIANA VERNA*, L. One of the most lovely plants we met with, growing in beds on the slopes of the Gobista valley. The masses of deep blue blossom were very striking.

*GENTIANA TENELLA*, Fries. This small Gentian was found in only one locality, a ravine some five miles north of our camp.

*ARMERIA VULGARIS*, var. *ARCTICA*, Cham. Extremely abundant on the weather-beaten summits of the sea-bluffs.

*PRIMULA STRICTA*, Horn. Common on the slopes leading down from the tundra, in ravines, and likewise in the valleys.

*PRIMULA SIBIRICA*, L., var. *FINMARKICA*, Jacq. We first met with this beautiful Primrose on the banks of the Gobista, some five miles from the sea. It was in full flower during July. We came across a bed of this plant near the mouth of the Kriva, not less than a quarter of an acre in extent, and a mass of bloom.

*TRIENTALIS EUROPEA*, L. Only met with in one locality, a ravine five miles north of our camp.

*PINGUICULA ALPINA*, L. This plant, with its delicate waxen flower, was found growing in some abundance on bogs and damp places in the Gobista valley, some five miles inland.

*CASTILLEIA SEPTENTRIONALIS*, L. Growing as a plant six to eight inches high, on the banks of the Gobista river.

*MYOSOTIS ALPESTRIS*, Schmidt. Very common in the valley of the Gobista. We did not meet with *M. arvensis*, nor with *Eritrichium villosum*, which are common plants on the eastern side of the island (*vide* Trevor-Battye).

*ADOXA MOSCHATELLINA*, L. Only found in one locality, some four miles south of our Gobista camp.

*BARTSIA ALPINA*, L. Common on the slopes of the Gobista valley, but not fully in flower by the middle of July.

*PLANTAGO MARITIMA*, L. With *Sedum rhodiola*, the commonest

plant, along the wind-swept heights of the shore-bluffs, on the west side of the island.

*ALLIUM SIBIRICUM*, L. Very common; on sandy banks near the mouth of the Gobista, on slopes further inland, and near the mouth of the Kriva river.

*KÆNIGIA ISLANDICA*, L. Not uncommon in damp spots on the tundra, and the lowlands of the valley, where it was discovered by the Rev. H. H. Slater.

The following list includes all flowering plants and vascular cryptogams found by Dr. Ruprecht and Mr. Trevor-Battye as shown in that published in 'Ice-bound on Kolguev.' Those which Colonel Feilden did *not* find are in italics, and those which he adds to the list are distinguished by an asterisk.

- RANUNCULUS* *ACRIS*, L., var. *PUMILUS*.  
 „ *lapponicus*, L.  
 \* „ *HYPERBOREUS*, Rup.  
 „ *SAMOYEDORUM*, Rup.  
 „ *PYGMEUS*, L.  
 „ *PALLASII*, Schlecht. (var. *MINOR*, Rup.)  
*CALTHA* *PALUSTRIS*, L.  
*TROLLIUS* *EUROPÆUS*, L.  
*DELPHINIUM* *ELATUM*, L.  
*Aconitum septentrionale*, Willd.  
*ARABIS* *ALPINA*, L.  
*CARDAMINE* *PRATENSIS*, L.  
 \**COCHLEARIA* *ARCTICA*, D. C.  
 „ *danica*, L.  
*DRABA* *ALPINA*, L.  
 „ *HIRTA*, L.  
 „ *rupestris*, R. Br.  
 „ *MURICELLA*, Wahl.  
 \* „ *INCANA*, L.  
*EUTREMA* *EDWARDSII*, R. Br.  
*VIOLA* *BIFLORA*, L.  
 „ *EPIPSILA*, Led.  
*DIANTHUS* *SUPERBUS*, L.  
 \**ALSINE* *BIFLORA*, Wahl.  
*CERASTIUM* *ARVENSE*, L., var. *INCANUM*.  
 „ *alpinum*, L.  
*ARENARIA* *PEPLOIDES*. L.

- \*MELANDRIUM AFFINE, Wahlb.  
*Wahlbergella angustiflora*, Rup.  
*Sagina intermedia*, Rup.
- \*SILENE ACAULIS, L.  
 STELLARIA LONGIPES, Goldie (S. EDWARDSII, R. Br.)  
 „ HUMIFUSA, Rottb.
- \*MONTIA FONTANA, L. (1 spec. only).  
 GERANIUM SYLVATICUM, L.  
 OXYTROPIS SORDIDA, Willd.  
 ASTRAGALUS ALPINUS, L.
- \*HEDYSARUM OBSCURUM, L.  
*Dryas octopetala*, L.  
*Geum rivale*, L.
- POTENTILLA SALISBURGENSIS, Haencke.  
 „ COMARUM, Nestl.
- SIBBALDIA PROCUMBENS, L.  
 ALCHEMILLA VULGARIS, L.  
 RUBUS CHAMEMORUS, L.  
 „ ARCTICUS, L.
- \*EPILOBIUM ANGUSTIFOLIUM (sine fl.)  
 „ *lineare*, L.
- SAXIFRAGA CERNUA, L.  
 „ CESPITOSA, L.
- \* „ DECIPIENS, Ehr.  
 „ HIERACIFOLIA, W. & K.  
 „ HIRCOLUS, L.  
 „ *nivalis*, L.  
 „ RIVULARIS, L.  
 „ STELLARIS var. COMOSA, Poir.
- CHRYSOSPLENIUM ALTERNIFOLIUM, L.  
 PARNASSIA PALUSTRIS, L.  
 „ *obtusiflora*, Rup.
- SEDUM RHODIOLA, D. C.  
 HIPPURIS VULGARIS, L.  
 ADOXA MOSCHATELLINA, L.  
 PACHYPLEURUM ALPINUM, Led.  
 ARCHANGELICA OFFICINALIS, Hoffm.  
 VALERIANA CAPITATA, Willd.  
 ARTEMISIA VULGARIS f. TILESII, Ledeb.  
*Antennaria carpathica*, R. Br.  
 „ *alpina*, R. Br.

- GNAPHALIUM SUPINUM, L.  
 ERIGERON UNIFLORUS, L.  
 MATRICARIA INODORA (PHEOCEPHALA, Rup.)  
*Pyrethrum bipinnatum*, Willd.  
*Achillea millefolium*, L.  
 SAUSSUREA ALPINA, D. C.  
 NARDOSMIA FRIGIDA, Hook.  
 SENECIO CAMPESTRIS, D. C.  
 „ *palustris*, L.  
 TARAXACUM OFFICINALE, Schrank, var. ALPINUM.  
*Hieracium alpinum*, L.  
*Campanula rotundifolia*, L.  
 VACCINIUM ULIGINOSUM var. MICROPHYLLUM, Lange.  
 „ VITIS-IDEA, L., var. PUMILUM, Horn.  
 „ *myrtilus*, L.  
 ARCTOSTAPHYLOS ALPINA, Spr.  
 PYROLA MINOR, Sw.  
 „ *uniflora*, L.  
 GENTIANA VERNA, L.  
 \* „ TENELLA, Fries.  
 ARMERIA MARITIMA, Willd.  
 PRIMULA STRICTA, Horn.  
 \* „ SIBIRICA var. FINMARCKICA, Jacq.  
*Aulrosace septentrionalis*, L. (*f. ciliata*, Traut).  
 \* TRIENTALIS EUROPEA, L.  
 \* PINGUICULA ALPINA, L.  
 POLEMONIUM HUMILE, Willd. (PULCHELLUM, Bunge.)  
 „ CERULEUM *f. ACUTIFOLIUM*, Willd.  
 MYOSOTIS ALPESTRIS, Schmidt.  
 „ *arvensis*, Hoff.  
*Eritrichium villosum*, Bunge.  
 VERONICA *alpina*, L.  
 „ LONGIFOLIA, L.  
 BARTSIA ALPINA, L.  
 CASTILLEIA SEPTENTRIONALIS, L.  
 PEDICULARIS LAPPONICA, L.  
 „ HIRSUTA, L.  
 † PLANTAGO MARITIMA, L.  
 † KENIGIA ISLANDICA, L.  
 OXYRIA RENIFORMIS, Hook.

- POLYGONUM VIVIPARUM, L.  
 RUMEX ACETOSA, L.  
 „ DOMESTICUS *f.* NANUS.  
 BETULA NANA, L.  
 SALIX HERBACEA, L.  
 „ MYRSINITES, L.  
 „ RETICULATA, L.  
 „ LANATA, L.  
 „ LAPPONUM, L.  
 „ POLARIS, Wahlbg.  
 EMPETRUM NIGRUM, L.  
*Juniperus communis*, L. (or *nanus*).  
 \*ALLIUM SIBIRICUM, L.  
 \*JUNCUS ARCTICUS.  
 LUZULA HYPERBOREA, R. Br.  
 „ WAHLENBERGII, Rup.  
 \* „ MULTIFLORA, Lej.  
 \*CAREX AQUATILIS, Wahlb.  
 \* „ DIOICA, L.  
 \* „ LIMOSA, L.  
 \* „ GLAREOSA, Wg.  
 „ *rigida*, Good.  
 „ *stricta*, Good.  
 \* „ SALINA, Wg.  
 \* „ VAGINATA, Tausch.  
 \*ERIOPHORUM ANGUSTIFOLIUM, Roth.  
 „ *vaginatum*, L.  
 \* „ SCHEUCHZERI, Hoppe.  
 AIRA *flexuosa*, L.  
 \* „ CESPITOSA var.  
 ALOPECURUS ALPINUS, Sm.  
*Festuca ovina* et vars.  
 \*POA ALPINA, L.  
 „ FLEXUOSA et var. ARCTICA.  
 „ *prolifera arctica*.  
*Trisetum subspicatum*, P. de B.  
 LYCOPODIUM SELAGO, L.  
 \*EQUISETUM ARVENSE var. ARCTICUM, Led.  
 „ *palustre*, L.



## VII.

## THE MOLLUSCA OF NORFOLK.

BY ARTHUR MAYFIELD, M.C.S.

*Read 24th February, 1896.*

THE following list of species and varieties of Norfolk Mollusks is intended to supplement the papers on the subject written by Messrs. J. B. Bridgman and F. W. Harmer, and published in the first volume of the Society's 'Transactions.'

With a few exceptions, which are marked with an asterisk, the land and freshwater varieties have already been recorded by Rev. S. Spencer Pearce and myself in 'The Journal of Conchology,' vol vii pp. 391—404. A few shells which have not come under my own notice, but which are given on the authority of the Rev. S. S. Pearce, are marked (S. S. P.). The additions I am able to make to the marine list are the result of researches made in the spring of 1893, when I was residing at Great Yarmouth, and in July, 1890, while making a holiday-tour along the coast from Yarmouth to Hunstanton.

\**ARION MINIMUS*, Simroth. Under dead leaves. Caistor St. Edmund's, Dunston, Buckenham.

*A. HORTENSIS*, Fér. var. *GRISEA*. Heigham.

*AMALIA SOWERBYI* (Fér.) Plentiful at Catton; Kirby Bedon.

\**A. GAGATES* (Drap.). In gardens. Heigham.

*AGRIOLIMAX LEVIS*, Müll. Plentiful on marshes and ditch-banks, Bramerton, Postwick, Colney, Costessey.

*HYALINIA NITIDULA* (Drap.) var. *HELMII* (Alder). Old Lakenham.

\**H. PURA* (Alder). var. *MARGARITACEA* (Jeff.). Under dead leaves. Dunston.

- H. CRYSTALLINA (Müll.) var. CONTRACTA. Westl. Whitli Woods (S.S.P.).
- HELIX LAPICIDA, L., var. NIGRESCENS, Taylor. Framingham
- H. ASPERSA (Müll.), var. MINOR, Moq. With usual form. Hellesdon.
- „ var. CONOIDEA, Picard. A single spe Hellesdon.
- „ var. GRISEA, Moq. Hellesdon, Thorpe.
- \* „ var. ALBO-FASCIATA, Jeff. Drayton.
- \* „ var. TENUIOR, Shuttl. Yelverton.
- \* „ var. FLAMMEA, Picard. Very common. Ea Colney, Hellesdon, Drayton.
- \* „ var. ZONATA, Moq. Upper Hellesdon.
- H. NEMORALIS, L., var. MINOR, Moq. Occasionally with t Earlham and St. Faith's; plentiful upon a bank at Hethersett.
- „ var. ROSEOLABIATA, Taylor. Rare, Earlham.
- „ var. LIBELLULA, Risso. Very common everyw
- „ var. RUBELLA, Moq. Frequent, Earlham, Hel Hethersett, Catton.
- „ var. CASTANEA, Moq. Plentiful at Horsha Faith's, Earlham.
- „ var. OLIVACEA (Risso). One specimen at Hc St. Faith's.
- „ var. CARNEA. Very common.
- „ var. DIAPHANA. A single specimen at Yel (S.S.P.).
- „ var. HYALOZONATA, Taylor. A single spe Earlham. (This shell had also a pale aperture.)
- H. HORTENSIS, Müll., var. FUSCOLABIATA, Taylor. Brooke.
- „ var. ALBINA, Moq. Very common, Br Lakenham, Catton, etc.
- „ var. LUTEA, Moq. Common. This and the pre are the most abundant forms.
- „ var. INCARNATA, Moq. Catton and Sprowston
- „ var. ARENICOLA, Macgill. Catton, Kirby Bramerton.
- „ var. TENUIS, Baudon. Yelverton (S.S.P.).

- H. ARBUSTORUM** L., var. **CINCTA**, Taylor. With type and var. **FLAVESCENS** at Thorpe.
- H. RUFESCENS**, Penn., var. **RUBENS**, Moq. Plentiful at Earlham.
- ,, var. **ALBA**, Moq. Earlham.
- ,, var. **DEPRESSA**, Taylor. Catton.
- ,, **MONS. SUBSCALARE**, Williams. A single specimen at Eaton.
- H. HISPIDA**, L., var. **NANA**, Jeff. Banks of the Yare at Whitlingham.
- ,, var. **DEPILATA**, Alder. Under dead willow leaves, Costessey Common.
- H. GRANULATA**, Alder (= **H. SERICEA**, Jeff.), var. **CORNEA**. Costessey Common.
- A. ITALA**, L. (= **H. ERICETOCUM**, Müll.), var. **GRISESCENS**, Colbeau. The common form about Norwich.
- ,, var. **MINOR**, Moq. Earlham, Bowthorpe.
- H. CAPERATA**, Mont., var. **MAJOR**, Jeff. Eaton and Framingham Earl.
- ,, var. **GIGAXII**, Jeff. Common. With type at Eaton, Thorpe.
- ,, var. **SUBSCALARIS**, Jeff. Eaton.
- ,, var. **ORNATA**, Picard. A single specimen on road-side near Stoke Holy Cross (S.S.P.)
- ,, var. **BIZONALIS**, Moq. Yelverton (S.S.P.).
- ,, var. **LUTESCENS**, Pasc. A very common form; Eaton, Framingham Earl, Thorpe, Hellesdon.
- ,, var. **OBLITERATA**, Picard. Near the Asylum, Hellesdon.
- ,, var. **ALBA**, Picard. With preceding, and at Drayton.
- H. VIRGATA**, Da Costa, var. **SUBALBIDA**, Poiret. Heigham, Upper Hellesdon, Thorpe.
- ,, var. **ALBICANS**, Grat. Hellesdon, Thorpe.
- ,, var. **SUBDELETA**, Ckll. Hellesdon, Thorpe, Postwick.
- ,, var. **CARINATA**, Jeff. Thorpe.
- \*     ,, var. **LINEATA**, Olivi. Mundesley and Sheringham.
- \*     ,, var. **ALBA**, Taylor. Roadside at Upper Hellesdon, Trowse.
- \* **VERTIGO SUBSTRIATA** (Jeff.). Among dead leaves. Diss.
- V. PUSILLA**, Müll. Among dead leaves on hedge-banks at Earlham and Bowthorpe. A single specimen at Bramerton.

- CLAUSILIA RUGOSA, Drap., var. EVERETTI, Miller. Earham.  
 „ var. TUMIDULA, Jeff. Whitlingham Woods (S.S.P.).  
 „ var. ALBINA, Moq. Yelverton (S.S.P.).
- COCHLICOPA LUBRICA, Müll., var. LUBRICOIDES, Fér. Whitlingham Marsh (S.S.P.).
- SUCCINEA ELEGANS, Risso, var. PFEIFFERI, Rossm. With type Heigham.
- PLANORBIS NAUTILEUS (L.), var. LÆVIGATA, Adami. With the usual form in the pond near Mousehold Heath.
- P. CARINATUS, Müll., var. DISCIFORMIS, Jeff. Colney.
- P. UMBILICATUS, Müll. (=P. COMPLANATUS, Jeff.). var. RHOMBEA (Turt.). In ditches near Great Yarmouth.
- BULLINUS (=PHYSA) HYPNORUM (L.) In a ditch at Thorpe, with PLAN. SPIRORBIS and PISIDIUM FONTINALE.  
 „ mons. DECOLLATUM (Nelson). With above.
- AMPHIPEPLEA GLUTINOSA (Müll.), var. ALBIDA, Williams. Shell milk-white. A single specimen at Colney.
- LIMNÆA PEREGRINA (Müll.), var. LACUSTRIS, Leach. Ranworth Broad, and near Brundall (S.S.P.).  
 „ var. INFLATA, Kob. Ranworth Broad, ditch near Acle (S.S.P.).  
 „ var. MARGARITACEA, Esm. Heigham.  
 „ var. CANDIDA, Porro. Ditch by side of New Cut near Reedham (S.S.P.).
- L. PALUSTRIS (Müll.), var. TINCTA, Jeff. Brundall, Reedham (S.S.P.).  
 „ var. CARINATA, Pearce. In a ditch by the side of the New Cut, Reedham (S.S.P.).
- VELLETIA LACUSTRIS (L.), var. COMPRESSA, Jeff. In the Yare at Brundall (S.S.P.).
- NERITINA FLUVIATILIS (L.), var. PALLIDA, Pascal. In the Wensur near Norwich Waterworks.  
 „ var. TRIFASCIATA, Colb. With above.
- BYTHINIA LEACHII (Shepp.), var. ELONGATA, Jeff. Surlingham Ferry (S.S.P.).
- SPHERIUM CORNEUM (L.), var. FLAVESCENS (Macgill). Colney.  
 „ var. NUCLEUS (Stud.). Near Bramerton and Whitlingham (S.S.P.).  
 „ var. PISIDIODES, Gray. Colney.

*PISIDIUM FONTINALE* (Drap.), var. *PULCHELLA*, Jenyns. In a ditch at Colney.

\**P. NITIDUM*, Jen. In a ditch near Thetford.

MARINE.

*MODIOLARIA DISCORS* (L.). Common in sea-weed; Yarmouth, Cromer, Palling.

*DENTALIUM ENTALIS*, L. In drift, Wells.

*CHITON CINEREUS*, L. Wells Harbour.

*C. MARGINATUS*, L. Sheringham and Cromer.

*HELCION PELLUCIDUM* (L.) In drift, Wells.

*TROCHUS MAGUS*, L. Wells, Heacham.

„ var. *CONICA*, Marshall. A single specimen of this rare variety (now in the possession of Mr. Marshall of Torquay) was picked up from drift at Heacham.

*T. UMBILICATUS* (Mont.). Yarmouth, Cromer, Hunstanton, Wells.

*T. STRIATUS*, L. Wells.

*LACUNA DIVARICATA*, Fabr. In drift, Yarmouth.

„ var. *GRACILIOR*, Metc. One specimen, Yarmouth.

*L. PALLIDULA* (Da C.). Yarmouth.

*LITTORINA NERITOIDES* (L.). Breydon Water.

*RISSOA PARVA* (Da C.). A few specimens of the typical form in drift at Yarmouth.

*HYDROBIA VENTROSA*, Mont. Plentiful in a ditch near Breydon.

„ var. *PELLUCIDA*, Jeff. Breydon.

*ODOSTOMIA UNIDENTATA* (Mont.). In drift, Wells.

*SKENEA PLANORBIS*, Fabr. Breydon.

*APORRHAIIS PES-PELECANI* (L.). One water-worn shell in drift, Wells.

*CERITHIUM RETICULATUM*, Da C. Wells.

## VIII.

## METEOROLOGICAL NOTES, 1895.

(From observations taken at Bradestone House, Brundall, Norfolk)

BY ARTHUR W. PRESTON, F. R. MET. SOC.

*Read 24th February, 1896.*

## JANUARY.

THIS was a very winterly month throughout. Snow was deep on the ground when the month came in, and continued, with fresh supplies, till the 16th, when there was a slight thaw. Frost returned on the 21st, and the earth remained covered with a white mantle until the end of the month. The number of days on which snow was registered (18) was the largest in any month since March, 1883. The mean temperature of the month was nearly 5 degrees below the average.

## FEBRUARY.

With the exception of 1855 this was the coldest February over 100 years past. Snow lay on the ground almost throughout the month, and frosts occurred on twenty-seven nights. The thermometer fell below 20 degrees on nine nights, and below 10 degrees on three nights, the lowest being 4 degrees on the 10th. On the grass it fell below zero on three nights, and nearly to the point on other nights. On the 7th it fell to *minus* 3.5 degrees at Brundall, and to *minus* 12 degrees at Cringleford. As a detailed description of the weather of this and the previous month has already been given (vol. vi. part i. p. 95) it is not necessary here to go into further particulars.

## MARCH.

The severe winter weather broke up on the 6th, and the remainder of the month was much milder. The great meteorological e

of the month was the terrific gale of the 24th, full particulars of which have already been noted in a special paper on the subject (vol. vi. part i. p. 99).

## APRIL.

This was a fine, warm, "growing" month with considerably less east wind than usual at this season. There were showers at intervals, but the rainfall was below the average. The mean temperature was about a degree above the normal, thereby constituting the third warm April in succession, and a pleasing contrast to the six cold Aprils of 1887—92.

## MAY.

May entered with fine, bright weather, with cold north-easterly winds, changing to warmer currents on the 6th, with magnificent summer-like days of high temperature for so early in the season. An extraordinary change occurred on the 16th, when the temperature dropped 28 degrees, accompanied by a chilling northerly wind and showers of hail and sleet. The young foliage on the north sides of trees was torn to shreds and blackened, and, in many instances, never recovered throughout the summer. The weather became warm again at the end, the thermometer touching 80 degrees on the 30th.

## JUNE.

This was an exceedingly dry month, although local showers occurred in places. The total fall at Brundall was 0.85 in., and at Heigham, Norwich, 0.58 in. At the former station 0.40 in. was registered in less than half an hour during a thunderstorm on the 27th, whilst at the latter place no rain whatever fell on that date. It was a fine, sunny month, and the mean temperature quite up to the average.

## JULY.

The first seventeen days were exceedingly fine, very warm, and attended by much sunshine. There was but little rain, and the ground was greatly parched. The last fortnight, while still warm, was very showery, 2½ inches of rain falling in eleven days. Thunder occurred on the 19th, 21st, and 22nd, but the storms were few and

slight when compared with those of the previous July. The temperature was in close agreement with the average, a singular coincidence, precisely the same as in the two previous years.

#### AUGUST.

To the 14th the weather was rainy, close, and thundery; remainder of the month was remarkable for its warmth and fine interrupted only by a severe thunderstorm on the morning of the 22nd, and some squally showers on the 27th. The temperature was about  $2\frac{1}{2}$  degrees warmer than the previous August, and about one degree above the average for the month.

#### SEPTEMBER.

This was a remarkable month, and will long be remembered. Entering with a continuance of the fine, warm weather with which August closed, the thermometer reached 70 degrees and upwards on each of the first ten days, and on the 2nd a maximum of 81 degrees was attained. Thunderstorms occurred on the 3d and 6th, the latter yielding 0.41 in. of rain, which was within the total month's fall. The third week was fine, and the heat was not excessive. The chief feature of the month was the last week, which was, probably, the warmest week so far in the year upon record. The thermometer considerably exceeded 70 degrees on each day, and on the 25th rose to 79 degrees, on the 26th to 80 degrees, and on the 28th to 77 degrees. At this time the sky was nearly cloudless, and the heat, particularly indoors, was almost overpowering, as, from the low declination of the sun, its rays penetrated into dwellings in the hottest part of the day to a far greater extent than during June and July, when the sun is nearly overhead. The results of the measurements at various stations showed that the amount of sunshine at the various stations showed that the amount was greater during this month than any previously recorded. Rain fell on three days only. The mean temperature of the month was about 4 degrees above the average, but was less than in previous years, which gave more warm days, and no rain whatever, at least in the last week was not then so warm as the three previous weeks. The only other instance during the present century of a month



of 80 degrees in East Anglia in the last week in September was in 1832, when the thermometer touched that value on the 25th and 26th.

#### OCTOBER.

This month also presented features of unusual meteorological interest, having had the warmest day and coldest night observed in any October for a great number of years. On the 1st the thermometer reached 75 degrees in the shade, which was an altitude probably not recorded in the tenth month in East Anglia since 1859, although in 1886 there was one reading which nearly equalled it. On the morning of the 2nd a decided change set in, with a considerable fall in temperature, and the reading of the thermometer at 9 a.m. on the 3rd was 31 degrees lower than on the afternoon of the 1st. This sudden and abrupt change was the more noticeable by reason of the temperature of the previous fortnight having been of unusual uniformity. Cool, rainy weather ensued till the middle of the month, when it became drier, though cold for the season. Winterly conditions, of a severity most unusual before the end of November or beginning of December, set in on the 22nd and continued until the 31st. During this cold period the thermometer never once exceeded 47 degrees by day, and by night it fell below the freezing-point in the screen on six nights successively. The lowest readings recorded were, in the screen, 25.4 degrees on the 28th, and 25 degrees on the 29th; and in the grass 17 degrees on the 28th, or 15 degrees of frost. Much cold rain and sleet fell at times, accompanied by lightning on several evenings, and on the 29th there were falls of snow both in large flakes and of the granular type. The injury to vegetation was most marked; trees in full leaf on the morning of the 28th were completely stripped by the evening of the following day, and dahlias and other tender garden flowers which were in full bloom on the former day were speedily transformed into blackened masses.

#### NOVEMBER.

The mean temperature was about 4 degrees above the average, and 9.6 higher than the previous November. The month was the mildest November since 1881. On the 16th the thermometer rose to 62.8, which appears to have been the warmest day in any

November since 1857 when it rose to 64 degrees on the 3rd, and 63 degrees on the 5th. The rainfall was about the average, and nearly the same as last year. There were several destructive gales, and from the 23rd to the 25th it blew at gale force almost continuously. The last three days were very gloomy, damp, and unpleasant.

#### DECEMBER.

This was a very stormy, unsettled month, with slight frost 7 times, but of no great intensity. There were many gales of a violent character, that on the 5th from the W.S.W. being the most severe, although those of the 12th from the S., and the 24th from the E. were also very destructive. The rainfall accompanying them was by no means excessive, and the month's total was half an inch below the average, but on many days the air was excessively humid, particularly at the close of the month, when fog and mist prevailed day after day. The mean temperature of the month was slightly above the average, but it was generally a colder month than the previous December. There was but little snow. Much lightning was seen in the north-east on the evening of the 6th. A driving blast from the east on Christmas Day made the weather exceedingly uncomfortable, and after the 23rd the sun was almost invisible to the end of the month.

#### THE SEASONS.

The following Tables show the mean temperature and rainfall for the four seasons, together with those of the five previous years, and of a twenty-year approximate average. Winter comprises the three months, December to February inclusive; Spring, March to May; Summer, June to August; and Autumn, September to November.

TEMPERATURE.								
Seasons.	1890.	1891.	1892.	1893.	1894.	1895.	20-year average.	Departure of 1895 from average.
Winter	38.9	33.9	37.0	36.5	39.2	34.7	37.8	-3.1
Spring	46.8	44.0	44.9	49.1	47.7	47.6	46.2	+1.4
Summer	58.6	58.9	58.3	61.2	59.3	60.4	60.2	+0.2
Autumn	50.2	50.9	48.8	50.0	50.1	51.4	49.5	+1.9
Year	48.0	47.7	46.9	49.6	49.2	48.4	48.4	0.0

RAINFALL.								
Seasons.	1890.	1891.	1892.	1893.	1894.	1895.	20-year average.	Departure of 1895 from average.
	in.	in.	in.	in.	in.	in.	in.	in.
Winter ...	4.80	3.10	6.36	5.80	4.81	7.35	6.02	+ 1.33
Spring ...	5.14	6.64	5.10	1.61	5.62	4.15	5.21	— 1.06
Summer ...	9.61	9.39	10.20	5.37	8.74	7.51	7.17	+ 0.34
Autumn ...	6.87	7.00	11.15	6.10	7.12	7.13	8.50	— 1.37
Year ...	25.96	28.35	31.05	19.66	27.32	24.91	26.90	— 1.99

From the above it will be seen that the winter was much colder than the average, although not quite so cold (owing to the mild December) as 1891. The other seasons were somewhat warmer than the mean. The rainfall of the winter and summer was slightly excessive in each case, but the dry periods in the spring and autumn made the total for the year decidedly deficient.

#### YEAR.

The mean temperature of the year was about the average, notwithstanding the intense cold of the first two months. The warm weather of March, April, May, September, and November, counteracted the previous severity, with the result that the excesses of cold and heat equally balanced. The rainfall was about two inches deficient, and although September was the driest month, the long-continued want of rain in April, May, and June, was the most severely felt, and affected vegetation to an extent from which it never recovered. There were, however, so many meteorological features during the year of an abnormal character that it will not be easily forgotten. The frost in the early months, though on the mean not quite so severe as in the winter of 1890-1 was greater on some nights in its intensity, and in the damage it created. It was certainly one of the most severe winters of the present century. Next came the great hurricane of March 24th, when the wind blew with greater fury than within living memory, and will leave a mark for some years to come. The summer was one of the best, longest, and warmest for many years, with much bright sunshine and warm, pleasant days, without any such exceptional heat as occurred in August, 1893. The warm weather at the end of September was by no means the least remarkable meteorological feature of the year, and the great cold at the end of October, the storm in the middle of November, and the violent gales in that and the following month should also be noted in a summary of the year presenting so many exceptional features.

1895.

MONTH.	BAROMETER.				THERMOMETER.				HYGRO-METER. Relative Humidity, 9 a.m.	CLOUD. Estimated proportion	RAINFALL.		WIND.							
	Highest.	Date.	Lowest.	Date.	Highest.	Date.	Lowest.	Date.			Inches.	No. of days.	N.	N.E.	E.	E.S.	S.	S.W.	W.	N.W.
JAN.	30.51	30	28.98	24	29.664	16	29.5	27	32.8	7.0	3.44	27	5	3	4	2	4	2	6	2.8
FEB.	30.51	16	29.60	26	30.089	23	4.0	7	30.3	6.5	0.88	18	6	5	10	1	0	1	4	2.6
MARCH	30.37	15, 16	28.83	28	29.710	23	23.0	3	42.1	6.3	1.86	19	4	0	1	4	4	7	6	3.8
APRIL	30.38	12	29.23	6	29.904	20	29.0	5	47.3	6.4	1.20	11	3	4	3	1	3	8	4	3.0
MAY	30.50	2	29.52	18	30.081	30	36.2	17	53.3	4.2	1.09	9	5	2	6	5	2	1	4	3.1
JUNE	30.46	24	29.63	29	30.067	23	37.7	15	58.1	5.8	0.85	10	6	9	0	4	1	5	2	2.6
JULY	30.25	6	29.50	12	29.853	8	46.0	6	61.4	6.1	3.21	16	3	1	0	2	6	9	4	3.4
AUG.	30.25	17	29.28	4	29.895	22	44.2	25	61.9	5.9	3.45	16	0	1	0	4	2	14	8	2.9
SEPT.	30.45	21	29.72	11	30.147	2	38.2	21	60.8	3.0	0.46	3	1	2	3	10	3	5	2	2.5
OCT.	30.55	18	29.10	8	29.816	1	25.0	29	46.8	6.9	4.00	23	2	7	0	2	1	3	9	2.6
NOV.	30.52	1	29.15	12	29.900	16	28.0	3	46.7	7.1	2.67	21	1	2	4	7	6	8	1	3.6
DEC.	30.51	28	29.05	12	29.770	5	26.4	22	39.1	7.6	1.80	20	0	2	6	4	3	6	8	3.7
MEANS					29.908				48.4	6.1			86							3.0

IX.

SOME ADDITIONS TO  
THE NORWICH CASTLE-MUSEUM IN 1895.

By THOMAS SOUTHWELL, F.Z.S.

*Read 30th March, 1896.*

The Report for the year 1895, recently issued by the Committee of the Castle-Museum, is the first which has emanated from that body which the work of a complete year is reviewed, and it must be regarded as a most satisfactory one; the additions made during that period to the various collections are numerous and valuable, and the progress in their arrangement has been considerable. It was not until the 7th of April that turnstiles were fixed to record the numbers of visitors, and the attendance thus indicated reveals the great amount of interest taken by the public in the only fine institution which has arisen in their midst. Between the 7th of April and the 31st of December, the Museum was open 267 days, on 163 of which the admission was free, on 65 by payment, and 39 were Sundays; during that time 146,893 persons visited the Museum, and thus far in the current year there has been no falling off in the attendance.

Amongst the more important additions to the collections, commencing with the Mammalia, may be mentioned a fine pair of Malayan Bears (*Ursus tibetanus*), presented by Mrs. Petre, of Westwick House. These, when sent to England were very young, and lived at Westwick about four years; circumstances rendered it necessary to terminate their career as living specimens, and their stuffed skins were transferred to Museum collection. A fine male Red Deer (*Ovis musimon*), killed in Cyprus by Sir Henry Bulwer, and presented by him, has also been added. For many years the

Museum has been indebted to the Wombwells, and their successors the proprietors of the celebrated travelling manageries, for gifts of animals which have died in their collections, and Mr. E. H. Bostock, the present proprietor, has been most liberal in this respect. To him we are indebted for a very handsome Leopard (*Felis pardus*), an Ocelot (*Felis pardalis*), a Raccoon (*Procyon lotor*), and a Coypu (*Myopotamus coypus*), all of which were very acceptable additions. To the Trustees of the National Museum, Melbourne, Australia, through Sir Francis G. M. Boileau, the Museum is indebted for the present of specimens of the Australian Duckbill (*Ornithorhynchus anatinus*), the Echidna (*Echidna hystrix*), the Wombat (*Phascolomys platyrhinus*), and the Bandicoot (*Perameles gunnii*); and to Mr. A. G. Hudson for two specimens of the Norwegian Lemming.

The general collection of Birds has also received some interesting additions from Sir Francis Boileau, amongst which may be mentioned a pair of Huia Birds (*Heteralocha acutirostris*), a species new to the collection, two specimens of the Parson Bird (*Prothemadera novae-zelandiae*), the Stych Bird (*Pogonornis cineta*), the New Zealand Bell-bird (*Anthornis melanura*), and others from New Zealand, and male and female specimens of the Victorian Lyre-bird (*Menura victorie*), from the Trustees of the National Museum, Melbourne, through Sir Francis Boileau. Two specimens of the Pelican (*Pelicanus onocrotalus*), killed in Egypt, and presented by Mr. S. Gurney Buxton examples of Brunnich's Guillemot, and a female King Eider (*Somateria spectabilis*) from Novaya Zemlya; a White-billed Dive (*Colymbus adamsi*) from Norway; and a Mediterranean Black-headed Gull (*Larus melanocephalus*) from Malta, with other specimens from Colonel Feilden, and to the Rev. C. J. Lucas the Museum is indebted for a very interesting variety of the Long-eared Owl, with white wings, which was shot at Filby.

Peculiar interest attaches just now to the White-billed Dive in this county, for as recently pointed out by Mr. A. F. Griffith ('Zoologist,' 1896, p. 14), there can be no doubt that a specimen of this Arctic species was killed by the late Mr. Booth, on Hicklin Broad, on the 14th of December, 1872, after a "fearful gale from the S.W." The bird in question is now in the Booth collection at the Brighton Museum, and its identification is beyond question; it is thus entitled to a place in the list of birds killed in Norfolk. Only two other British-killed specimens of this bird are known.

one of these, now in the possession of Mr. Gurney, at Keswick, was killed at Pakefield, in the spring of 1852, and the other on the Northumberland coast.

Mr. Gurney has favoured me with the following notes of the additions to the Birds of Prey, to the enriching and extension of which he gives his unremitting attention.

"During 1895, one Hawk—new to the collection—has been added to the yearly increasing series of Raptorial Birds. This bird, *Accipiter rufotibialis*, Sharpe, was collected by Mr. A. Everett (a constant frequenter of the Old Museum when he used to live in Norwich) in Borneo, and is certainly not so adult as the bird of the same species figured in 'The Ibis,' 1889, p. 68. There are several broken bars of white on the under parts, and the thighs are not such a bright red as in the plate. My father seems to have had a share in discriminating *A. rufotibialis*, and his remarks, as they are unpublished, are worth giving. Alluding to the one figured, he says:—

"On comparing this specimen [of *A. rufotibialis*] with the two oldest males of *A. virgatus* in the Norwich Museum (one from Java, and one from Ceylon), I find that it differs in the chin and throat being buffy white instead of pure white, and in the central dark longitudinal streaks on that part being narrower and not continued on to the upper breast. Also by there being no white on the central portion of the upper breast, and by the white transverse bars on the middle and lower breast being much hidden by the rufous portions of the plumage. Also in the tibial feathers being a uniform rufous, without either white or brown transverse bars; also in the underside of most of the remiges being tinged slightly with rufous'" (J. H. G., ms.).

"Another example of the handsome and conspicuous Madagascar Bay Owl, *Heliodilus soumagnei*, Gr., has come to hand from our good friend Mr. James Wills, and the valuable donation from Sir Francis Boileau I need not dilate upon, as *Scelogluus albifacies* is to have an article to itself.

"A large box of skins collected in Borneo by Mr. A. Everett, and Mr. C. Hose, consigned to the Museum by their agent in London, yielded another specimen of *Heteroscops lucie* (Sharpe), of which we had only one before; also a good *Poliwaëtus plumbeus* (Hodg.), *Limnaëtus alboniger*, and a few other rather noteworthy birds, but

nothing new. The only other thing which calls for remark is, the our already grand series of Lämmergeyers (*Gypæëtus barbatus*) further enriched by an adult shot at Ladak in India, by Capt. F. Adair, who killed it with a 0.300 rifle, as it was drinking at a stream at an elevation of about 17,000 feet."

Mr. Gurney has likewise contributed a considerable number of eggs of Birds of Prey; and Lord Walsingham has sent a nest and eggs of the Gadwall Duck, taken at Merton, which it is hoped, with a pair of old birds, will soon form a prominent object in the Museum.

Conspicuous in the Fish Room is a fine specimen of the Tarpon (*Megalops thrissoides*), the gift of the Earl of Orford, by whom it was taken in a river in Florida, in 1894. Lord Orford has also placed with the case the rod and line with which, he captured this monster fish which weighed 140 lbs.

A very important addition to the Entomological Collection has been made through the generosity of Mr. J. B. Bridgman, who has presented the whole of his fine series of Hymenopterous Insects, perhaps unequalled in extent. It is contained in two cabinets, with twenty-six drawers and six boxes; many of the specimens are exceedingly rare, and the whole are beautifully set and arranged. Mr. Bridgman has also given a Collection of Works relating to Hymenoptera, consisting of thirty-two volumes of printed matter, seven volumes of manuscript, and other papers. A collection of upwards of 250 specimens of Lepidoptera, from Lake Nyasa, has been given by Mr. A. F. Gurney; and five cases of Lepidopterous and other Insects, from Ceylon, by Mr. J. Sanicroft Holmes.

An important addition to the Geological department has been made by the presentation by the widow of Mr. S. V. Wood, Jun. of a collection of Tertiary Mollusca, made by the late Mr. S. V. Wood F.G.S., and his son, Mr. S. V. Wood, Jun., of Martelsham, near Woodbridge. This important collection, which is contained in two large cabinets, is now in course of arrangement.

There are many other donations which, although of considerable interest, it is impossible to mention here, nor does it fall within our province to particularise the additions to the Library and Picture Gallery, Ethnology, Antiquities, &c., which have been both numerous and valuable.



## X.

FREDERIC KITTON,

24TH APRIL, 1827—22ND JULY, 1895.

BY JAMES MOTTRAM.

*Read 30th March, 1896.*

On the formation of your Society in 1869, Frederic Kitton was one of the two Vice-Presidents then appointed, and he served the office of President for the term 1873—74. It will, therefore, be agreeable to many that some notice of him should appear in your 'Transactions.'

An interesting memoir of him has been prepared and published by his son, a copy of which is placed in your library, but whilst making use of some of the matter therein contained, it will be suitable in these pages to recall him, as he was known to us here in Norwich.

Born in Cambridge, he removed to this city in 1844, at the age of 17, and then commenced to assist in the tobacco business carried on by Mr. Robert Wigham, in the Haymarket.

Mr. Wigham was a botanist of some repute, and his young friend soon began to join in his rambles and studies.

Mr. Thomas Brightwell was at that time carrying on his microscopic enquiries into the Diatomaceæ, in which subject Wigham also was interested, and it thus came to pass that Kitton assisted the first named in many ways, and through him, in the course of a few years, was in correspondence with many of the best authorities on the subject. There is no record of the exact date from which he was considered a member of the Norwich Microscopical Society, but he became the friend of all connected therewith, and all had to thank him for the unfailing accuracy of his knowledge, for his ready assistance in all technical matters, either with the microscope, or the preparation of objects, and for his liberality in the supply of any material which had come into his hands.

It was at this time that I made his acquaintance, and his valued friendship remained to me to the end. I had the pleasure of spending a morning with him some two months before his death, and though finding him sadly altered, I did not anticipate that I should see him no more.

In the thirty years between 1855 and 1885, he was associated, more or less, with all the Societies in Norwich which had for their object the increase of knowledge, and in all he was valued; but I fear that as his own special study was one that could not be generally appreciated, scarcely any one realised that we had in our midst one whom the learned in other parts of the kingdom and in far distant countries "delighted to honour," for he was an honorary member of both the Royal Microscopical and Quekett Societies in London, and a corresponding member of the New York, Belgian, and Dublin Societies. An illustration of how easy such ignorance is, I may mention that he once told me with what surprise he learnt himself that the eminent Swedish Diatomist, P. T. Cleve, of Upsala, with whom he had long corresponded, had come to England, not on the subject of their mutual interest, but to receive the honour of the honorary membership of the Chemical Society.

About 1881, he published sets of 100 slides each, to illustrate the Diatomaceæ of the County of Norfolk; these were neatly packed in four-rack cases, bound as 8vo. books. His lists of the order for the county will be found in your 'Transactions,' vol. ii. p. 336; and vol. iii. p. 754.

He was able to read and translate any scientific papers which were published in French, German, or Danish, and he had also some acquaintance with the Anglo-Saxon language and literature. It is only necessary to read his Presidential Address to yourselves, or some others of his papers read in Norwich, to learn how much he knew of English literature.

He was of most retiring and simple manners, but with any one with whom he was well acquainted, of a most genial disposition. Such of his friends were always welcome at the shop in the Haymarket, and many a pleasant and instructive evening hour have I spent there with him.

First and last he must have mounted many thousands of slides, and he left in his own cabinets about 5000, though many of these were presents or exchanges. About 4000 slides referred to the

Diatomaceæ, and I think it must be a satisfaction to all his friends that these have passed *en bloc* into the possession of Mr. Wynne E. Baxter, F.R.M.S., the Coroner for East London, a gentleman who is qualified to appreciate them, and who proposes shortly to publish a work on the order.

The remainder consists principally of Foraminifera, sections of Rocks and Shells and Sponge Spicules. About 400 of these slides are now in my own cabinet, and amongst them are some of considerable local interest, including sections of Flints procured in Norfolk; and also the original slides which furnished the illustrations to the paper on that subject in your 'Transactions,' vol. i. part 2, page 59, and read 27th February, 1872; and I need scarcely add that these objects will now be available to any one studying the subject. The slide showing the borings in a *Haliotis* Shell from New Zealand, of which two illustrations were given in the Journal of the Quekett Club, vol. vi. series 1, in reference to papers by Mr. B. W. Priest and Mr. J. G. Waller, is now with the former.

In the part which Frederic Kitton took in editing the Diatomaceæ, in the last edition (1861) of Pritchard's Infusoria, he had perforce to work on the classification therein adopted, but otherwise he had then and for the future himself used that of Professor H. L. Smith, of Geneva, N.Y. He was in full agreement with the Rev. William Smith, the author of 'The Synopsis, British Diatomaceæ,' as to the great care necessary in establishing new species, and of the injury resulting to science from the careless introduction of synonyms. But with all due care he discovered and named many new forms, and a list of more than a dozen of these is given in his son's memoir.

There is also a list of a dozen other new species, to which various friends, to do him honour, attached his name, and in 1886, Messrs. Grove and Sturt, from the wonderful deposit found at Oamaru in New Zealand, created a new genus *Kittonia*.

So with *Brightwellia superba* and *Kittonia elaborata* (both disc forms) the two friends, who so long worked together will, for many a year, be associated in the minds of those who shall succeed them in their favourite study.

May I, in conclusion, using the idea of one of Frederic Kitton's favourite authors (Dickens), say to such students, "Keep his memory green," as a simple-minded, earnest, hard-working man, who strove for "the truth, the whole truth, nothing but the truth."

## XI.

ON AN EARLY RECORD OF THE OCCURRENCE OF  
THE NARWHAL (*MONODON MONOCEROS*)  
ON THE COAST OF NORFOLK.

BY MILLER CHRISTY, F.L.S.

*Read 30th March, 1896.*

THERE have, I believe, hitherto been only three known instances of the occurrence of the Narwhal on the coasts of Britain— one near the Isle of May, in the Firth of Forth, in June, 1648; one near Boston, Lincolnshire, in February, 1800; and one in the Sound of Weesdale, Shetland, in September, 1808. It is with pleasure, therefore, that I call attention to an apparently genuine and reliable record which seems hitherto to have been overlooked.

The Rev. Samuel Purchas, in recounting Frobisher's second voyage in search of a North-west Passage in 1577, says\* that Frobisher and his companions met with "a great dead Fish, round like a Porcepis,† twelue foot long, hauing a Horne of two yards (lacking two ynches) growing out of the Snout, wreathed and streight like a Waxe Taper, and might be thought to be a Sea— Vnicorn. It was broken in the toppe, wherein some of the Sayers said they put Spiders, which presently dyed. It was reserued as Jewell by the Queene's Commaundment in her Wardrobe of Robes.'

The animal thus described was, of course, a Narwhal or Sea Unicorn, and its "horn" was long preserved at Windsor. Several later writers mention having seen it there. Purchas, in the second and third editions of his 'Pilgrimage,' adds that it is "still at Windsore to be seene."

That the horn in question should have been so long and so carefully preserved in the Queen's "wardrobe" at Windsor was i

\* "Purchas his Pilgrimage" (Lond., fo., 1613), p. 621; 2nd Ed. (Lond., fo. 1614), p. 739; 3rd Ed. (Lond., fo., 1617), p. 917; and 4th Ed. (Lond., fo. 1626), p. 811.

† An old form of the word we now generally write "Porpoise," and derived from the Latin *porcis piscis* (the hog-fish).

remarkable ; for, at the time, the tusks of the Narwhal counted of enormous value. The Unicorn of Fable was said to be an animal of immense strength and vital power, virtues being especially concentrated in its single frontal horn. To this horn, therefore, marvellous virtue was ascribed, and was in consequence much sought after ; but, as the animal does not exist, no such thing as its horn was really obtainable. The twisted tusks of the Narwhal were, however, often said to be the real article : hence it came about that, in earlier times, the Unicorn of Heraldry (which figures as one of the supporters of the Royal Arms of England) was represented as holding a Narwhal's tusk in the centre of its forehead. Though the Narwhal (now often called the "Sea-Unicorn") must have been known to the mariners of the extreme north from very early times, it was only at the time when Purchas wrote (the beginning of the seventeenth century) that the animal and its tusk became known to the world at large through the narratives of the Arctic explorers and whale-fishers. The so-called " Unicorn's Horn " was, therefore, really a new discovery, and a prodigious value was set upon it. There are many instances on record at the period in which a tusk was sold for £6000 or £7000, while small fragments were sold for large sums. Although Purchas does not mention the amount obtained for one he says was sold to Constantinople (see *post*), it was probably a very large sum indeed. Among the marvellous properties ascribed to the horn were the protection it was supposed to afford against all poisons and noxious creatures, which is probably what is alluded to by the mention of Spiders having died when put into the rosbasher found. It was long before it came to be generally known that the so-called " Unicorn's Horn " was in reality nothing more than the tusk of the Narwhal.

In his description of the finding of the dead Narwhal, as given above, Purchas adds a side-note, which contains the information with which we are here more especially concerned. It is as follows :—

" When a horne was brought home two yeres since, found on a desolate Island ; and such an one was taken up A. 1588 on the coast of Norfolke, and sold by an ignorant woman for a peece, which proued effectually against poisons, as I was told by one Mr. Salmon, of Leegh, who had a peece of it."

In the second edition, although the indication of the date of discovery stands unaltered\*, some additional information is given as follows :—

“Such a horn was brought home two yeeres since, found on Shore in *Greenland* by the carpenter of *Jonas Poole's* ship, seven foot and a half long, and sold since at Constantinople, proued good against poisons ; and such a one was taken up A. 1588 in the coast of *Norfolke*, and sould by an ignorant woman for 18 pence ; which proued effectually against poisons, as I was told by Mr. *Rob. Salmon*, of *Leegh*, who had a peece of it.”

In the third and fourth editions, the information stands exactly the same, except that, in the two places where the horn is said to have been “proved” effectual against poisons, an alteration has been made to “reported” in the first case, and to “said to be” in the second, as though Purchas had in the interval seen some reason to doubt its efficacy.

Now, before accepting unreservedly such a record as the foregoing, we are bound to ask ourselves : Is it a genuine and satisfactory record ?

It must, in the first place, be admitted that there is nothing inherently improbable in the statement that a Narwhal was met with on the coast of Norfolk in the year 1588. Although the animal habitually frequents very high latitudes, and is certainly very seldom met with on the British coasts, it cannot be denied that, if a specimen was met with on the coast of Lincolnshire one hundred years ago, it is equally likely that one was met with on the adjacent coast of Norfolk three hundred years ago.

In the second place, Purchas is a serious writer and an historian of acknowledged position, whose veracity no one is likely to call in question. It appears, however, that Purchas derived his information from some one else—a certain Mr. Robert Salmon. We are, therefore, under the necessity of inquiring also who this man was. Here, again, we can find no reason to call in question the *bonâ fides* of the record under consideration ; for Robert Salmon was a man of some eminence in his day, and not at all the kind of

\* The “horn” was found (as what follows will show) on Jonas Poole's voyage to “Greenland” (as Spitzbergen was then called) in 1611, of which voyage Purchas gives an account (“Purchas his Pilgrimes,” Lond., 1625, vol. iii., p. 711).

erson whose veracity one would doubt without good reason. He was a wealthy merchant and mariner, and, at the time when Purchas wrote, he held a prominent position in connection with the Trinity House, of which, at a later date, he became Master. He seems to have resided at Leigh, in Essex, where he was probably well known to Purchas, who from 1604 to 1614 was vicar of the adjacent parish of Eastwood, a position which enabled him to make the acquaintance of the many ships' captains who then inhabited the little sea-port town, and which undoubtedly led in the end to his becoming such a well-known geographical historian. There is in Leigh Church a fine monument in commemoration of his Robert Salmon (who died 18th June, 1641), as well as brasses of some earlier members of his family.

I can therefore see no reason why we should not accept as genuine and veracious the record to which I have called attention.

## XII.

### THE WILD BIRDS PROTECTION ACTS OF 1880 AND 1894, AS APPLIED TO THE COUNTY OF NORFOLK.

It will be remembered that in the summer of 1893 when a Bill brought up from the Commons was awaiting its second reading in the House of Lords, the Norfolk and Norwich Naturalists' Society took an active part in advocating the principle of protection by specified areas rather than by named species, and that a resolution embodying these views was sent to the Earl of Kimberley, then Lord President of the Council and one of our Vice-Presidents, asking him to use his influence to secure their reception, which he most kindly did. It was probably owing to this action that the Bill as finally passed rendered it optional either to prohibit the taking of the eggs of any wild birds in specified areas, or to prohibit the taking of the eggs of certain named species, thus embodying both principles.

The Act thus having been obtained, a proposal for its application was discussed in the Norfolk County Council, when our Society again urged its views, and following in the wake of the Lincolnshire Naturalists' Union, presented the following resolution to the County Council, on the 2nd February, 1895 :

"The members of the Norfolk and Norwich Naturalists' Society learn with pleasure that the Lincolnshire Naturalists' Union having laid before the County Council of the parts of Lindsey their views with regard to the enforcement of the provisions of the Wild Birds Protection Act of 1880 as amended in 1894, that body has decided to apply to the Home Secretary to put in force the powers of the Act conferred by Section 2, thereby prohibiting the taking of the eggs of any wild birds within a well-defined area along the coast of Lincolnshire, between the 1st day of May and the 1st day of August. The Norfolk and Norwich Naturalists' Society, as represented by this meeting, would respectfully suggest to the County Council of Norfolk that a similar protection should be extended to certain breeding haunts under their jurisdiction, hereafter to be decided upon, of easy definition, and frequented by a number of birds which are in great danger of extermination. They also wish to record their opinion that any attempt to protect named species would prove abortive, owing to the great difficulty of obtaining a conviction, chiefly in consequence of the impossibility of distinguishing the eggs of some species of birds which require protection from those of other species which need not be included in the schedule."

The result was that the Wild Birds Protection Committee of the County Council requested our Society to furnish them more fully with their views upon the subject, and the following report was drawn up by a sub-committee appointed for the purpose and duly presented :—

TO THE CHAIRMAN OF THE WILD BIRDS PROTECTION  
COMMITTEE, NORFOLK COUNTY COUNCIL.

CASTLE MUSEUM, NORWICH,

19th February, 1895.

SIR,

The Committee of the Norfolk and Norwich Naturalists' Society having considered the resolution passed by your Committee at the meeting held on the 2nd February, 1895, and submitted to them, they having had the advantage of the advice of the following members of the Society not present at these consultations, viz., The Earl of Leicester, Mr. Cresswell (Lynn), Mr. le Strange (Hunstanton), Colonel Feilden (Wells), Sir Edward Newton (Lowestoft), and others—beg to report as follows :—

The Committee are strongly of opinion that the most advantageous mode of applying the Act in the County of Norfolk would be that provided for



by paragraph (1) Section 2, which empowers the prohibition of the taking or destroying the eggs of all wild birds in certain specified areas, this they would like to see applied to the whole of the foreshore of the County from Wolferton Creek to Gorleston North Pier, and in this opinion they are strengthened by correspondence which they have had with some of the largest landowners on the coast, but they have not yet had the opportunity of making the necessary advances to all those whose rights would have to be considered, and must therefore, for the present, be content with advocating a less ambitious scheme. They beg to recommend, with the full consent and approval of the owners of the soil, or those possessing rights over the same, that the following specified areas be suggested to the County Council for application to be made to the Secretary of State to put in force Section 2 (1) of the Act, thereby rendering illegal "the taking or destroying of wild birds' eggs, in any year or years, in any of the areas specified, viz. :

[Then follow the particulars as to the areas recommended, which will be found set forth as finally adopted in paragraph ii. of the Secretary of State's order, printed at the end of this article.]

The Committee believe that within these boundaries the principal breeding places of the shore birds on the Norfolk coast will be included. They do not think it desirable for a public body to make any suggestion with regard to inland sites, which should be left to the owners or occupiers to deal with in their discretion; but they would cordially support a memorial which will in due time be presented to the County Council, asking for protection to be extended to a specified area in the district of the Broads.

The above recommendations, if adopted, will, it is believed, to a great extent protect the shore-breeding birds, which congregate in numbers in very small areas at the nesting period, but there are a few species, named below, which this Committee think, from their being scattered at the breeding season over a large extent of country, their great rarity, or other causes, might with advantage be protected throughout the whole of the county under the jurisdiction of the Norfolk County Council, and this they think could best be done through the medium of Section 2 (2) of the Act, prohibiting the taking or destroying the eggs of certain named species—the species alluded to are as follows :

[See paragraph iii. of the Secretary of State's order.]

The Committee further approve the suggested placing of the Bearded Titmouse or Reed Pheasant on the Schedule of the principal Act (1880), and would recommend that the name of the Crossbill be also added.

The Committee also recommend that the close time for the eggs of all the birds which it is deemed desirable to protect, and of the protected areas, should be from the 1st day of May to the 1st day of August, both inclusive.

Were it possible to enlist the services of the men of the Coastguard, they would be of the greatest use in carrying the Act into effect.

I am, Sir, your obedient Servant,

(Signed) THOMAS SOUTHWELL,  
Ex-President Norfolk and Norwich Naturalists' Society.

The writer of these notes having been invited to attend the meeting of the County Council Committee, further to explain the views of our Society, but being prevented by illness from being present, addressed a letter to the Chairman, setting forth more fully the reasons which led them to advocate the measures embodied in the above report, and from which the following is extracted :—

“First as to areas. Admitting the principle of ‘specified areas’ to be adopted—the only one, I am convinced, which can be successfully carried out—personally, I should advocate the protecting the whole of the foreshore of the tidal coast from, say, Wolferton Creek to Gorleston North Pier, including the shingles, cliffs, sand hills, warrens, and salt marshes, between the sea and any embankment or other artificial boundary separating the same from the cultivated land. This would have the advantage of simplifying boundaries, and render unnecessary the precise indication of the spots to which the birds resort for the purpose of nesting, which might be attended with prejudicial results, and with regard to which I have always considered it prudent to be very reticent. The inner marshes, such as those at Holme, Holkham, etc., not affected by the salt tides, are generally cared for by their owners or occupiers, or could if considered needful be made the subjects of special application as in the case of the ‘Broad District,’ with regard to which a special memorial will be presented. By this plan the shore-breeding birds which stand in such sore need of protection would be effectually taken care of without hardship to anybody, or the interference with any private rights or vested interests, and the few small birds which would share in the protection are almost without exception insect feeders.

“As to the date on which the close time should commence, there will doubtless be difference of opinion. In order to protect Ducks and Snipe, this should be fixed rather early. I have known Ducks with eggs in the middle of March, and have heard of them late in February. Snipe pair very early, and may have eggs on 1st of April, but with both these species I think it much depends on the early or lateness of the season. The Great Crested Grebe sometimes has eggs as early as the first or second week in April. The shore-breeding birds, Terns, etc., do not lay as a rule much before the end of May. I think the 15th April a good all-round date to commence the close time.

“Those interested would probably not object, by means of a small subscription, to employ a watcher for a few summer weeks, as is already done on the Wells Marshes, but if interest could be made with the Admiralty (or other proper authorities) to allow the Coastguard to watch the shore, it would be a most effectual help, and might be done without in any way interfering with their proper duties. It may be mentioned, if a precedent be required, that the authorities (Trinity Brethren?) gave permission to the various light keepers, afloat and on shore, to keep records and make reports to the Migration Committee of the British Association, which were found to be of great interest.

"A difficulty seems to present itself with regard to a few inland species, such as the Stone Curlew and the Ring Dotterels, which breed in certain open districts and heath lands in central Norfolk. These are too scattered in their breeding places to be prescribed, and, I fear, must be left to the discretion of those who have an interest in their chosen sites.

"The only serious objections which I have heard advanced against the 'specified areas' proposal are (1) That *all* the birds breeding in such areas would have to be protected. This appears to me to be a very minor objection, as the areas mentioned would hardly be those in which obnoxious birds bred, these species almost entirely frequenting woodland districts strictly protected for game, or the immediate neighbourhood of the abode of man (Sparrow), neither of which localities would be likely to be suggested for protection, and could be treated on their individual merits if such were the case. (2) Predacious Birds. The only birds which could be considered to come under this head in the districts to which I have referred are three species of Harrier and the Short-eared Owl (the Kestrel and White Owl are altogether blessings). All these species formerly bred in Norfolk, but have, except in rare instances, ceased to do so. Two species of Harrier and the Short-eared Owl almost entirely subsist on small rodents, thereby conferring undoubted benefit on man, and the third species of Harrier (the Marsh Harrier) although it certainly will, when driven by hunger, attack domestic poultry and ducks, is so rare as scarcely to be worthy of being taken into account, and probably, were the young of the wild breeding birds, which it is hoped will become more numerous by protection, less difficult to obtain, it would not be driven to commit depredations on the domesticated birds to meet its wants.

"I have little more to say than that if the Act is to be successfully carried out, the goodwill of all should be enlisted, friction should be avoided, and care be taken that even prejudice, as far as possible, should be gently dealt with, trusting to experience and time to reconcile those who may be doubters as to the expediency of a measure, the benefits of which they may not at present be able to appreciate."

The following memorial was also presented by the landowners and others resident in Yarmouth and the "Broad District":

TO THE CHAIRMAN, ALDERMEN, AND COUNCILLORS  
OF THE COUNTY COUNCIL FOR THE ADMINISTRATIVE  
COUNTY OF NORFOLK.

THE MEMORIAL of the undersigned Landowners and others interested  
in the protection of Wild Birds.

Sheweth that by a recent Act of Parliament intituled "The Wild Birds Protection Act, 1894," being an Act to amend "The Wild Birds Protection Act, 1880," it is enacted that a Secretary of State may, upon application by the County Council of any Administrative County, by order prohibit—

(1) The taking or destroying of Wild Birds' Eggs, in any year or year in any place or places within that County, or

(2) The taking or destroying the eggs of any specified kind of Wild Birds within that County, or part or parts thereof.

Your Memorialists, whilst fully recognising that the eggs of certain birds should never be taken or destroyed, are strongly of opinion that the object of the above mentioned Acts of Parliament can better be effected entirely prohibiting the taking or destroying of Wild Birds' Eggs in certain districts, than by prohibiting the taking and destroying the eggs of certain specified Wild Birds; in other words, that protection by districts is better than protection by species.

Your Memorialists would indicate the following as districts which are specially deserving of protection, and in which the taking or destroying Wild Birds' Eggs should be totally prohibited after the 30th day of April in every year; that is to say:

[Here follow the specifications as set out in paragraph No. 1 of the Secretary of State's order.]

Your Memorialists therefore pray that you will be pleased to take this matter into your consideration, and thereupon make application to the Secretary of State for an Order prohibiting the taking or destroying of Eggs of any Species of Wild Bird in or upon any of the before mentioned Districts, after the 30th day of April in any and every year.

Dated this 2nd day of February, 1895.

The final result was that the following order was issued by the Home Secretary, to come into force on the 1st of May, 1895, and to continue for one year:

In pursuance of the powers conferred on me by the Wild Birds Protection Act, 1894, and upon application by the County Council of the Administrative County of Norfolk, I hereby make the following Orders:—

I. The taking or destroying of the Eggs of any species of Wild Bird is prohibited for a period of one year from the 1st day of May, 1895, within the following areas:—

Hickling Broad, Whitesley and Heigham Sounds, Blackfleet Broad, Horsey Mere, Martham and Somerton Broads, and the Rands Skirts, and Walls thereof, and Fens and Reed Grounds appertaining thereto respectively, and the Islands therein, and the Dykes communicating therewith, including the Hundred Stream or Thur River, and ancient bed, and the Rands and Walls thereof from Heigham Bridge to the Sea at Winterton, and all the Marshes and low-lying and uncultivated Lands, Fens, Reed Grounds, Warren, Marram or Sand Hills and Sea Shore, to the line of high water mark, in the several parishes of Waxham, Horsey, Potter Heigham and Hickling, and such part of the Parish of Catfield as lies to the East of the Midland and Great Northern Joint Railway.

The Warrens, Marram, or Sand Hills and Sea Shore, to the line of high water mark in the Parish of Winterton.

And the series of Broads known as Ormesby, Rollesby, Hemsby, Filby, and Burgh Broads, and the Rauds, Skirts, and Walls thereof, and the Dykes communicating therewith, and the Fens, Reed Grounds, and low-lying Lands, Marshes, and Pastures adjacent thereto, including Lady Broad or Hard Fen Water in the Parish of Filby, Brandyke Broad in the Parish of Burgh St. Margaret, and Muckfleet Dyke, and the Marshes and low-lying Lands, Marshes, and Pastures near or adjacent thereto respectively.

II. The taking or destroying of the Eggs of any species of Wild Birds is prohibited for a period of one year from the 1st day of May, 1895 within the following areas, viz. :—

The whole of the Foreshore, including the Shingle, Sand Hills, Salt Marshes, Creeks and other unenclosed Lands extending from High Water Mark to the first boundary of enclosed or cultivated land separating the Foreshore from them, from the Estuary Sluice at North Wootton to the Eastern Boundary of the Parish of Cley-next-the-Sea.

III. The taking or destroying of the Eggs of the following species of Wild Birds is prohibited throughout the entire County of Norfolk, viz. :—

1. The Bearded Titmouse or Reed Pheasant. (*Panurus biarmicus*.)
2. The Crossbill. (*Loxia curvirostris*.)
3. The White or Barn Owl. (*Strix flammea*.)
4. Wild Ducks and Teal of all species.
5. The Norfolk Plover, Stone Curlew, or Thickknee. (*Edicnemus scolopax*.)
6. Ruff or Reeve. (*Machetes pugnax*.)
7. The Ring Dotterel, Ring Plover or Stone Runner. (*Ægialitis hiaticula*.)
8. Oyster Catcher or Sea Pie. (*Hæmatopus ostralegus*.)
9. The Terns, Sea Swallows, Pearls, or Dip-cars. (*Sterna*.) All species.
10. The Great Crested Grebe or Loon. (*Podiceps cristatus*.)

IV. The Wild Birds Protection Act, 1890, shall apply within the County of Norfolk to the Bearded Titmouse, or Reed Pheasant, and the Crossbill, as if these two species of Wild Birds had been included in the Schedule to the said Act.

*The foregoing Orders shall come into force on the  
1st day of May, 1895.*

Given under my hand at Whitehall, this 8th day of April, 1895.

(Signed) H. H. ASQUITH.

The Order was renewed for a further period of one year from the 1st of May, 1896. The means are thus obtained of offering a very considerable amount of protection to the rarer birds nesting in the County of Norfolk, but it must be remembered that Acts of Parliament, however excellent, will not enforce themselves, and that to be of any service some means must be devised of making them effectual. The examples set by the Breydon Protection Society, and the similar Society at Wells, which are both doing excellent work at very little cost, should stimulate other districts to similar action, but it must still remain very much a "landlord's question," and if those who have had provided for them such a simple means of protecting the rare and interesting birds which visit their estates will not avail themselves of its advantages, the Act will, I fear, remain to a great extent a dead letter.

T. S.

---

### XIII.

#### THE NORFOLK AND NORWICH MICROSCOPICAL SOCIETY, 1852—1884.

BY JAMES MOTTRAM.

*Read March 30th, 1896.*

It has been suggested as desirable that some record should be made in our Transactions of the Microscopical Society and of some of its members. I gladly therefore endeavour to recall the pleasant memories which remain to me of its meetings.

As I write, I have before me its minute book kept by its first secretary, W. K. Bridgman, who relates that on 19th December 1852, there met at the house of the Rev. Joseph Crompton, beside himself, Thomas Brightwell, F.L.S., Rev. James Landy Brown, M.A., Arthur Morgan, and William Kencely Bridgman, with the object of forming a Microscopical Society, and at an adjourned

meeting at Mr. Bridgman's house, at which Donald Dalrymple, afterwards M.D., and William Brooke were also present, it was determined to carry this into effect; and let me here remind you that the host of the first evening was also your own first President, who in 1869 spoke to you of "rocking your cradle," as he had, in fact, rocked that of the earlier body in 1852. During the next few months the following became members: William Harcourt Ranking, M.D., Edward Copeman, M.D., William Cadge, James Newbegin, Jun., Elijah Bleakley. I shall not allude further to Messrs Morgan, Ranking, Copeman, and Cadge—they were all medical men in busy practice, and they appear very shortly to have found it difficult or impossible to attend the Society's meetings; but as to the other names mentioned more must be said.

THOMAS BRIGHTWELL (b. 1787, d. 1868) was a Suffolk man, who early in the century settled in Norwich to practise as a solicitor. He had from his youth been led to take an interest in Natural History, and as the achromatic microscope became improved, he adopted it in his studies, and devoted his attention to "Pond life." He published a *History of Norfolk Infusoria*, making some very valuable observations in various branches of that subject, but eventually applied himself more especially to the order of the *Diatomaceæ*.

Between 1853 and 1858 he published several papers, chiefly on the Genera *Chaetoceros*, *Rhizosolenia*, and *Triceratium*, which at the time were the acknowledged authority on those forms. The genus *Brightwellia* was established by his friend, J. Ralfs, in his honour, and the specific names of *Triceratium Brightwellii*, *Sarirella Brightwellii*, and of other forms, commemorate him, as does *Chaetoceros Wighamii*, his friend, Robert Wigham (d. 1857), who supplied him with the gathering in which that diatom was first identified.

The disciple of these two men was Frederic Kitton,\* as to whom a separate record appears at p. 201, of this vol.

Kitton assisted Mr. Brightwell in the above investigations, and though his name does not appear in the papers, the latter, in his own circle, never omitted to mention the help he had received, and testified his friendship for Kitton in many ways.

\* Frederic Kitton was President 1874—79, and on the Council 1864—67 1869—72, and 1879—82.

Shortly after 1858 symptoms of cataract warned Mr. Brightwell that his labours must cease, and, practically, blindness ensued. He was a man of deep religious feeling, and bore his trial with all fortitude. In 1862 he intimated his wish to give his instrument and collection of objects to the Society, and further details of what was done follow at page 221. He was requested to be President of the Society for life, and for his satisfaction the monthly meetings were held at his house, at least two or three times a year, to his great enjoyment. His zest for his old studies was equally manifested at the scientific lectures which, in the winters of several of the ensuing years, were given in Norwich by Owen, Pengelly, Waterhouse Hawkins, Rolleston, and others. In a year or two a successful operation restored his sight for ordinary purposes, for which he was deeply thankful, and he was able to attend some of the meetings of the British Association in Norwich in 1868.

The Society's September meeting of that year was held at his house, when he discussed with his friends all the recent interests; but old age had come, a change ensued, and he passed away, without suffering, 17th November, 1868. His response, on hearing of inquiries from some of his old friends a few days before, being: "Give my love to everybody."\*

REV. JAMES LANDY BROWN, M.A. [Council, 1862—65, 1868—71, 1872—75, 1876—79, 1880], son of the Rev. James Brown, who was for forty-eight years the respected incumbent of St. Andrew's and Chaplain of the Prison at the Castle, is the sole survivor of the original members of the Society. He held curacies in Norfolk and London, but in 1852 returned to his native city, and succeeded his father in the chaplaincy. (I notice, by the way, that the senior gentleman is recorded as a visitor at the first meeting of the Society held at his son's house.)

He was an expert in metal work, and also an entomologist, and became very successful in his preparation of objects for the microscope, connected with that study and in other branches. Some weakness in sight induced him, about twenty years ago, to relinquish his favourite pursuit, but he retains his cabinet of some

\* He was from the first the senior member of the Society, and from 1860 till his death its first formally recognised President. See Memoir, with likeness, by his daughter, C. Lucy Brightwell. Fletcher, Norwich, 1860.



municating his acquired knowledge to others, especially the young. As a microscopist he devoted some attention to the lower forms of aquatic life, but he never prepared many objects, or kept any large collection of slides. His instrument was a small one, but passers-by might see it standing near the window of his rooms on Bank Plain, ready to interest any caller in a dip of water from his aquarium.

A warning of trouble in one of his eyes, somewhere before 1860, precluded his further use of the microscope; but he continued a most faithful and interested attendant at the monthly meetings.

Having seen in his native town the benefit and interest excited by the meetings of the British Association, he strenuously advocated that one should be held in the city of his adoption, and in 1868 he acted here in conjunction with Canon Hinds Howell and Dr. Dalrymple as local secretary, so that two of the members of the Microscopical Society filled that office.

In later life he took orders in the Church of England, and died Rector of St. Lawrence parish. All who knew him during his long residence here had for him deep respect and esteem, and he inspired his parishioners, most of whom were of the humbler orders, with the same feelings. He died from a chill, brought on during a hurried visit to his parish to arrange for an Easter tea-party, and those who attended the funeral service in his church can never forget the sight of his little choir boys, whose bitter tears rendered them inaudible, or the long stream of women who reverently walked behind the mourning carriages to the cemetery.

Remember, he was the first President of your Society, and an appreciative mention of him appears in the opening of the Presidential address in 1879, but the writer of that notice had not known him for forty years as I had been permitted to, and I venture therefore to hope that this tribute may not be inappropriate.

He had known JAMES MOTTRAM [Council 1873—76; Secretary, 1859—73], from his childhood, and when in 1856 the latter consulted him as to the purchase of a microscope, he readily assisted him in the selection of a Smith and Beck "Student" stand. But this was not all, for without consulting him he proposed his young friend as a member of the Society. The new instrument, which was fitted to play the part of David to the

Some notes by him of the development of the eggs of *Limnaeus perijer* are entered in the minute book.

One of his pupils, whom he introduced to the Society, was JAMES NEWBEGIN (b. 1820, d. 1871), [Council, 1865—68, 1870— ], who with his father of the same name was a tobacco manufacturer in Norwich. Like Mr. Brown and Mr. Bridgman, he was an expert lathe worker, originally making his own stand (on the Ross model), and afterwards altering it to binocular form. He was a most careful manipulator, and perhaps the chief exhibitor at the meetings of then difficult test objects. In his later years he had but little time to give to his favourite studies, as he threw all his energy, as Vice-Chairman of the Board of Guardians, into the working of the Poor Laws in the City, and he died, at a comparatively early age, deeply regretted by those who knew him.

ELIJAH BLEAKLEY (b. 1818, d. 1857), was educated as a surgeon, but suffering from ill health, and having independent means in the later years of his life, he only practised to assist his professional brethren. He was an expert anatomist, and his connection with the Society, coupled with ample leisure, supplied the stimulus for him to devote his power to the preparation of objects, in which he was eminently successful. He also made one gathering of diatoms at Felixstowe, which had almost world-wide repute—one practically pure, of that beautiful form, *Pleurosigma formosum*. More than once was the search repeated there, but the chance did not recur. Very retiring, but of most kindly manners, he was ever ready to assist his brother members in their studies, and his death, at the age of thirty-nine, was a great regret to them. He also had other earnest interests, as by his will, on the recent death of his widow, his property passed to the Norwich City Mission; but so many years have passed away, that his personality is remembered but by few.

But more should now be said of JOSEPH CROMPTON, M.A. (b. 1813, d. 1878), [Council, 1862, 1871—74], to whom, I believe, the inception of the Society was due. The son of a Birmingham surgeon, and educated at Glasgow University, in 1839 he settled in Norwich as the minister of the Octagon Chapel. Well educated, and endued with all that is most estimable in a man, he had a most happy facility of picking out the salient points in a new book or the most recent discovery in science, and then of com.

municating his acquired knowledge to others, especially the young. As a microscopist he devoted some attention to the lower forms of aquatic life, but he never prepared many objects, or kept any large collection of slides. His instrument was a small one, but passers-by might see it standing near the window of his rooms on Bank Plain, ready to interest any caller in a dip of water from his aquarium.

A warning of trouble in one of his eyes, somewhere before 1860, precluded his further use of the microscope; but he continued a most faithful and interested attendant at the monthly meetings.

Having seen in his native town the benefit and interest excited by the meetings of the British Association, he strenuously advocated that one should be held in the city of his adoption, and in 1868 he acted here in conjunction with Canon Hinds Howell and Dr. Dalrymple as local secretary, so that two of the members of the Microscopical Society filled that office.

In later life he took orders in the Church of England, and died Rector of St. Lawrence parish. All who knew him during his long residence here had for him deep respect and esteem, and he inspired his parishioners, most of whom were of the humbler orders, with the same feelings. He died from a chill, brought on during a hurried visit to his parish to arrange for an Easter tea-party, and those who attended the funeral service in his church can never forget the sight of his little choir boys, whose bitter tears rendered them inaudible, or the long stream of women who reverently walked behind the mourning carriages to the cemetery.

Remember, he was the first President of your Society, and an appreciative mention of him appears in the opening of the Presidential address in 1879, but the writer of that notice had not known him for forty years as I had been permitted to, and I venture therefore to hope that this tribute may not be inappropriate.

He had known JAMES MOTTRAM [Council 1873—76; Secretary, 1859—73], from his childhood, and when in 1856 the latter consulted him as to the purchase of a microscope, he readily assisted him in the selection of a Smith and Beck "Student" stand. But this was not all, for without consulting him he proposed his young friend as a member of the Society. The new instrument, which was fitted to play the part of David to the

Goliath of some of the other members, excited much attention for its compactness and portability; and a most kindly welcome was extended to the young man, who had thus the benefit, not only of the microscopical experience of his elders, but also of their cultured knowledge on many subjects.

He deeply valued the friendships he formed, and could only hope in after years that during the fourteen years he was their secretary and official, he was able in some way to repay their kindness; and it was with great regret that in 1870 he found that, from circumstances chiefly beyond his own control, he could not continue satisfactorily to fill that office.

After October, 1853, no notes of the monthly meetings were made, but I can say that the following were at various times elected members: Hampden G. Glasspoole, of Ormesby, James Mottram, Jeremiah James Colman, Dr. now Sir Peter Eade, M.D., Dr. Webbe, M.D., then living at Lowestoft, but who moved from the district in 1857.

HAMPDEN GLEDSTANES GLASSPOOLE (b. 1825, d. 1887), the son of an East India Captain, lived for many years at Ormesby, near Yarmouth, where he had every opportunity, on the broads and the sea-shore, of pursuing his studies in Natural History, and especially as a botanist. In later life he lived in London, and was a frequent exhibitor to the Quekett Club; but his kindly smile and manner and his constant supply to his friends of choice material for examination and mounting is not forgotten by them.

In the spring of 1857 a desire was expressed that the Society should be photographed in a group. The first attempt, at a meeting at Mr. Colman's, by Mr. J. R. Sawyer, who was then an optician and photographer in London Street, was a failure; but at Mr. Crompton's, on the 30th of June, another trial was more successful, E. Bleakley and J. Mottram being the only two absentees.

In the autumn of that year the Society sustained a great loss in the decease of Mr. Bleakley, but shortly after received important recruits, Frederic Kitton and Francis Sutton, and also Colonel Baddeley, R.A., who was then residing at Gorleston, and who rendered yeoman service to science by using his opportunities there to secure Noctilucae in whose frail bodies many diatoms were found not previously observed, being of pelagic habit.

The next change was in May, 1859, when W. K. Bridgman, who had till then made all the arrangements for the Society, desired to resign the Secretaryship, and J. Mottram was appointed in his stead.

FRANCIS SUTTON, F.I.C. [Council, 1867], well known by the work on Volumetric Analysis which bears his name, and for his practice as a chemist and analyst, added greatly to the interest of the meetings by his practical knowledge as applied to the subject matter of the Society.

About this time Rev. William Cufaude Davie, M.A., of Cringleford, and Charles Mends Gibson, M.R.C.S. (d. 1874), [Council, 1866—69], joined the Society.

In 1862 the presentation by Mr. Brightwell to the Society of his instrument and cabinet of objects necessitated its reconstruction under more definite rules, and with a small share capital of £2 per share, and an annual subscription.

On the 26th September in that year, at a meeting at Mr. Brightwell's, he made some remarks on the nature of his collection of slides, and then formally handed them and the microscope to the Society. On the 3rd October the Secretary superintended their removal to the rooms of the Literary Institution in St. Andrew's, where, by permission of that body, a large cupboard cabinet had been placed for their reception, and, from this time forth, the host of each monthly meeting arranged for the appearance of the microscope on his table, and for its return. In after years, at various dates, two micro-slide cabinets holding 1000 each, a micro-spectroscope, and a micro-lamp were purchased.

For some years (1869—1876) the 'Monthly Microscopical Journal' was taken and circulated amongst the members, and these volumes are now in your own library. In 1872 a 1-10th immersion object glass was obtained, and in 1873 the instrument was converted to a binocular.

In the spring of the year 1863 a microscopical evening was held by invitation, in the rooms of the Literary Institution, courteously granted by the Committee of that body for the occasion. More than one hundred of the friends of the members were present, and twenty-one instruments were placed on the table, with the result that a most enjoyable evening was spent.

The same course was pursued in 1864 and 1866 with a like

result ; and it may be here noted that as most of the microscopists were members of the library, a strong bond of union always existed between the two bodies. It was somewhere about 1866 that became definitely fixed that the meeting of the British Association for 1868 should be held in Norwich, and it was not surprising that during the intervening time the approach of so important an event was continually referred to at the monthly meetings of the Society and it gave the members great pleasure to offer to assist at an evening soirée in St. Andrew's Hall.

Ten instruments were then used for the display of a miscellaneous selection of objects, and were crowded with visitors during the evening.

No further soirées were given by the Society, but in 1871 and 1875 very pleasant evenings, were by his invitation, spent at Mr. Brown's, at which each member had the opportunity of introducing a friend.

At the dates given, the following were elected into the Society  
 1864, August. Rev. D. S. Govett. Left Norwich 1865.  
 1865, December. Michael Beverley, M.D.  
 1866, March. Shephard Thomas Taylor, M.D.  
 1866, April. Josiah Fletcher. Died 1873.  
 1869, May. Thomas Richmond Pinder, LL.B. [Council 1871-73, 1877-80, 1881].

1871, October. Walter Overbury.  
 1871, December. J. W. Whelan. Died 1874.  
 1872, June. Thomas Slack. Left Norwich shortly after.  
 1872, September. John Brooks Bridgman, F.L.S.  
 1872, December. Haynes Sparrow Robinson.  
 1873, April. Octavius Corder. [Council, 1882].  
 1873, November. Rev. Charles Howes. Resigned 1880.  
 1874, March. Herbert Decimus Geldart. [President 1874 Council, 1875-78. President of your Society, 1874, 1882, 1889 whose contributions to the records of our district need no further reference.

1876, December. Benjamin Edgington Fletcher.  
 1877, August. Charles Firth.  
 1878, February. Frederic Wm. Harmer.  
 1878, September. Herbert King.

At the annual meeting in May, 1873, J. B. Bridgman was elec

the place of Mr. Mottram, who resigned, and he the duties of that office till 1884.

JOSEPH BRIDGMAN, eldest son of W. K. Bridgman, was born, 1875—1876. He has contributed to your lists of names, and furnished you with many papers and notes. Recently given his collection of Hymenoptera and of the rest of the subject to the Norwich Museum.

Monthly meetings continued to be held with regularity, but gradually amongst the original members, and by the year 1879 many had passed away.

The removal of Mr. Kitton from Norwich was greatly regretted, in conjunction with Mr. Geldart, been constantly bringing of various objects of interest from his numerous excursions, which he never failed to bring to the notice of the

Naturalists' and Geological Societies and the Science Gossip. Various other interests had claims on the time of the Society, so that thus it came to pass that in April, 1884, it was finally wound up the Society. The slides were distributed amongst the existing members, and the instrument was for some time in the care of Mr. Kitton, but at the present time it, with the microscope and the spectroscope are in the hands of Messrs. Geldart, and Bridgman, and would be available for any emergency which might, phoenix-like, arise.

A time may in some way come seems not improbable, when it would be more welcome than to the writer.

As the Society did not publish, it leaves no printed record, but

its members to other bodies show much useful work, and in the general life of our city the names of those connected with the Norfolk and Norwich Microscopical Society will remain bright and shed lustre.

## XIV.

*MISCELLANEOUS NOTES AND OBSERVATIONS.*

HIGH TIDE ON THE EAST COAST.—On the 16th of May, 1895, a very high tide occurred on this coast, and the sea-water came up the rivers of Norfolk and Suffolk to such an extent that thousands of fish were killed. The river Thurne, from Potter Heigham to Kendle Dyke and Heigham Sounds, contained countless numbers of dead fish. Pike, some of considerable weight, Bream, Bream-flats, also Roach, Perch, Tench, and Gudgeon, and numerous fresh-water Mussels were seen floating on the surface, victims to the salt-tide. At Potter Heigham, several barrel-loads of fish were taken out of the river a day or two after the high tide, and used as food for the pigs. G. Applegate, Jun., a Potter Heigham boatman, states that he remembers several cases of high tide, but not one so disastrous to fish-life as that of the 16th May, 1895. At Oulton Broad the water rose above the Staithe, and I am informed that fish were destroyed in the New Cut, and as high up the Yare as Coldham Hall; the vegetation on the banks also being affected by the sea-water. Captain Day, Pier Master at Gorleston, in a letter to Mr. F. Danby Palmer, states as follows:—"That the high tide of the 16th of May last was quite an exceptional tide for the season. The early morning's tide, on the day named, registered 7 feet 3 inches above zero, or local datum, or say about 15 inches higher than an ordinary high-water spring-tide. This, however, of itself was not at all an excessive flow. But what may in a great measure account for the prolonged presence of salt-water in the upper rivers, and which as you state, destroyed so many fish, was that the low water following this 7 feet 3 inches tide, only ebbed down one foot; there being therefore at low water 6 feet 3 inches above zero, or, in other words, to an ordinary high-water spring-tide. This great volume of water having been pent up by a strong northerly gale during the whole of the ebb, and further backed up by the ensuing flood in the afternoon which rose to 8 feet 10 inches above zero, thereby further assisting the salt water to force its way still higher up the



rivers than would otherwise have been the case had the ebb-tide fallen to its normal depth, which may roughly be taken at 12–15 inches above zero, although it frequently happens that it falls to 1–2 ft. below zero. Therefore, in the case alluded to there would be, over and above an ordinary ebb, a head of salt water quite 5 feet high, pressing, and mixing itself up with the fresh water in the upper rivers, with an additional head of 3 feet 10 inches on the high water. We have, as you are aware, had much higher tides, but not at the same season of the year. I am therefore inclined to think with you that this is the secret of the salt water killing so many fish." The increased amount of dredging now done in the Bure may account for the salt water coming up higher than formerly. It seems to be the opinion of anglers that more fish are killed now by salt tides than was formerly the case.—W. A. NICHOLSON, *Hon. Sec.*

**FISH NOTES FROM YARMOUTH.**—The past year has not been one of exceptional interest with regard to the occurrence of rare fishes. One new species only has been added to the county list, viz., the Streaked Gurnard (*Trigla lineata*). Beyond this there is very little to report upon.

**POLE OR CRAIG-FLUKE** (*Pleuronectes cynoglossus*).—From a pile of Dabs I drew out a fair-sized example of this species on April 3rd, 1895. It is now in Cambridge Museum of Zoology. Another occurred on January 20th, 1896.

**LUMP FISH** (*Cyclopterus lumpus*).—In April, 1895, a number of these were met with.

**SHADS.** **TWAIT SHAD** (*Clupea finta*) and **ALLIS SHAD** (*C. alosa*).—Rather unusual catches were made during May, 1895, in the draw-nets. One specimen of the Twait Shad had fifteen spots on either side. The usual number being nine.

**BASS** (*Labrax lupus*).—A fine specimen, weighing 8 lbs. 10 ozs., length 30½ inches, taken in a draw-net May 28th, 1895.

**PILCHARD** (*Clupea pilchardus*).—One taken in drift-net May 29th, 1895. Others shortly afterwards.

**ALBINO EEL.**—A fifteen-inch creamy-white Eel taken on a "bab" in the river Bure on June 6th, 1895. The "lips" were pink; a faint tinge of same colour adorning the dorsal and anal fins.

**SCRIBBLED MACKEREL** (*Scomber scomber*) var. (*scriptus*).—A twelve-inch example came into my hands on June 25th, 1895.

This is the first Yarmouth record ; and second for the county. (*vide* Trans. Norfolk and Norwich Nat. Soc. vol. v. p. 116). It is now in Glasgow Museum. On December 7th, 1895, another was landed on Fish-Wharf.

**STREAKED GURNARD** (*Trigla lineata*).—The Rev. C. J. Lucas met with a specimen at a fish shop. It was forwarded to me for identification, and to Mr. Lowne for preservation ; its locality of capture was uncertain. Length  $9\frac{1}{2}$  inches. I met with a second on November 22nd, 1895, length  $12\frac{1}{4}$  inches. A bright, fresh, well-authenticated example, 12 inches long, was taken off Lowestoft on March 10th, 1896, and came into my hands a few hours later. It is now in the possession of Mr. E. M. Connop, Rollesby Hall.

**BUBALIS** (*Cottus bubalis*).—On August 17th, 1895, a  $4\frac{1}{2}$ -inch specimen was taken in a draw-net.

**RAY'S BREEM** (*Brama raii*).—Very fine example taken with Herrings by a local drifter on October 29th, 1895. Length  $23\frac{1}{2}$  inches, weight  $5\frac{3}{4}$  lbs. A pen and ink reproduction of this fish appeared in 'Daily Graphic,' October 31st, 1895.

**SPRAT** (*Clupea sprattus*).—On December 5th, 1895, I examined some Sprats with roes beginning to form definitely ; the ova could be detected by aid of a microscope. An unusual and out-of-season catch was made during the third week in February, when roes and milts were found well developed. The ova differed very little in relative size from those of a Herring. I consider that the Sprat regularly spawns in March, and at no great distance from the land.

**ROSE PERCH** (*Scorpena dactyloptera*).—An 8-inch example was brought me on December 11th, 1895. It was taken off Lowestoft.

**NORWAY HERRINGS** (*Clupea harengus*).—Amongst a large consignment of these coarse-grained, hard-boned fish, on December 17th, 1895, I found several that measured 15 inches in length, girth 7 inches, weight  $14\frac{1}{2}$  ounces. A long-shore is only 10 inches. I believe the Norwegian "variety" are simply very aged herrings.

**GREENLAND BULLHEAD variety** (*Cottus groenlandicus*).—A  $5\frac{1}{2}$ -inch specimen captured with Shrimps December 19th, 1895.

**BULL-DOG COD-FISH**.—A well defined specimen of this extremely ugly variety of *Gadus morhua* was hooked off Britannia Pier on December 21st, 1895. Length 21 inches.

**LARGE TURBOTS.**—Two on Wharf, February 1st, 1896. Respectively 29 lbs. and 30 lbs., after being gutted.

**SOLE, variety.**—A curiously rounded Sole was brought me on February 25th, 1896. Length  $7\frac{1}{2}$  inches; extreme width  $4\frac{3}{4}$  inches. Was at least three inches less in length than a fish that width should be.—A. PATTERSON, Hon. Sec. Great Yarmouth Section.

**MIGRATION NOTES FROM LOWESTOFT.**—As circumstances obliged me to spend the spring and summer in the North Cliff, Lowestoft, I spent my spare time in observing the birds frequenting the North Hills and Denes, and offer the following brief notes.

The birds that I noticed migrating were Redstarts, Cuckoos (I counted a flock of fifteen), Yellow Wagtails, Ring Ousels, Turtle Doves, Wheatears.

On October 15th and 16th a strong wind from N.N.W. was blowing, and I observed migrants coming in all day. I could, with my telescope, see them far out at sea, and watched them making for the land. They all seemed to come ashore at the same point, (between the lighthouse and the yacht pond). I observed Rooks, Royston Crows, Starlings, and Peewits. The Rooks, Royston Crows, and Starlings came over in small flocks (twenty to thirty): they flew a few yards above the sea, rising higher as they approached the shore, and some giving voice when the land was reached. A few alighted on the Denes, but the majority flew on inland. The Peewits formed one large bunch, and came flying across the sea, about a hundred yards above it: they went inland without stopping. One of the Rooks was nearly drowned within a hundred yards of the shore, and had the greatest difficulty in reaching the land.—P. H. EMERSON, B.A., M.B. (CANTAB.).

**ACULEATE HYMENOPTERA AT TOSTOCK, NEAR BURY ST. EDMUND'S.**  
—The past summer and autumn—the most beautiful I ever remember—gave me abundance of field-work. Strange enough, without looking for them, I obtained four additions to my list of Aculeate Hymenoptera (vol. vi. pp. 36—46) which I may as well record. *Leptothorax Nylanderii*, Foerst. Under dead bark of Black Poplar, three specimens, September 5th. *Stenamma Westwoodi*, West. One in nest of *Bombus terrestris*, September 11th. *Crabro Pubescens*, Shuck. Bred from stump, August 1st. *Crabro Kollari*, Dhlb [*lituratus*]. On a dead stump, September 1st.

From wasps' and bees' nests I obtained a large number of

Inquiline Beetles, and several new to me, viz. : *Choleva Watsoni* (*Vespa sylvestris*), *Ocypus brunripes* (*Myrmica scabrinodis*), *Ceuthorrynchus sulcicollis* (*Formica fuliginosa*). Although I examined fifteen nests of *V. vulgaris* I only obtained a single "Wasp Beetle" (*Metæcus paradoxus*) on September 14th. Of the general things the pretty *Anthocomus fasciatus* abounded in June, and the following local species:—*Endomichus coccineus*, *Corynetes cœruleus*, *Apoderus coryli*, *Callidium violaceum*, *Lagria hirta*, *Thyamis longitarsus*; and from the breck district near Brandon, Mr. Frank Norgate sent me two coast species, *Cteniopus sulphuralis* and *Anomala Frischii*.

The Fungi in October yielded *Dacne bi-pustulata*, *D. rufifrons*, *Mycetophagus atomarius*, *M. multipunctatus*, *M. 4-pustulatus*, *M. 4-guttatus*, *Rhizophagus bi-pustulatus*, *Nitidula bi-pustulata*, *Triphyllus suturalis*, *Homalium rufipes*, *H. iopterum*, *Epurcea limbata*, *Orchestes alni*, *Triplax russica*, *Pocadius ferrugineus*, *Xylophilus boleti*. Judging by the number of applications I receive, I wonder that coleopterists do not work at Fungi. October is the best month; and the large species growing upon dead trees such as Poplar, Ash, Beech, Birch, and Elm are the most productive, in the order named. Those growing upon ivy-infested trees are not worth trying. The Fungi should be brought carefully home and immersed in a vessel containing rain-water, which quickly brings the mature Beetles to the surface. The Fungi should be then drained and placed in any decayed trees or stumps, when, at the end of March, they will afford a fresh supply.—W. H. TUCK.

P.S.—The brilliant weather in June of the present year (1896), gave me four additions to the Aculeate-hymenoptera, which I take the opportunity of recording as this passes through the press: *Agencia hircana*, Fab.; *Pemphredon morio*, V.D., Lind; *Prosopis signata*, Panz.; *Sphecodes rubicundus*, Sladen; which brings my list to Ants, 9; Fossors, 49; Wasps, 13; Bees, 105; Total 176.

BLACK-WINGED STILT.—My friend, Mr. T. Petch and I, saw two Stilts on Wolferton Marsh, on October 8th, 1895. Mr. Hudson, Jun., of Castleacre, shot a Stilt, close to the river at Castleacre, on October 12th, 1895, which appeared to him to be alone.—C. T. LOWRIGHT.

FULMAR PETREL.—While walking from Thornham to Hunstant we found two recently killed Fulmars on Holme Beach.

of these birds was an adult in full plumage; but the other seemed to be immature.—C. T. M. PLOWRIGHT.

**MUS RATTUS AT YARMOUTH.**—At the last Monthly Meeting it will be remembered, Mr. Patterson, in his Yarmouth Notes, referred to the existence of the old English Black Rat at Yarmouth. I think several of the members expected, as I certainly did, that it was some recent importation of the Mediterranean species (or, as some say, variety), *Mus alexandrinus*, that Mr. Patterson has found; but he stuck to his guns that it was *rattus*, and through Mr. Southwell, who has taken much trouble to thresh out the matter, specimens were sent to Mr. Eagle Clarke at Edinburgh and Mr. Barrett-Hamilton of London. The former wrote at once, 5th March, 1896: "The Rats you send are most undoubtedly the old English species, *Mus rattus*, and their occurrence in abundance in Yarmouth is an interesting fact. *Mus rattus* and *Mus alexandrinus* are considered to be *race* of the same species; the black *rattus*, being the form found in temperate regions, and the brown *alexandrinus* the tropical one. Yours truly, W. EAGLE CLARKE."

Mr. Barrett-Hamilton's reply was almost precisely to the same effect, and equally positive that the specimens sent were *rattus* and not *alexandrinus*. Before two such authorities I suppose we must all submit, and though we have some of us been taught to consider *rattus* and *alexandrinus* good distinct species, though closely allied, it does not, I think, very much matter which we call them, well-marked varieties or closely allied species. But, admitting the Yarmouth Rats to be *rattus* (and I must confess that though unconvinced by some immature specimens shown by Mr. Patterson, a full-grown female he has since sent me, and which Mr. Roberts is preserving for me, is most typical of what I have thought *rattus* to be) this is far from making them of the old English race, those which though apparently not here in the time of the Romans, had still been settled several centuries in the county, when they were driven out by the present universal Brown Rat, *Mus decumanus*, about the time we lost the old line of kings, and the Royal House of Hanover succeeded that of Stuart. The Brown Rat has consequently been very generally known as the Hanoverian Rat. I have myself generally called it by that name. It is supposed to have been originally a denizen of the far East,

some have said China, and like almost everything else gradually spread West till, at last, soon after 1700 it reached these islands, to exterminate quite, or nearly so, the Black Rat, and has since spread with the Anglo-Saxon race to every quarter of the Globe.

To return to *M. rattus*, Mr. Patterson says they are at Yarmouth principally confined to one very plainly marked locality, that section of old "rowed" Yarmouth, lying between the river and King Street in width, and between Friar's Lane and Regent Road in length. Any one who knows Yarmouth will, I think, easily appreciate the significance of their confinement to this district. As Mr. Patterson has said, it is against their recent importation in grain vessels, as all these unload the other side of the river where *rattus* seem to be quite unknown: but it is, to my thinking, equally against their being a survival of the old stock, else why are they not equally to be found in that portion of old "rowed" Yarmouth to the north of Regent Road? It looks to me as though they had been re-introduced (probably from some Continental port) since Regent Road was made, which I expect is something less than a century since, and that this wide street has proved a barrier not easy for them to cross. Mr. Patterson tells me only of one occurrence to the north of Regent Road, and that but just over; while to the south they are fairly common, and, as he says, have been for the last twenty years or more, though they seem to have increased of late. Mr. Patterson has given much time to their observation, and tells me that he knew of them when quite a lad. He says they seem most partial to malt-houses, and that the old houses in that portion of the town where they abound, many of them wainscotted, seem most admirably adapted to their use. He says that Cats both catch and eat them, but their holes are, as a rule, too small for Ferrets to enter, so they cannot be killed in that way.

At the recent meeting of the Yarmouth section of our Society, of which Mr. Patterson is such an admirable secretary, he exhibited what looked very much like a cross between the Black and Brown Rat, but it was only half-grown, and I have a great mistrust of immature specimens for purposes of comparison.

I feel that our thanks are very greatly due to Mr. Patterson for the way in which he has brought another most interesting question before our Society and the public at large.—J. T. HOTBLACK.

TRANSACTIONS  
OF THE  
Norfolk and Norwich  
NATURALISTS' SOCIETY;

*Presented to the Members for*

1896—97.

VOL. VI.—PART 3.

Norwich:  
PRINTED BY FLETCHER AND SON.  
1897.





# Norfolk and Norwich Naturalists' Society.

## OFFICERS FOR 1896—97.

### President.

SIR F. G. M. BOILEAU, BART., F.S.A.

### Ex-President.

MR. H. D. GELDART.

### Vice-Presidents.

THE RIGHT HON. THE EARL OF LEICESTER, K.G.

THE RIGHT HON. THE EARL OF KIMBERLEY, K.G.

THE RIGHT HON. THE LORD WALSHINGHAM, F.R.S.

THE RIGHT HON. THE LORD AMHERST OF HACKNEY.

SIR FRANCIS G. M. BOILEAU, BART., F.Z.S., F.S.A.

MICHAEL BEVERLEY, M.D.

COL. FEILDEN, C.M.Z.S.

HERBERT D. GELDART.

JOHN HENRY GURNEY, F.L.S.

JOHN B. BRIDGMAN, F.L.S.

F. W. HARMER, F.G.S.

T. SOUTHWELL, F.Z.S.

### Treasurer.

MR. W. H. BIDWELL.

### Hon. Secretary.

MR. W. A. NICHOLSON.

### Committee.

MR. E. J. H. ELDRED.

MR. F. C. HINDE.

MR. G. C. EATON.

MR. J. MOTTRAM.

MR. A. MAYFIELD.

MR. E. CORDER.

MR. J. T. HOTBLACK.

MR. J. REEVE.

MR. H. J. THOULESS.

### Journal Committee.

MR. W. H. BIDWELL.

PROFESSOR NEWTON.

MR. JAMES REEVE.

MR. A. W. PRESTON.

### Excursion Committee.

MR. C. BUSSEY.

MR. J. T. HOTBLACK.

MR. E. CORDER.

MR. A. PATTERSON.

MR. F. DIX.

MR. A. W. PRESTON.

### Auditor.

MR. S. W. UTTING.

### Harmony Section.

*Ex-officio Members of the General Committee.*

REV. C. J. LUCAS, *Chairman.* MR. F. DANBY PALMER, *Treasurer.*  
MR. ARTHUR PATTERSON, *Hon. Sec.*

## LIST OF MEMBERS, 1896—97.

\* Members who have compounded for their subscriptions are marked with an asterisk.

- A**
- \*Ames Victor  
Bolton Studios, Fulham Road, S.W.  
Amherst Right Hon. Lord, F.Z.S., V.P.  
Didlington Hall  
Anderson Major J. A. Dilham  
Andrew W. H. M. Colney  
Aplin Oliver V. Bloxham  
Atmore E. A. Lynn
- B**
- Back Rev. A. J. Carleton Rode  
Backhouse James Dale Side, Harrogate  
Baker W. E. Tilney All Saints  
Balls F. Sprowston  
Balls J. E. Castle Meadow, Norwich  
Barclay Francis H. Leyton, Essex  
Barclay H. G., F.R.G.S. Colney Hall  
\*Barclay R. High Lee, Hoddesdon  
Barlee Rev. W., M.A. Cringleford Hall  
Barnard Miss A.  
Prince of Wales Road, Norwich  
Barrett C. G., Hon. Mem.  
39 Linden Grove, Nunhead, S.E.  
Barwell H. G. Surrey Street, Norwich  
\*Becher Major Edward F., R.A., F.Z.S.  
Grosvenor Chambers, Oxford St., W.  
\*Becher Rev. William Wellow, Notts  
Beckett J. B.  
11 Lancaster Road, Great Yarmouth  
Bennett Arthur, F.L.S. Croydon  
Beverley M., M.D., V.P.  
Prince of Wales Road, Norwich  
Bidwell E. 1 Trigg Lane, E.C.  
Bidwell W. H., *Treasurer*,  
Thorpe Road, Norwich  
Bird Rev. M. C. H., M.A., M.B.O.U.  
Brunstead Rectory  
Birkbeck Sir Edward, Bart.  
Horstead Hall  
Birkbeck E. L. Norwich  
Birkbeck H. Stoke Holy Cross  
Birkbeck W. Thorpe St. Andrew, Norwich  
Blake Dr. H. 25 Hall Quay, Great Yarmouth  
Blake E. Bracondale, Norwich  
Bloomfield Rev. E. N., M.A., F.E.S.  
Guestling Rectory, Hastings  
Boardman E. T. Queen Street, Norwich  
Boileau Sir F. G. M., Bart., F.Z.S., F.S.A.,  
*President*, Ketteringham Park  
Boileau Lady Ketteringham Park  
Boileau Miss Ketteringham Park  
Boileau M. C. Ketteringham Park  
Boileau E. F. Ketteringham Park  
Bolingbroke L. G. Ferryside, Norwich  
Borror W., F.Z.S., F.L.S.  
Cowfold, Horsham
- Bridgman J. B., F.L.S., V.P.  
St. Giles Street, Norwich  
Brittain Henry. St. Stephen's Street, Norwich  
Broeck Ernest Vanden, *Hon. Mem.*  
124 Rue de Terre Neuve, Brussels  
Brown Rev. J. L. Chapel Field Grove, Norwich  
Bulwer W. D. E. Quebec House, East Dereham  
Bunsen L. de Colkirk House, Fakenham  
Burlingham D. Catlin Lynn  
Burn Rev. W. Felham, M.A.  
The Chantry, Norwich  
Burnard G. B. Worstead  
Burrell W. H. Sheringham  
Burton James Gt. Yarmouth  
Burton Mrs. J. Gt. Yarmouth  
Burton S. H., M.B. St. Giles Street, Norwich  
Bussey C. St. Martin-at-Palace, Norwich  
Butcher H. F. Chester Place, Norwich  
Butler Colonel  
Brettenham Park, Bildeston, Suffolk  
Butterfield W. C. J. E. St. Leonards  
Buxton A. F. 50 Cornhill, E.C.  
Buxton C. Louis Bolwick Hall, Norwich  
Buxton E. G. Norwich  
Buxton Geoffrey F., F.Z.S.  
Dunston Hall, Norwich  
Buxton H. E. Great Yarmouth  
Buxton H. G. Catton Hall, Norwich  
Buxton S. G., F.Z.S. Catton Hall, Norwich  
\*Buxton Sir T. F., Bart., F.Z.S.  
Warlies, Waltham Abbey
- C**
- Candler C. Harleston  
Candler G. Harleston  
Candler Henry  
War Office, Pall Mall, London, S.W.  
Carter W., Free Library, Great Yarmouth  
Chase E. W.  
Priory Road, Edgbaston, Birmingham  
Christy Miller, F.L.S.  
Pryors, Broomfield, Chelmsford  
Clarke W. G. Thetford  
\*Clifton The Right Hon. Lord  
Dumpton Park, Ramsgate  
Clowes J. E., Hall Quay, Great Yarmouth  
\*Cocks A. H., M.A., F.Z.S.  
Thames Bank, Great Marlow, Bucks  
Collett Professor Robert, *Hon. Mem.*  
The University, Christiania, Norway  
Colman J. J. Carrow House, Norwich  
Colman Russell J. Bracondale, Norwich  
Combe E. H. H.  
Gorleston, Great Yarmouth  
Connop E. M. Rollesby Hall

Cooke G. F. Thorpe, Norwich  
 Cooke M. C., *Hon. Mem.*  
 146 Junction Road, Upper Holloway  
 Cordeaux John Great Cotes, Lincoln  
 Corder O. Brundall  
 Corder Edward London Street, Norwich  
 Cox F. E. East Carlton Rectory  
 Craswell George Lynn  
 Craswell Rev. S. F., D.D., F.R.A.S.,  
 F.R.G.S. Northrepps Rectory  
 Crook Dr. A.  
 Prince of Wales Road, Norwich  
 Cross J. M. Mile End Road, Norwich  
 Crowfoot W. M., M.B. Beccles  
 \*Crowley P., F.Z.S., F.L.S.  
 Waddon House, Croydon

## D

Davis G. C. Town Close, Norwich  
 Day Rev. A. G. M.A.  
 Great Melton Rectory, Wymondham  
 Digby A. Fakenham  
 Dix Francis Essex Street, Norwich  
 Dix Miss E. L. Essex Street, Norwich  
 Downson E. T., F.R. Met. Soc. Geldeston  
 \*Dresser H. E., F.Z.S., F.L.S.  
 Topclyffe Grange, Farnborough  
 Duckett Dr. C.  
 St. George's Terrace, Great Yarmouth  
 Du Port Rev. J. M., M.A., Denver Rectory

## E

Eade Sir Peter, M.D.  
 St. Giles Street, Norwich  
 Eaton George C.  
 Cleveland House, Eaton, Norwich  
 Edwards J., *Hon. Mem.*  
 Colesborne, Gloucestershire  
 Eldred E. J. H. Castle Meadow, Norwich  
 Emerson P. H., B.A., M.B. Oulton  
 Everitt H. R.  
 Prince of Wales Road, Norwich

## F

Falcon Michael Horstead  
 Farn A. B., Mount Nod, Greenhithe, Kent  
 \*Feilden Col. H. W., V.P., F.G.S., C.M.Z.S.  
 West House, Wells  
 Fitch Rev. H. C. Beeston Rectory  
 Fletcher B. E., Marlingford Hall, Norwich  
 \*Fletcher W. H. B.  
 Chapel Road, Worthing  
 Forrester J. B. Tombland, Norwich  
 Foster Charles  
 Thorpe St. Andrew, Norwich  
 Fowler W. Warde, Lincoln College, Oxford

## G

\*Gainsborough The Right Hon. the Earl  
 of Exton Park  
 Gawne Rev. R. M. Keymerstone  
 Geldart H. D., *Ex-President*,  
 Thorpe Hamlet, Norwich  
 Geriah W. B. Wormley, Herts  
 Glandfield W. A.  
 St. George's Terrace, Great Yarmouth  
 Goose A. H.  
 Prince of Wales Road, Norwich  
 Griffiths Rev. H. T. Smallburgh Rectory

Gunn T. E., F.L.S.  
 St. Giles Street, Norwich  
 Gurdon R. T. Letton Hall  
 Gurney Eustace Sprowston Hall  
 \*Gurney Gerard H. Keswick Hall, Norwich  
 \*Gurney J. H., V.P., F.L.S., F.Z.S.  
 Keswick Hall, Norwich  
 Gurney J. Nigel Sprowston Hall, Norwich  
 Gurney R. H. J. Northrepps Hall  
 Gurney R. Sprowston Hall, Norwich  
 Guyett W. J. King Street, Norwich

## H

\*Hackblock W. H. Coltishall  
 \*Haigh C. H. Caton  
 Grainsby Hall, Gt. Grimsby  
 Haldinstein Alfred  
 Unthank's Road, Norwich  
 Hall H. Woodbridge  
 Hamblen W. W. Wells  
 Hamond Charles A.  
 Twyford Hall, East Dereham  
 \*Hamond Rear-Admiral R.H., R.N.  
 Swaffham  
 Harcourt B. W., St. Giles Street, Norwich  
 Harmer F. W., V.P., F.G.S.  
 Cringleford, Norwich  
 Harmer S. F., B.A., B.Sc.  
 King's College, Cambridge  
 Harris G. H., 8 Camperdown, Gt. Yarmouth  
 Harvey E. K. Lowestoft  
 Harvie-Brown J. A., F.B.S.E.  
 Dunipace House, Larbert, N.B.  
 Hastings The Right Hon. Lord  
 Melton Constable  
 Hebbert C. T., F.Z.S.  
 The Rhodron,  
 Hook, Kingston-on-Thames  
 Hector Sir James, M.D., K.C.M.G., F.L.S.  
*Hon. Mem.*  
 New Zealand Institute, Wellington  
 Herring Capt. H. L.  
 Thorpe St. Andrew, Norwich  
 \*Hill Alexander, M.D.  
 Downing College, Cambridge  
 Hinde F. C. Thorpe Hamlet, Norwich  
 Hinde G. J., Ph.D., F.R.S., F.G.S., *Hon.*  
*Mem.* Avondale Road, Croydon  
 \*Hoare S., M.P. Cromer  
 Hooker Sir J. D., M.D., K.C.S.I., C.B.,  
 F.R.S., *Hon. Mem.*  
 The Camp, Sunningdale, Surrey  
 Hotblack G. S. Brundall  
 Hotblack J. T., Newmarket Road, Norwich  
 Howard R. J., M.B.O.U.  
 Hawkhurst, Blackburn

## I

Irby Colonel, F.L.S., F.Z.S.  
 14 Cornwall Terrace, Regent's Park, N.W.

## J

Jarrold W. T. F.  
 Thorpe St. Andrew, Norwich  
 Jenkins Rev. T. L. Worstead  
 Jickling Rev. F. Smallburgh Hall  
 \*Jodrell Sir Alfred, Bart. Bayfield Hall  
 Jones Sir Laurence, Bart.  
 Crammer Hall, Fakenham

## K

Kimberley The Right Hon. the Earl of,  
K.G., V.P.  
Kimberley Hall, Wymondham  
King H. A. Exchange Street, Norwich

## L

Laurence Rev. J. A. Dilham, Norwich  
Laurence B. Norwich  
Leathes Colonel H. M. Dovercourt  
\*Lee Warner Henry Walsingham Abbey  
Lee Warner Henry Swaffham  
Leicester The Right Hon. the Earl of,  
K.G., V.P. Holkham Hall  
Le Pelley Rev. J. L., M.A. Ringland  
le Strange Hamon, F.Z.S.  
Hunstanton Hall  
\*Lindley The Right Hon. the Lord Justice  
East Carlton  
Long F. Wells  
Long J. Dunton  
Lowe John, M.D., Hon. Mem.  
4 Gloucester Place, Portman Square,  
London, W.  
\*Lubbock The Rt. Hon. Sir John, Bart.,  
M.P., D.C.L., F.R.S.  
High Elms, Hayes, Kent

## M

Macpherson A. H.  
51 Gloucester Place, Hyde Park, W.  
Mauby A. B., M.D. East Rudham  
\*Mann T. J.  
Hyde Hall, Sawbridgeworth, Herts  
Manning Rev. C. E., M.A., F.S.A.  
Diss Rectory  
Marsham Major Rippon Hall  
Mayfield A. Mendelsham, Stowmarket  
\*Micklethwait Major G. N. Bath  
Middleton C. Holkham  
Miller Henry, Jun. Bosmere House,  
Norwich Road, Ipswich  
Morley Claude  
34 Berners Street, Ipswich  
Mottram James Bank House, Norwich

## N

Newcome E. C. Feltwell  
Newcome F. d'Arcy Feltwell Hall  
Newton Professor, M.A., F.R.S., Hon.  
Mem. Magdalene College, Cambridge  
Newton E. T., F.R.S., Hon. Mem.  
H.M. Geological Survey Office,  
28 Jermyn Street, London  
Nicholson F., F.Z.S.  
84 Major Street, Manchester  
Nicholson W. A., Honorary Secretary  
Norwich

## O

\*Ogilvie F. M. Sizewell House, Leiston  
Owen Rev. J. R. B. Tofts

## P

Page G. W. Fakenham  
Paget Sir James, Bart., F.R.S., Hon. Mem.  
5 Park Square West, Regent's Park,  
London, S.W.  
Palmer F. Danby, M.S.A.  
Hall Quay, Great Yarmouth  
\*Parkin Thomas, M.A., F.Z.S.  
High Wickham, Hastings  
Parry A. Lound, Lowestoft  
Partridge Rev. W. H., M.A.  
Caston Rectory, Attleborough  
Patterson A., Hon. Sec. Great Yarmouth  
Section 273 Southtown, Gt. Yarmouth  
Pattin Dr. H. Cooper Norwich  
Peake E. 36 Earlam Road, Norwich  
Peckover Alexander Wisbech  
Pigott T. Digby, C.B., F.R.G.S.  
5 Ovington Gardens, S.W.  
Plowright C. E., M.D., Hon. Mem. Lynar  
Power F. D.  
299 Cold Harbour Lane, London  
Preston A. W., F.R. Met. Soc. Bradeston  
Purdy R. J. W. Woodgate House, Aylsham  
Pycraft W. University Museum, Oxford

## R

Ray Rev. H. Unthank's Road, Norwich  
Reeve J., Clarence Road, Thorpe, Norwich  
\*Reid Clement, F.L.S., F.G.S.  
H.M. Geological Survey Office, London  
\*Reid Capt. Savile G., R.E.  
Yalding, Maidstone  
\*Ringer Sidney, M.D.  
Cavendish Square, Norwich  
Ripley Rev. W. N. Earlam Hall, Norwich  
Roberts E. T. Castle Meadow, Norwich  
Robinson H. S. St. Giles Plain, Norwich  
\*Rosebery The Right Hon. the Earl  
K. G. Berkeley Square, London  
Royal Microscopical Society, President  
the, Hon. Mem. 20 Hanover Square, London

## S

Sapwell A. D. Woodford Green, Essex  
Saunders Howard, F.L.S., F.Z.S.  
7 Radnor Place, London, W.  
Savill-Onley C. A. O.  
Boxfields, Galleywood, Chelmsford  
Scherren H., F.Z.S.  
9 Cavendish Road, Harringay, N.  
Sharman W. Cobholm, Great Yarmouth  
Shaw Eland, F.E.S. Fakenham  
Shiple W., Jun. Southtown, Great Yarmouth  
Sillis T. W.  
63 York Road, Great Yarmouth  
\*Singh Prince Frederick Duleep  
Old Buckenham Hall  
Smith W. R. Harleston  
\*Southwell C.  
Gurrey Lodge, Childs Hill, N.W.  
Southwell Miss Janet Norwich  
Southwell T., F.Z.S., V.P.  
10 The Crescent, Norwich  
Spelman W. W. Brundall  
Sutton Francis, F.C.S.  
The Close, Norwich  
Sutton W. L. Norwich

T  
 H. J., 48 Grove Avenue, Norwich  
 Eric de C. St. Giles' Street, Norwich  
 Wilfred S. St. Giles' Street, Norwich  
 J. T. Chapel Field Gardens, Norwich  
 P. W., *Hon. Mem.*  
 S. National Museum, Washington,  
 U.S.A.  
 Rev. J. G.  
 Tostock Rectory, Bury St. Edmunds  
 W. H.  
 Tostock House, Bury St. Edmunds

U  
 H. M., F.Z.S. Feltwell  
 S. W. Thorpe, Norwich

V  
 an Matthew Haileybury College

W  
 ingham The Right Hon. Lord,  
 S., F.P. Merton Hall, Thetford  
 r J. H. Drayton

\*Watling R. A. Scratby Hall, Ormesby,  
 Great Yarmouth  
 Watson A. Q. Thetford  
 Watson Mrs. Stacy  
 Caister Road, Great Yarmouth  
 Wheeler F. D., M.A., LL.D.  
 Bracondale, Norwich  
 \*Whitaker Joseph, F.Z.S.  
 Rainworth Lodge, Mansfield  
 White R. W. St. Giles' Road, Norwich  
 Whitlock F. B.  
 Gregory Boulevard, Nottingham  
 Whitty C. B., M.D. Hunstanton  
 Williams C.  
 Prince of Wales Road, Norwich  
 Wilson Cecil Surrey Court, Norwich  
 Wilson H. F. Chiswick Mall  
 Winter J. J. Drayton, Norwich  
 Woodward H. B., F.R.S., F.G.S., *Hon. Mem.*  
 8 Inglewood Road, West Hampstead,  
 London, N.W.  
 Wright C. A., Knight of the Crown of  
 Italy, F.L.S., F.Z.S.  
 Kayhough House, Kew

Y  
 Young John, F.L.S., F.Z.S.  
 64 Hereford Road, London, W.

# The Treasurer in Account with the Norfolk and Norwich Naturalists' Society, Year ending March, 1897.

	Dr.	£	s.	d.	Cr.	£	s.	d.
To Balance from last year ... ..				7				9
To Subscriptions —		£	s.	d.				
7 for 1896—96 ... ..		1	15	0				
165 „ 1896—97 ... ..		41	5	0				
5 „ 1897—98 ... ..		1	5	0				
Additional payments for monthly notices ... ..				44				5
„ Sale of <i>Transactions</i> ... ..				0				7
				1				5
				6				
				£53				7
				3				
				£53				7
				3				
								34
								9
								0
								7
								17
								6
								0
								8
								6
								0
								12
								0
								0
								3
								0
								0
								6
								0
								1
								0
								0
								1
								1
								0
								5
								0
								0
								2
								10
								3
								£53
								7
								3

## LIFE MEMBERSHIP FUND.

To Balance from last year ... ..	£	s.	d.		£	s.	d.
„ One Composition ... ..			88	16			11
„ Interest for 1896 ... ..			4	0			0
			2	4			10
			£95	1			9
				9			
							£95
							1
							9

Norwich, April 6th, 1897.

Examined and found correct,

STEPHEN WM. UTTING, Auditor.

*List of the Publications received by the Society as Donations  
or Exchanges from March, 1896, to March, 1897.*

---

- BRETT (Charles G., F.E.S.). The Lepidoptera of the British Islands. Vol. iii. 8vo. Lond., 1896. *From the Author.*
- BROW Naturalists' Field Club and Literary and Scientific Association. Annual Reports and Proceedings; vol. xi. for the year ending March, 1896. 2 nos. 8vo. Barrow-in-Furness, 1896. *From the Club.*
- THE Natural History and Antiquarian Field Club. Proceedings, Vol. viii. no. 3. 8vo. Bath, 1896. *From the Club.*
- LEGIUM. Annales de la Société Belge de Microscopie. Tome 21. 8vo. Bruxelles, 1897. *From the Society.*
- VENNET (Arthur, F.L.S.). Records of Scottish Plants for 1895, additional to Watson's 'Topographical Botany,' second edition, 1883. [Reprinted from 'The Annals of Scottish Natural History,' April, 1896.] pp. 3. 8vo. *From the Author.*
- Iceland and Faroe Botany. [Reprinted from the 'Journal of Botany' for August, 1896.] pp. 2. 8vo. *From the Author.*
- Notes on 'The Flora of Dumfriesshire,' by Mr. G. F. Scott-Elliot, F.L.S. [Reprinted from 'The Annals of Scottish Natural History,' October, 1886.] pp. 4. 8vo. *From the Author.*
- Notes on Japanese Potamogetones. [Extrait du 'Bulletin de l'Herbier Boissier, Août, 1896.'] pp. 5. 8vo. *From the Author.*
- DEN (W. Wells). The Cuckoo and its foster parents. Being a portion of the Annual Address delivered to the Members of the North Staffordshire Naturalists' Field Club and Archæological Society. pp. 20. 8vo. Stoke-upon-Trent, 1896. *From the Author.*
- STOL Naturalists' Society. Proceedings. New series, vol. viii. part 1. 8vo. Bristol, 1896. *From the Society.*
- BRITISH Association. Report of the sixty-sixth Meeting of the British Association for the Advancement of Science held at Liverpool in September, 1896. 8vo. Lond., 1896. *From the British Association.*
- Liverpool Meeting, 1896. Report of the Committee appointed for the purpose of making a digest of the observations on the Migrations of Birds, at Lighthouses and Lightvessels, 1880—1887. pp. 27. 8vo. Lond., 1896. *From Mr. T. Southwell, F.Z.S.*
- BRIDGE. Studies from the Morphological Laboratory in the University of Cambridge. Edited by Adam Sedgwick, F.R.S. Vol. vi. roy. 8vo. Lond., 1896.

- CARDIFF Naturalists' Society. Reports and Transactions. Vol. xxviii. part 1. 8vo. Cardiff, 1896. *From the Society.*
- CROYDON Microscopical and Natural History Club. Proceedings and Transactions, 1895—96. 8vo. Croydon, 1896. *From the Club.*
- EALING Natural Science and Microscopical Society. Annual Reports and Proceedings for 1889, 1890, 1892—6. 6 nos. 8vo. Ealing, 1890—96. *From the Society.*
- EDINBURGH Botanical Society. Transactions and Proceedings. Vol. xx. parts 2, 3. 8vo. Edinburgh, 1895—96. *From the Society.*
- EDINBURGH. Royal Physical Society of Edinburgh. Proceedings. Vol. xiii. part 2. 8vo. Edinburgh, 1895. *From the Society.*
- EDINBURGH. Royal Society of Edinburgh. Proceedings. Vol. xx. 8vo. Edinburgh, 1895. *From the Society.*
- EDWARDS (Prof. Arthur M., M.D.). The Fossil Diatomaceæ Older than those of Virginia and California, which are Older Miocene. [Reprinted from 'The Journal of the Quekett Microscopical Club,' March, 1895.] pp. 4. 8vo.
- ESSEX Field Club. Journal of Proceedings. Vol. iv. part 1. 1885. 8vo. *From the Club.*
- Transactions. Vol. iv. part 1. 1885. 8vo. *From the Club.*
- The Essex Naturalist: being the Journal of the Essex Field Club. Vol. viii. nos. 1—12, vol. ix. nos. 1—22. 8vo. Buckhurst Hill, 1894—96. *From the Club.*
- Museum Handbooks, No. 2. Notes upon the Romano-British Settlement at Chigwell, Essex. By I. Chalkley Gould. pp. 16. 8vo. Chingford, Epping Forest Museum, 1895. *From the Club.*
- Special Memoirs, vol. i. Report on the East Anglian Earthquake of April 22nd, 1884. By Raphael Meldola, F.C.S., and William White, F.E.S. 8vo. Lond., 1885. *From the Club.*
- FIELD VOLES (Scotland). Report of the Departmental Committee appointed by the Board of Agriculture to inquire into a Plague of Field Voles in Scotland, with Minutes of Evidence and Appendices. fcp. folio. Lond., 1893. *From Col. Feilden, F.G.S.*
- GALLOWAY (Rev. W. B.). The Chalk and Flint Formation, its origin in harmony with a very ancient and a scientific modern theory of the world. 8vo. Lond., 1886. *From Col. Feilden, F.G.S.*
- GLASGOW. Natural History Society of Glasgow. Transactions. New Series, vol. iv. part 2. 8vo. Glasgow, 1896. *From the Society.*
- GURNEY (John Henry) and Fisher (William Richard). An account of the Birds found in Norfolk, including Notices of some of the rarer species, which have occurred in the adjoining Counties; with Remarks on Migration. [From 'The Zoologist.'] 8vo. Lond., 1846. *From Mr. J. H. Gurney, F.Z.S.*
- GURNEY (John Henry, F.Z.S.). List of Articles and Publications on Ornithology by J. H. Gurney. pp. 4. sm. 8vo. *From Mr. J. H. Gurney, F.Z.S.*



- URNEY** (John Henry, F.Z.S.). On the occurrence in England of the Caspian Tern. pp. 2. 8vo. [Reprinted from 'The Zoologist,' Dec., 1887.] *From the Author.*
- On the Beak of the Scoter. pp. 4. 8vo. [Reprinted from 'The Zoologist' for August, 1894.] *From the Author.*
- Ornithological Notes from Norfolk, 1894—1896. [Reprinted from 'The Zoologist.'] 8vo. *From the Author.*
- The Norwich Museum. [Reprinted from 'The Zoologist' for March, 1896.] pp. 10. 8vo. *From the Author.*
- On the effect of westerly winds on the Flight of Gulls (*Laridæ*) and other Birds. [Reprinted from 'The Ornithologist,' April, 1896.] pp. 9. 8vo. *From the Author.*
- UNDE** (George Jennings, Ph.D.). Descriptions of new Fossils from the Carboniferous Limestone. [From the Quarterly Journal of the Geological Society for August, 1896.] pp. 14. 8vo. *From the Author.*
- HOOKER** (Sir Joseph Dalton, C.B.). Himalayan Journals; or, Notes of a Naturalist in Bengal, the Sikkim and Nepal Himalayas, the Khasia Mountains, &c. [Vol. xxxii. of the Minerva Library of Famous Books. Edited by G. T. Bettany.] sm. 8vo. Lond., 1891. *From the Author.*
- Lecture on Insular Floras, delivered before the British Association for the Advancement of Science, at Nottingham, August 27th, 1866. pp. 36. 8vo. Lond., 1866. *From the Author.*
- Speech at the Anniversary Dinner of the Royal Society, Nov. 30, 1887, in reply to the Toast—"The Medallists," coupled with the name of Sir J. D. Hooker (the Copley Medallist). pp. 8. 8vo. *From the Author.*
- S** (The), a Quarterly Journal of Ornithology. Edited by P. L. Sclater, Ph.D., F.R.S., and Howard Saunders, F.L.S. Seventh Series, vol. ii. nos. 2—4. 8vo. Lond., 1896. *From Mr. G. F. Buxton, F.Z.S.*
- LIVERPOOL** Geological Association. Journal. Vol. xiv. 8vo. Liverpool, 1894. *From the Association.*
- LIVERPOOL** Geological Society. Proceedings. Vol. vii. part 3. 8vo. Liverpool, 1895. *From the Society.*
- LONDON**. British Museum (Natural History). Guides. 5 nos. 8vo. Lond., 1885—88. *From Col. Feilden, F.G.S.*
- I. Guide to the Collection of Fossil Fishes in the Department of Geology and Palæontology. 1885.
  - II. A Guide to the Exhibition Galleries of the Department of Geology and Palæontology. Fourth edition. 1886.
  - III. Guide to the Shell and Starfish Galleries (Mollusca, Echinodermata, Vermes) in the Department of Zoology. 1887.
  - IV. Guide to the Galleries of Reptiles and Fishes in the Department of Zoology. 1887.
  - V. Mineral Department. An introduction to the study of Minerals, with a guide to the Mineral Gallery. 1888.

- LONDON. British Museum (Natural History). Guides. 15 nos.  
8vo. Lond., 1888—97. *From the Trustees of the British Museum.*
- I. A General Guide to the British Museum (Natural History). 1895.
  - II. Guide to the Shell and Starfish Galleries (Mollusca, Echinodermata, Vermes) in the Department of Zoology. Second edition. 1888.
  - III. A Guide to the Exhibition Galleries of the Department of Geology and Palæontology. Part 2. Fossil Reptiles, Fishes, and Invertebrates. 1890.
  - IV. Guide to the Galleries of Reptiles and Fishes in the Department of Zoology. Third edition. 1893.
  - V. Guide to the Galleries of Mammalia (Mammalian, Osteological, Cetacean) in the Department of Zoology. Fifth edition. 1894.
  - VI. Mineral Department. An Introduction to the Study of Meteorites. 1894.
  - VII. A Guide to the Mineral Gallery. 1895.
  - VIII. Mineral Department. An Introduction to the Study of Minerals. 1895.
  - IX. The Student's Index to the Collection of Minerals. 1895.
  - X. Mineral Department. An Introduction to the Study of Rocks. 1896.
  - XI. Guide to Sowerby's Models of British Fungi in the Department of Botany. 1893.
  - XII. Guide to the British Mycetozoa exhibited in the Department of Botany. 1895.
  - XIII. A Guide to the Fossil Reptiles and Fishes in the Department of Geology and Palæontology. 1896.
  - XIV. A Guide to the Fossil Mammals and Birds in the Department of Geology and Palæontology. 1896.
  - XV. Guide to the Fossil Invertebrates and Plants in the Department of Geology and Palæontology. 1897.
- LONDON. Geological Society. Quarterly Journal, nos. 206—209.  
8vo. 1896—97. *From Col. Feilden, F.G.S.*
- LONDON. Royal Geographical Society. The Geographical Journal, including the Proceedings of the Royal Geographical Society. 1896. 2 vols. Lond., 1896. *From Mr. H. G. Barclay, F.R.G.S.*
- LONDON. Royal Microscopical Society. Journal of the Royal Microscopical Society; containing its Transactions and Proceedings, etc. April, 1896 to February, 1897. roy. 8vo. Lond., 1896—97. *From the Society.*
- LONDON. Royal Institution of Great Britain. Proceedings. Vol. xiv. part 3. 8vo. Lond., 1896. *From the Royal Institution.*
- LONDON. South London Entomological and Natural History Society. Abstract of Proceedings for the Year 1896. 8vo. *From the Society.*
- MANCHESTER Geological Society. Transactions. Vol. xxi. no. 12; vol. xxii. nos. 3, 13; vol. xxiii. nos. 3—9; vol. xxiv. nos. 1—10; vol. xxv. nos. 1—3. 8vo. Manchester, 1891—97. *From the Society.*
- MANCHESTER Literary and Philosophical Society. Memoirs and Proceedings. Fourth Series. Vol. x. nos. 1—3 and vol. xli. parts 1 and 2. 8vo. Manchester, 1896—97. *From the Society.*

- MANCHESTER** Literary and Philosophical Society. List of the Members and Officers, etc. pp. 53. 8vo. Manchester, 1896.  
*From the Society.*
- MANCHESTER** Microscopical Society. Transactions and Annual Report, 1885. 8vo. Manchester, 1896. *From the Society.*
- MARTORELLI** (Prof. G.). Nota Zoologica sopra i Gatti selvatici e le loro affinità colle razze domestiche. pp. 32. 8vo. Milano, 1896.  
*From Mr. J. H. Gurney, F.Z.S.*
- MONTVIDEO.** Anales dei Museo Nacional de Montevideo, publicados bajo la direccion de J. Arechavaleta. Nos. V., VI. imp. 8vo. Montevideo, 1896. *From the Museum.*  
V. Las gramineas uruguayas (continuación), por Prof. J. Arechavaleta.  
VI. Nuevo fermento butyrico, por Vicente Curci.
- NEW ZEALAND.** Transactions and Proceedings of the New Zealand Institute. Vol. xxviii. Edited and published under the authority of the Board of Governors of the Institute, by Sir James Hector, K.C.M.G., M.D., F.R.S. Director. 8vo. Wellington, 1896.  
*From the Institute.*
- NORTH STAFFORDSHIRE** Naturalists' Field Club and Archæological Society. Annual Report and Transactions. Vol. xxx. Stoke-upon-Trent, 1896. *From the Society.*
- NORTHUMBERLAND.** Natural History Transactions of Northumberland, Durham, and Newcastle-upon-Tyne. Vol. xiii. part 1. 8vo. Lond., 1896. *From the Society.*
- NORWAY.** The Norwegian North Atlantic Expedition, 1876—78. [In Norwegian and English.] Part 23. folio. Christiania, 1896. *From Professor Newton, F.R.S.*  
Contents :—Zoology. Tunicata.
- PLYMOUTH** Institution and Devon and Cornwall Natural History Society. Annual Report and Transactions. Vol. xii. part 2. Plymouth, 1896. 8vo. *From the Institution.*
- RUSSIA.** Bulletin de la Société Impériale des Naturalistes de Moscou. Année 1896. nos. 1—3. 8vo. Moscou, 1896. *From the Society.*
- SCHERREN** (Henry). Ponds and Rock Pools. With hints on collecting for and the management of the Miro-Aquarium. sm. 8vo. Lond., 1894. *From the Author.*
- SHEFFIELD** Naturalists' Club. Twenty-fifth Annual Report, 1895. pp. 30. 8vo. Sheffield [1896]. *From the Club.*
- SOUTHWELL** (Thomas, F.Z.S.). Memoir of the late John Henry Gurney, [Reprinted, with some revisions, from the Transactions of the Norfolk and Norwich Naturalists' Society, vol. v. p. 156.] pp. 12. 8vo. Lond., 1896. *From Mr. J. H. Gurney, F.Z.S.*
- UNITED STATES OF AMERICA.** Annual Report of the Smithsonian Institution for the year ending July, 1894. 8vo. Washington, 1896. *From the Smithsonian Institution.*
- Bulletins of the United States Geological Survey. Nos. 123—126, 128, 129, 131—134. 8vo. Washington, 1895—6.  
*From the U.S. Geological Survey.*

- UNITED STATES OF AMERICA. Fifteenth Report of the United States Geological Survey, to the Secretary of the Interior by J. W. Powell, Director. imp. 8vo. Washington, 1895.  
*From the U.S. Geological Survey*
- Sixteenth Report of the United States Geological Survey to the Secretary of the Interior. Charles D. Walcott, Director. In four parts. imp. 8vo. Washington, 1895—96.  
*From the U.S. Geological Survey*
- Seventeenth Annual Report of the United States Geological Survey, to the Secretary of the Interior. Charles I. Walcott, Director. Part 3 in 2 vols. imp. 8vo. Washington 1896.  
*From the U.S. Geological Survey*
- North American Fauna. Published by authority of the Secretary of Agriculture. No. 12. 8vo. Washington, 1896.  
*From Col. Feilden, F.G.S*
- American Museum of Natural History. Annual Report for the year 1895. 8vo. New York, 1896.  
*From the American Museum*
- Report upon Natural History Collections made in Alaska between the years 1877 and 1881. By Edward W. Nelson 4to. Washington, 1887.  
*From Col. Feilden, F.G.S*
- Bulletin of the Chicago Academy of Sciences. Vol. ii No. 2. Preliminary outline of a New Classification of the Family Muricidæ, by Frank Collins Baker. 8vo. Chicago, 1895  
*From the Academy*
- Illinois States Laboratory of Natural History, Champaign Ill. Biennial Report of the Director, 1893—94. pp. 36. 8vo Chicago, 1894.  
*From the Director*
- UPSALA. Bulletin of the Geological Institution of the University of Upsala. Edited by Hj. Sjögren. Vol. ii. part 2. Upsala 1896.  
*From the University of Upsala*
- WHITLOCK (F. B.). The Migration of Birds. A consideration of Herr Gätke's Views. 8vo. Lond., 1897. *From the Author*
- YEAR-BOOK of the Scientific and Learned Societies of Great Britain and Ireland; comprising lists of the Papers read during 1895. 8vo. Lond., 1896. *Purchased*
- YORKSHIRE Naturalists' Union. Transactions. Part 20. 8vo Leeds, 1896. *From the Union*
- ZOOLOGIST (The): a Monthly Journal of Natural History. April 1896, to March, 1897. 8vo. Lond., 1896—97.  
*From Mr. G. F. Buxton, F.Z.S*

## ADDRESS.

*read by the President, SIR FRANCIS G. M. BOILEAU, BART  
F.Z.S., F.S.A., to the Members of the Norfolk and Norwich  
Naturalists' Society, at their Twenty-eighth Annual Meeting,  
held at the Norwich Castle-Museum, April 6th, 1897.*

MES AND GENTLEMEN—On vacating the chair to which you  
elected me twelve months since, in accordance with the usual  
practice pursued by your Presidents, I wish to take a brief review  
of the Society's work during that period, and I think we may  
gratulate ourselves on having had a fairly prosperous year.

Financially, as you have heard from our Treasurer, we are in  
a good position. We commenced the year with 264 members, of  
whom we have lost by death and other causes 20, but have elected  
24 new members, leaving the present number 256. A considerable  
number of valuable additions have been made to the library by  
purchase and exchange; chief amongst the donors are Sir J. D.  
Hooker, Professor Newton, Messrs. H. G. Barclay and G. F. Buxton,  
and Colonel Feilden. The Library is steadily increasing and has  
acquired some of considerable value; the Committee recommend the  
transfer of £10 from the Life Membership Fund for binding,  
which has got somewhat into arrear.

I think it is regrettable that the Excursions, which were formerly  
an attractive feature in the programme of our Society, and which  
as you will find specially enumerated amongst its "objects,"  
of late have fallen almost entirely into abeyance. During  
the past year the members of the Society have not had a single  
meeting together. Now when we consider how interesting these  
meetings are, how useful they are in promoting friendly inter-  
course between the members, and in keeping alive the remembrance

of our very existence amongst our country members, many of whom can rarely be present at the monthly meetings, I cannot help saying that I think we are neglecting one very important section of the Society's work, and one which, in my opinion, forms, or should form, a very tangible outward and visible sign of its vitality. I trust that, in the coming year, the Excursion Committee will take this into consideration. Our monthly meetings too have not been so well attended as could be wished; members by their absence have often missed very enjoyable evenings, and they should remember that their presence is an encouragement to those who at considerable expenditure of labour prepare papers for us.

During the past year I regret to say we have lost five members by death: Herr Gätke, Lord Lilford, Mr. Stacy-Watson, Rev. C. J. Lucas, and Mr. Woolfe Haldinsein. The latter, although a member since 1874, has been non-resident, and never took an active part in the affairs of the Society. Mr. C. Stacy-Watson, who died very suddenly on the 15th of November, 1896, was instrumental in establishing the Yarmouth Section of the Society, and has contributed the article on the Herring Fishery for the years 1894 and 1895. He was the proprietor of the Yare Fishery Works at Yarmouth, and his paper in vol. v. p. 584 of our 'Transactions,' on the "Varieties and Distribution of the Herring," throws considerable light on the localities frequented by this valuable food-fish, both in the seas of Northern Europe and those of America, and points out the distinguishing features of the various races found on the different fishing-grounds, some of which differ considerably from each other. Mr. Watson was a man of active business habits, and took the lead in several philanthropic works, in which he will be much missed.

Lord Lilford has been an honorary member of the Society since 1876, and contributed to its 'Transactions' two papers (in 1888 and 1890) on the Birds in the Lilford Aviaries, which were unsurpassed in the spaciousness and convenience of their arrangements, and the inmates of which were maintained in the highest perfection of plumage. In the death of this distinguished naturalist, which took place rather suddenly on the 17th June, 1896, the science of Ornithology throughout the world sustains a severe loss.

orough naturalist and an ardent sportsman, yet ever to advance the cause of humanity,—as evidenced in judicious support of the Society for Protection of Birds,—judgment was always tempered with that sound common-sense which avoided sentimental extremes, and his liberality in promoting the objects of his favourite science was unbounded. Lilford was a martyr to gout, and spent much time on his yacht ("Zara") in the Mediterranean, adding largely to his knowledge of the birds of the islands and shores of the sea. From his frequent visits to Spain he was also an acknowledged authority on the birds of the Peninsula; but he by no means confined himself to exotic ornithology, and his book on 'Birds of Northamptonshire' is the model of what a county book should be, while his 'Coloured Figures of the Birds of the Channel Islands,' unfinished at the time of his death, is unsurpassed in the beauty of its illustrations. As a sportsman he was a skilful decoyman, an expert decoyman, and an ardent follower of the Otter-hunt. Mr. Southwell, to whom I am indebted for these notes, informs me that Lord Lilford was in correspondence with him on the subject of Otters till within a few days of his death.

Another honorary member, Herr Gätke, died on the 1st of July, 1897. Few men enjoyed such opportunities of studying the phenomena of Migration, and few could have made so good a use of his opportunities. Gätke was born in 1813, at the small town of the Mark of Brandenburg, and as a young man he went to Heligoland, induced by the facilities that island offered for the study of marine painting, and so enamoured did he become of that quaint little island that he never left it. He held an official position under the British Government, and when Heligoland was transferred to Germany he still continued to reside in his adopted island. The work of Gätke's life is embodied in his 'Birds of Heligoland' which, as has been aptly said, is of great value, "not only because it embodies the results of fifty years' observations at one particular station, and on that account most reliable, but also because it contains so many suggestive remarks which invite the consideration of other observers, who, though less

favourably situated than himself, may be able one day, with the aid thus afforded them, to deal effectively with some of the problems of migration as yet unsolved."\* Herr Gätke's book, which a copy presented by the author will be found in our library must be read to appreciate the nature and amount of work accomplished by this ardent observer, and the methods by which he obtained the remarkable collection of something like 39 species of birds secured by him on the island. Though failing in health, Gätke lived to see the English translation of his book which afforded him great satisfaction, the only regret being that a perfect a master of our language left it to others to produce a translation.

The Rev. C. J. Lucas died at Burgh House, Burgh Margaret's (of which parish he was Rector and Lord of the Manor), on the 11th March last. He joined the Society in 1877 and has been President of the Yarmouth Section since its formation. His life has been spent in the neighbourhood of the Broads, and he keenly appreciated the opportunities he has so long enjoyed of studying the remarkably rich "avifauna" of this favoured district. As a large landowner, he was instrumental in obtaining the order in Council by which this important district was brought under the Wild Birds Protection Act of 1894. The members of our Society will remember the kind reception given them, when on the 28th June, 1894, in conjunction with the Yarmouth Section, they paid a visit to Mr. Lucas at Burgh House, and under his guidance explored the beauties of Ormesby, Rollesby, and Filby Broads and the adjoining marshes, which were full of interest both to the ornithologists and botanists then present. Mr. Lucas formed a very valuable representative collection of the birds of the district, many of which are very rare. On our visit we noticed specimens of the Kite, Red-footed Falcon, Nutcracker, Avocet, Stilt Plover, Little Bustard, Little Bittern, and Stork, all obtained in that neighbourhood, and a Great Bustard trapped at Eriswell in Suffolk about 1827, the

\* 'Zoologist,' 1895, p. 366.



very interesting history of which is set forth in the 'Birds of Norfolk,' vol. ii. p. 36. Mr. Lucas's kindly disposition endeared him to all, and he will be greatly missed by his numerous friends and dependents.

Amongst the papers which have been read before the Society, and which will appear in the forthcoming number of the 'Transactions,' and therefore do not require to be noticed in detail, I may mention one by Mr. Gurney, on "The Tendency of Species of Birds inhabiting different Geographical Areas to resemble other allied species in plumage;" and a valuable paper on the "Vertebrate and Plant Life of Ben Nevis" by Colonel Feilden, supplemented by remarks by Mr. Geldart, followed by a paper on "Hawking in Norfolk" by Mr. J. E. Harting, all read at the September meeting.

In October, Mr. E. Corder made some suggestions on the subject of, and laid before the Society his proposal to establish, a fresh-water Biological Station in Norfolk: he also furnished some particulars as to the probable cost of such a station, which he estimated at about £150 per annum. An interesting discussion followed, and it was hoped that the subject, which was also attracting attention in other quarters, would not be lost sight of.

At the November meeting, Mr. Harris gave an interesting paper on the Trees and Plants of the Valley of the Wye; and a specimen of Pallas's Warbler killed in Norfolk, and new to the British Fauna, was exhibited.

In January, Mr. Southwell read a paper on "Some recent Discoveries in the Life-history of the Common Eel," followed by the usual report on the Herring Fishery, which, in consequence of the death of Mr. Stacy-Watson, Mr. Harris has been good enough to undertake.

In February, communications were read from Mr. Clement Reid on the so-called *Paradoxocarpus carinatus*\* from the Forest-bed, which had been found to be the fruit of the Water Soldier (*Stratiotes aloides*), and from Mr. H. E. Dresser on "Pallas's Warbler."

\* See the Society's 'Transactions,' vol. v. p. 382.

Mr. Preston has also contributed his usual valuable Meteorological Report, Mr. Southwell that on the progress of the Castle-Museum, and Mr. W. G. Clarke a contribution to the Fauna of the Thetford district. From time to time we have also been favoured with the Natural History Notes from Yarmouth by Mr. Patterson.

Of papers read before the Society, which will not be found printed in its 'Transactions,' may be mentioned, one by Mr. Southwell on the "Digest of the Observations on the Migration of Birds," prepared by Mr. Eagle Clarke, and presented to the British Association at their Liverpool meeting. The investigations of the Migration Committee revealed the fact, that there are two main migratory routes to and from our shores; one of which in spring takes a north-easterly direction leading to Northern Europe, the other at the same season takes a direction more or less east to west from the Continent, crossing the southern portion of the North Sea: in autumn these routes are reversed. The birds of passage by the northern route arrive and depart from the portion of the British Coast lying north of the Wash, arriving and departing during the hours of darkness; whereas those using the southern route arrive and depart from the East Coast south of the Lincolnshire border, passing the narrow sea by daylight. The meteorological aspect of the subject was found to reveal some rather unlooked-for results, the direction of the wind having little influence upon the movements of the birds, provided it be not too strong. The frequency of migratory movements during winds blowing from a certain direction was explained by the fact, that, easterly and south-easterly winds usually accompany the anti-cyclonic type of weather favourable to such movements. Temperature also influences the migratory movements very considerably, and fog caused the birds to wander out of their course; but gales of wind which sometimes overtake the migrants during their passage are still more fatal, often driving them into unwonted localities, or causing them to perish at sea from exhaustion or want of food.

Mr. Southwell also, at the April meeting, continued his remarks upon some of the rarer birds in the Castle-Museum (for which

purpose an adjournment was made to the Foreign Bird-Room), confining his attention to the Orders devoted to the Petrels, Albatrosses, Grebes, Auks, Flamingoes, Geese, Swans, and Ducks, which he illustrated by the specimens in the cases. On this, as on a previous occasion, the Members of the Science Gossip Club were invited to attend, a compliment which they returned on the occasion of Mr. Harmer's lecture "On the Geological Conditions of the Pliocene Period in Northern Europe," delivered before the members at their Club on the 8th of December.

It is with pleasure we note the good work done by the two local Societies for the protection of birds during the close time. With only a single watcher on Breydon, Mr. Gurney, in a recent paper in the 'Zoologist,' shows that the Breydon Wild Birds Protection Society has fully justified its existence. It was not to be expected that with such inadequate means an entire stop could be put to illegal shooting, but many birds which would otherwise have been slaughtered have certainly escaped. Mr. Gurney estimates that in the last ten springs and summers, not less than eighty-four Spoonbills have visited Breydon Water, and adds: "Surely if our gunners would be considerate enough to let this grand bird alone, the woods of Cantley and Caister might rejoice in its presence again in the breeding time." That this is not at all improbable, is indicated by the way in which flocks of these birds, sometimes numbering twelve or thirteen individuals, visit us in spring, evidently in search of breeding quarters. Colonel Feilden also writes, with regard to the Society for protecting the breeding Terns, &c., on the Wells Sand Hills, that during the seven years of its existence the Society has not had a single prosecution, and he does not believe (with the exception to be mentioned) that a single egg has been taken, and they have received the sympathetic support of the shore-going people, who as a rule appreciate their efforts. "One year only," writes Colonel Feilden, "did I omit putting on the watcher, partly because I was out of the country, and partly because I was somewhat desirous of seeing the result—which was that the idle boys harried and broke all the eggs, and hardly a Tern was hatched off. The mere fact of the watcher

being on the ground from early in May to the end of July is quite sufficient." And all this has been done at a cost of not more than £7 for each season. There is no doubt that the 1st of August is too early for the termination of the close time for these birds, as many of them have hardly left the nest on that date, and an extension to the 15th August would be attended with great advantage.

There is one subject which ought to be brought to your attention, that is, the subject of Federation, or District Union of Natural History Societies. It is specially advocated by the Corresponding Societies Committee of the British Association. The Honorary Secretary of the Essex Field Club has also approached us on the subject, and in his letter states as follows :—There are several degrees of Federation. (1) For the purpose of holding a joint Annual Meeting for reading papers, etc., and promoting unity of work. (2) For joint publication. (3) For the purpose of united action with regard to some piece of work, *e.g.*, Zoological Stations, inland or marine, etc. The subject has come before our Committee, but no actual steps have yet been taken. We are asked by the British Association to favour them with our views as to the proposal. There are several Naturalists' Unions already in existence (notably, the Yorkshire Naturalists' Union), all doing good work. The formation of an East Anglian Naturalists' Union would, evidently, be a step in the direction of the Organization of Scientific Research, and might increase the usefulness and efficiency of our own Society.

[The remainder of the President's Address was devoted to general observations made in the course of his very extended travels in all parts of the world, which included a visit to the Tunny fishery in the Bay of Paglia, a visit to Herr Gätke at Heligoland, the Fin-whale fishery at Vadso, in Finmark, shooting in the Himalayas, and interesting notes of occurrences in India and Ceylon, where in the latter island he came into contact with wild elephants. A visit to the Hamurana river, in New Zealand, and an account of the small eyeless fish, which are found in its waters, where this remarkable stream bursts suddenly with

great force from its subterranean source. Some of the notable members of the extremely interesting fauna of these islands were referred to, amongst others the curious flesh-eating Parrot known as the "Kea." Sir Francis has enriched the Castle-Museum with specimens of the beautiful Tui or Parson Bird, the Huia or Neomorpha of Gould, the rare Stitch Bird, and the extremely aberrant Owl known as the White-faced or Laughing Owl, of which on the same trip he obtained a stuffed specimen, an egg, and a living example, the two former being now in the Museum collection. Some of the equally singular vegetable productions of New Zealand were also referred to, also those of Ceylon, the botanical gardens at Kandy being described as unquestionably the most beautiful in the world. Amongst the wonders of the vegetable world which the President had visited were the giant Wellingtonias at Wawona in California, the celebrated Bo tree at Anaradapura, Ceylon, said on good authority to have been planted 245 years B.C., the ancient Dragon trees in Teneriffe, and the giant Gum-trees of New Zealand and Tasmania, but the most curious of all were the Japanese dwarfed trees, some of which, of great age, may be covered by the hand.]

---

## I.

ON THE TENDENCY  
IN BIRDS TO RESEMBLE OTHER SPECIES.

By J. H. GURNEY, F.L.S., V.-P.

*Read 29th September, 1896.*

I BELIEVE I am not the only observer who has long thought among Birds, both British and foreign, there is a tendency in species to vary now and again in colour of plumage, so as to resemble more or less other allied species, without this occasional "sport" in any way invalidating their distinctiveness as separate forms worthy of binomial nomenclature.

Thoughts such as these must have passed through the mind of almost every collecting naturalist, and puzzled him in some branch of zoology, if not in ornithology especially. It remains to be seen whether the theory has anything in it which will bear the test of examination, as, if it can be proved, it is of immense importance to ornithologists.

It is a tendency distinct from climatal variation, but which nevertheless, if it can be proved, probably been answerable for the creation of some of the many subspecies given to the Birds of late years by writers. That such a tendency does exist, is extremely probable, though at present our eyes are too veiled to understand it; and that it is something wholly different from the absence of colouring matter which makes albinism, or the presence of pigmentation which makes melanism and erythryism, is also probable. The existence of wild hybrids greatly complicates this question of resemblance by variation in Birds, for it is almost impossible to prove that the twenty variations to be enumerated (and many others of nearly the same kind recorded in Suchetet's 'Oiseaux Hybrides') were not due to crossbreeding. There can be no doubt whatever that crossbreeding goes on in a state of nature where species overlap or find a scarcity of hens of their own kind, and also occasionally where this is not the case. Illustrative of

For class are the Grey Crows, Goldfinches, and Grey Shrikes, and the latter the Blackgrouse and Greenfinch. The old naturalists had no idea of the extent of crossbreeding, though it went on before their eyes; some of them almost scouted its possibility. The labours of M. Andre Suchetet have shown how common hybridism is, he having collected enough instances to make a bulky volume of 873 pages, though at the end expressing doubt about some of them.

The following twenty cases will perhaps bear either the interpretation of abnormal resemblance or hybridism, as the reader is at liberty to view them; but I prefer to see "resemblance" in them, (except in No. 9 and No. 11) as the easier reading of the riddle of mixed plumage:—

No. 1. On three occasions adult males of our British Sparrowhawk, *Accipiter nisus*, have been shot in this country, which so closely resembled the South African *A. rufiventris*, Smith, as to have on the breast and underparts a clear rufous without any transverse streaks (cf. 'Ibis,' 1893, p. 346), as may be seen from the picture of some of them in Hancock's 'Birds of Northumberland.' To what extent the cause it may be due, the coincidence of colour is very marked, especially in the birds being adult, and their red appearance could hardly fail to attract the notice of any one conversant with British Birds.

No. 2. In the same way the Peregrine Falcon will sometimes be uncommonly like the Lanner, *Falco feldeggii*, especially about the throat.

No. 3. In 1875 I shot in Egypt a Lanner Falcon, *Falco feldeggii*, almost as dark as the South African *F. tanypterus*, which had previously paired with another *F. feldeggii* of the normal type, yet these two species are kept apart by all the best naturalists.

No. 4. Buzzards which were indistinguishable from the rufous North African Buzzard, *Buteo desertorum*, have been killed in England three or four times (cf. 'Ibis,' 1889, p. 574), and unless we admit the theory of resemblance here advanced, this distinct species is entitled to admission to the British list, though never recorded. No one for an instant doubts the distinctiveness in these cases of *Buteo vulgaris* and *B. desertorum* which inhabit a different geographical area.\*

\* Several fine examples of *Accipiter rufiventris*, *Falco feldeggii*, *tanypterus*, and *Buteo desertorum*, on view in the Norwich Museum, are available for comparison.

No. 5. In 1861 an example of *Picus major*, our Greater Spotted Woodpecker, obtained in Shetland, varied so as a little to resemble *P. leuconotus*, the White-backed Woodpecker, and was even figured as such in Gould's 'Birds of Great Britain.'

No. 6. In October, 1884, a Greater Spotted Woodpecker with a few scarlet feathers on its breast was obtained in Norfolk, clearly an approximation to the Algerian Woodpecker, *P. numidicus*. In the same way, probably, is to be explained the supposed occurrence of *P. numidicus* at Munster in Germany (Dresser's 'Birds of Europe,' vol. v. p. 34), unless we set them all down as hybrids; but then, it is surprising that they did not also show indications of it in some other parts of their plumage.

No. 7. In 1893, two or three Swallows, *Hirundo rustica* were netted at Brighton, in which the dark metallic chest-band or pectoral collar was considerably mixed with red, thus bearing an intimate resemblance to *H. gutturalis* of Asia, but to that species Messrs. Sharpe and Wyatt declined to assign them.

No. 8. Sparrows, *Passer domesticus*, have been now and then netted in Norfolk, and probably elsewhere, with an excess of chestnut colouring on the ear-coverts and occiput, a very little extension of which would convert these examples into the Italian *P. italica*. This excess of chestnut pigment in the feathers, reminds one of some Partridges with the entire breast and most of the back of that hue, which made their appearance in different coveys near Dereham, in Norfolk, in December, 1896, an erythryis which long ago received the name of *Perdix montanus*, bearing a superficial resemblance to an old cock Grouse.

No. 9. Last autumn I received from Mr. Brazenor, of Brighton a Linnet, *Acanthis cannabina* (which had been netted in the vicinity), with the beautiful purple back of a Twite, *A. flavirostris*, either resemblance or hybridism, but anyhow a strange bird.

No. 10. Some time ago Mr. Brazenor also sent a Greenfinch flushed with the dark bay Chaffinch's tint, forwarding another at the same time to the Tring Museum, where it came under the notice of Mr. Hartert, who thought the colour might have been artificially produced, but there were no signs of captivity whatever.

No. 11. Common Crossbills have been shot in the British Isles occasionally, and elsewhere, which simulated the Two-barred



Crossbill by having on their wings faint white bars. This variety is the *Loxia rubrifasciata* of L. Brehm, and is probably a valid species, or will in due time be admitted to stand as such (see Dresser's 'Birds of Europe,' supplement).

No. 12. The late Mr. F. Bond had a Red-spotted Bluethroat from Sweden, an adult male with a narrow white border round the bay coloured breast spot, thus approaching the White-spotted Bluethroat, *Cyanecula wolfi*. There are, however, some naturalists who do not consider them distinct species but that is not the general opinion.

No. 13. Very black Starlings, *Sturnus vulgaris*, were taken in Hampshire some years ago ('Zoologist,' 1877, p. 22), and in Yorkshire ('Naturalist,' 1886, p. 307), which were possibly examples of the veritable *S. vulgaris*. But they had assumed, or almost assumed, the sable spotless garb of their beautiful southern cousin, the Sardinian Starling, *S. unicolor*.

No. 14. Snipes have twice been shot, which presented some of the characters of the American *Gallinago wilsoni* ('Handbook of British Birds,' p. 143), and others have been shot in Norfolk which leant in the disposition of their colouring to *G. major*, and yet hardly seemed to be hybrids, so far as one could judge.

No. 15. Pink-footed Geese, correctly determined as such, with yellow legs like the Bean Goose, have been captured in Norfolk and elsewhere.

No. 16. Domesticated Peafowl occasionally produce a form with dark blue wings resembling in some measure *Pavo muticus*, L., or it may be some species of *Pavo* now extinct. Mr. Ogilvie Grant, however, thinks there can be no doubt that it is merely a sport of nature, though closely resembling hybrids between *P. cristatus* and *P. muticus* ('Catalogue of Birds,' vol. xxii. p. 370); but be it what it may, it is a strange race. Mr. Sclater even thinks it may be an undiscovered species.

No. 17. The Black Oystercatcher, *Hæmatopus unicolor*, of New Zealand, and the Pied Oystercatcher, *H. longirostris*, are considered to be distinct species, but they resemble each other at times in a perplexing way not at present solved, according to Sir Walter Buller in his 'Birds of New Zealand.'

No. 18. As do the several sorts of Kaleege Pheasants, *Euplocamus*, cf. Ogilvie Grant's 'Game Birds,' vol. i. p. 266.

No. 19. The Flicker or Gold-winged Woodpecker of North America is said to produce endless variations in plumage, to account for which several theories have been advanced (cf. Newton's 'Dictionary,' p. 258), but I must think, that of hybridism is untenable though supported by Mr. Elliot ('Auk,' 1892, p. 161). Perhaps here we may have some attempt at resemblance on a large scale, and in that way differing from those mentioned before.

No. 20. It may well be that "resemblance" spontaneous, and more than occasional, has been at the bottom of some of the confusion which has reigned in the Palearctic Shrikes, *Lanius*, a group about which hardly two authors hold the same views.

I believe no one doubts the genuineness of the Isabelline Nightjar shot in Notts in 1883, yet a very pale variety of the English Nightjar would be very difficult to distinguish from its southern ally, albeit the pattern of plumage is slightly different, so this may be quoted, as a possible case in point of two species resembling one another. Buff-coloured, sandy, and isabelline varieties of our Common Skylark are not very rare, and at once recall by their resemblance to them in colour the desert species of North Africa, such as *Galerita macrorhyncha* and *Ammomanes deserti*, so like in tint to the sandy tracts which they inhabit. This, however, is no more than saying that an albinistic Hawk in Europe might be like the Australian *Leucospizias* (White Goshawk). Teal are occasionally taken with white rings round the neck like a Mallard *Anas boschas*, only narrower. This is resemblance by means of incipient albinism, and is said to have been also observed in the Wigeon; but the vagaries of albinism are oftenest visible in the head and neck in the Ring Ouzel, Blackbird, and other Insessores. Thrushes which so resembled Blackbirds as to be taken for hybrids, and Blackbirds which resembled Ring Ouzels, have been from time to time recorded; but I do not adduce these in evidence, attributing the former to melanism and the latter to incipient albinism. Indeed, to the former, may be also due, the Black Starling already mentioned. Suchetet cites no hybrid Starlings. The whole of his articles on the *Passeres*, and especially those on the Thrush tribe (pp. 354, 792), are worth reading, in the light of the different interpretations which some of the cases he quotes are capable of receiving.

## II.

## VERTEBRATE AND PLANT LIFE ON BEN NEVIS.

BY COLONEL H. W. FEILDEN, V.-P.

*Read 29th September, 1896.*

WALKED up Ben Nevis on the 27th of August last. On reaching the top, about mid-day, it was clear, and for half an hour we enjoyed a magnificent view. Then the mist closed in. About 800 feet from the summit I saw the first Snow Bunting, a female; another female alighted on the thermometer screen, close to the observatory. Within a few yards of Wragge's well, sixty-six feet below the Ordnance cairn, which marks the summit of the mountain, 4406 feet, I came across the remains of three male Snow Buntings lately killed. I do not think that the cat at the observatory is answerable for their death, for in each case the thers had been plucked out on the spot, and in one the freshly plucked sternum lay amongst the feathers. This is not the way in which puss treats her prey, as a rule she munches up the bones of small bird. I should have credited the capture of these Snow Buntings to a Merlin Hawk, but Mr. J. Niel, an employé at the observatory, told me he had never seen a small hawk at any season of the year, nor on any occasion, near the summit of the mountain. He further gave me the following interesting notes:—Three, if not four different broods of Snow Buntings were hatched out this summer on the top of Ben Nevis; and that scarcely a day had passed, since the broods left their nests, but old and young were dropping about close to the observatory when he opened the kitchen door early in the morning. He had never been successful in finding their nests though he had searched diligently. I may mention that the wing feathers of the male birds whose remains I found showed that moulting had just taken place, and the primaries had not all attained full development. Mr. Niel also

showed me a specimen of *Sorex minutus*, Linn. (= *S. pygmaeus*, Pall.), the Lesser Shrew, which his cat brought into the observatory kitchen on the morning of the 25th August. This cat he assured me, never wanders far from the house, her longest walk being with her owner to the well. There can be no question that this Shrew was taken on the summit of Ben Nevis, and at the highest altitude recorded for the species in the British Isles. The specimen was sent by Mr. Angus Rankin, superintendent of the observatories, to the Edinburgh Museum of Science and Art. I learnt both from Mr. Rankin and Mr. Niel that Ptarmigan, though still common on the sides of Ben Nevis, especially about 1000 feet from the top, rarely visit the summit of the mountain. The Golden Eagle is seen, at intervals around the top of Ben Nevis, but they do not nest on that mountain. I know a breeding place in the neighbouring deer forest of Lord Abing, where they are protected.

In the interesting introductory notes by Mr. W. S. Bruce to the paper on Coleoptera from the Summit of Ben Nevis, by the Rev. A. Thornley\*, he refers briefly to the botany, and mentions that one or two phanerogams grow there. He does not, however, mention the species. I therefore supplement his notes by giving the names of three flowering plants I found growing in the immediate vicinity of the well, on the S.S.E. side of the mountain, sixty-six feet below the cairn. There between the lichen-covered blocks of porphyry are small accumulations of peaty humus, moistened by the drippings from the springs that feed the well. Several plants of *Saxifraga stellaris* grow in this spot, and I observed seedlings just showing. This is the highest station for the plant in the British Isles, viz., 4340 feet, exceeding that from the summit of Ben McDhui, 4296 feet, which is recorded by the late Dr. Dickie. The other two plants are *Deschampsia cespitosa*, and a *Carex*, possibly *Carex rariflora*. Judging from the growth of these plants, it seems to me that the paucity of phanerogamic vegetation on the summit of Ben Nevis is not altogether dependent on its altitude nor low temperature, but more to the almost entire absence of suitable accumulations of soil wherein plants could take hold, the summit of the mountain being either bare rock or a chaos of splintered porphyry. As special interest

\* Ann. S. N. H., 1896, p. 29.

attaches to plants growing at the highest altitude in the British isles, I submitted these specimens for the examination of Mr. H. D. Geldart, who has favoured me with the following report.

NOTE BY MR. H. D. GELDART.

The plants which Colonel Feilden has brought from Ben Nevis, and which I exhibit on his behalf to-night, do not show any signs of hardship from cold or want of nutrition, on the contrary, the specimen of *Saxifraga stellaris* is the most vigorous I have ever seen. Out of a full score of specimens from the counties of Aberdeen, Carnarvon, Cumberland, and Kerry, there is not one which will compare with it in size and habit; it has three flowering stems, the tallest five inches high, and has had seventeen flowers.

The *Carex* must be considered as only doubtfully named; the two specimens have only one small fertile spikelet between them, not affording sufficient material for careful dissection. Mr. Arthur Bennett, to whom the fertile specimen has been shown, takes exception to the habit of the root stock. I have, however, a specimen from Clova, which I believe to be rightly named, with a somewhat similar though much smaller root stock; to me the plant seems to be *Carex rariflora*, Sm., with very luxuriant leaves and but little flower.

The *Deschampsia cespitosa* belongs to Parnell's variety *longiaristata*, the awns agreeing well with his Plate cv. The stems to the tip of the panicle are about fifteen inches high.

With the flowering plants there were two specimens of *Polytrichum commune*, without fruit, from the same spot.

H. D. GELDART.

## III.

## SOME FURTHER NOTES ON HAWKING IN NORFOLK.

By J. E. HARTING, F.L.S., F.Z.S.

*Read 29th September, 1896.*

THE notes on this subject already printed by Professor Newton (Lubbock's 'Fauna of Norfolk,' 2nd. ed., pp. 224—239), by myself in these 'Transactions' (vol. iii. pp. 79—94), and by Mr. Southwell (vol. v. pp. 183—186), serve to illustrate, so far as they go, the history of Falconry in a part of England where it is evident that the sport was once much in vogue; and the extracts therein quoted from the Household Books of families resident in this county, and from other sources, give a curious insight into the daily pursuits and occupations of country gentlemen in Norfolk, at a time when the absence of railways and the unchanged conditions of the haunts of game and wildfowl afforded unlimited opportunities for indulgence in this ancient field sport. The late Mr. J. H. Gurney, too (whose name will for ever dwell in the memory of Norfolk naturalists), was not unmindful of the value of such excerpts as those referred to, and has printed (vol. iv. p. 393) some entries from a Book of Disbursements for John Windham of Felbrigge, 1653—56, which form a useful addition to what may be termed the *Collectanea Accipitraria* for Norfolk.

The supplementary remarks which I have now to offer are based on entries which occur in the MS. papers of the family of Gawdy, formerly of Norfolk, edited for the Historical Manuscript Commission in 1885, by our indefatigable antiquary Mr. Walter Rye, and on entries which I have noted in the more recently published (1895) 'Calendar of Correspondence and Documents relating to the Family of Oliver Le Neve, of Witchingham, Norfolk,' edited by the same industrious writer.

The period covered by these two manuscript collections should be here noted. The Gawdy Letters, comprising more than 1200 documents which have been calendared and indexed by Mr. Rye, range in date from A.D. 1509 to 1675, and thus form a welcome continuation of the better known county correspondence the Paston Letters, the last dated of which was written in 1506 (ed. Gairdner, vol. iii. p. 403). The Le Neve correspondence extends from 1675 to 1743, thus carrying on the records from the very year in which the Gawdy correspondence ends.

As to the family of Gawdy there is little to be told. They were long settled at Redenhall and Harleston, and are said to have been descended from Brews Gawdy who was taken prisoner in 1352, and was naturalised and settled in Norfolk. Their crest, a tortoise, is certainly a very un-English one, but Mr. Rye informs me that he does not find it ascribed to the foreign families of Gaude or Gaudy who both bore different arms.

The first of the family who appears to have been of any note was Thomas Gawdy of Harleston, a Sergeant-at-law in 1356, whose third wife was Katharine, daughter of Robert L'Estrange, and widow of Sir Hugh Hastings. This intermarriage probably had the effect of placing the family in a better social position in the county. Thomas Gawdy had two sons, both of whom were named after him, and one of them, following his father's profession, became like him a Sergeant-at-law. The other marrying Anne Bassingbourne had a numerous family, one of whom lived to become Sir Francis Gawdy, Lord Chief Justice of the Common Pleas. Mr. Rye in a letter to me has remarked, that the family may be regarded as "a fair average specimen of the sporting squire." It is now extinct.

As may well be supposed in a collection of more than twelve hundred documents, many extremely interesting entries are to be found illustrating the social life of the period; the formation of packs of hounds; the purchase and exchange of hounds (with some intimation of the value set upon them; the abundance of hares "in the little woods going from Reephams to Ling," and of foxes; the great store of pike in Norfolk rivers, and so forth: and this is especially the case in regard to the Le Neve correspondence presently to be noticed. But as the object of the present communication is to supplement what has been already printed

in these 'Transactions,' concerning the former practice of Falconry in Norfolk, it will be proper, at least for the present, to confine attention to this portion of the correspondence. It may here be stated that the Le Neve and Gawdy MSS., which are preserved in the British Museum, have been placed amongst the Egerton MSS. and not amongst the Additional MSS.

In the following selected entries it will be seen that each has prefixed the year of entry if not the precise date, which is not always given in the original manuscript, the number of the page in the printed volume in which it is transcribed and, in addition, the number of the particular document in which it occurs:—

— 1598 JASPER MELLER to SIR BASSINGBOURN GAWDY.

p. 63. Two days ago he caught with some labour this Tasslegentle<sup>1</sup>  
no. 407 and afterwards found on him the Queen's varvaile<sup>2</sup> and one Mr. Throgmorton's name on the "mayle."<sup>3</sup> Dares not disobey the Statute which directs the hawk to be sent to the Sheriff, but as he "knows not the knight . . . would rather hazard a touch of impudency from your honorable conjecture than . . . from a stranger." Asks Gawdy to acquaint the Sheriff, and asks "if the letter of the law be satisfied that he may not be unregarded."

20 Decr. 1603 THOS. WYTHE, Sternfield [Suffolk]  
[to SIR BASSINGBOURN GAWDY.]

p. 90 Wythe has got a good fellow to take two coveys of partridge  
no. 573 "and yet they are but eight" (which he sends) being the first taken by a long-winged hawk<sup>4</sup> since Wythe came there. Although Gawdy has two good sling hawks yet "the one will range, the other often miss."

22 July 1604 SIR ARTHUR HEVENINGHAM, of Ketteringham,  
to MR. SAYER of Pulham.

p. 93 Did not think neighbour Sayer would have dealt so dishonestly  
no. 589 with him "as to feed him with so many fair words with nothing but deceit in them." If the promised cast of hawks are not sent Sir Arthur may have to take them. [Ends with some jocose threats.]

---

<sup>1</sup> A tiercel, or male Peregrine. <sup>2</sup>The varvel (Fr. *vervelle*) a small silver ring attached to the jesses (Fr. *les jets* from *jetter* to 'cast off' the hawk) on which the name of the owner was inscribed. Except for a Goshawk the use of the varvel has been abandoned, and superseded by the swivel. <sup>3</sup>The mail, a small silver plate, has also long been discarded.

<sup>4</sup> That is, a falcon, as distinguished from the short-winged Goshawk, and Sparrow hawk.



— 1604 LEWES PICKERING, Thetford,  
to SIR BASSINGBOURN GAWDY, Harling.

Having occasion to employ his servant, Pickering is enforced to set down one of his hawks. Hearing Gawdy has a skilful; Pickering begs the man may mew the hawk (a heroner<sup>1</sup>) or get nest man to do it. If she is mewed with Sir William Woodhouse's they will be fit to fly together next year.

August) FYRMYN DENNY to SIR BASSINGBOURN GAWDY,  
Harling.

Hears that Gawdy's man Morrys was at Mr. Henry Jenny's after a falcon. Denny bought one of his cousin Jenny for Cornwallis last year giving 5l 6s for her. She turned out a very lusty falcon too full of mettle for a woodland country "ever raking rows." Gawdy can have her at the same price.

MICHAEL STANHOPE from his house at S——[?] to cousin  
SIR BASSINGBOURN GAWDY.

(30 September) Sends thanks for a hawk; would gladly see her on the wing if he could stay in the country, but has not time, falconer to entrust her to. Begs that he may return her, and next Gawdy will meet him in Suffolk with the hawk he will "show you e to weary both you and your hawk."

ril [circa 1608 or 9] LAWRENCE STEPHENS of Harling, to his master SIR ROBERT KNOLLIS St. Martin's Lane [London.]

The hawks in Stephens' keeping are well, but Guy could keep his no longer. Has found a man at Deepham who kept Bert Gardiner's hawks, and engaged him to mew a pair for 3l; 30s to down. Stephens could only pay him 6s earnest and begs the rest sent; also money to buy green geese<sup>2</sup> and ducks for the hawks. re very necessary; especially as Stephens' nag is so poor that he ill hawksmeat enough. The Dutch falcon is well.

[May 1608 or 9] The Same to Same.

Has received Sir Robert's letter and 20s by "my fellow William." "Your hawks are well and mewed to the long" expects them to mew them [i.e. the long feathers] every day.

---

is a falcon used for flying at the Heron. Sir William Woodhouse, to Spelman, was the first to introduce into England the Dutch constructing and working Decoys for wildfowl.

geese, fed in spring as distinguished from stubble geese fed in

Cannot draw the Tassel<sup>1</sup>; as Thos. Morrys is very sick. "Your old hawk was taken with the cramp and the quack"<sup>2</sup> and continued in the mew three weeks "and then we threw her out, and she is dead." Sir Guy's black haggard [an adult wild caught falcon] is well mewed to the long feather.

15 September 1635 SIR EDMOND MOUNDEFORD, Feltwell,  
to FRAMLINGHAM GAWDY, Harling.

p. 154 Moundeford has a Lanner to spare, if Gawdy knows any  
no. 947 person who wants one as "we have not partridges enough for  
a Jake-marlen."<sup>3</sup>

[? December 1637] ANTHONY MINGAY, Norwich,  
to FRAMLINGHAM GAWDY, West Harling Hall.

p. 167 Is glad Gawdy has his hawk again: neither that nor "any of  
no. 1001 her fellows" bring any partridges into town that he (Mingay)  
can see.

The writer is evidently sarcastic, not having received any share of the game killed by his friend's hawks.

The following entries relating to wildfowl are given as being of interest to falconers:—

31 Jan. 1633—4 ANTHONY MINGAY, Norwich,  
to FRAMLINGHAM GAWDY, West Harling Hall.

p. 145 It is reported at Norwich that the Lord Mayor hath set forth  
no. 896 a proclamation taxing the price of all manner of fowl.

7 Feb. 1633—4 Same to Same [London.]

p. 146 My Lord Mayor's rate for all kind of fowl is very reasonable.  
no. 897

<sup>1</sup> i.e. Cannot take the tiercel from the mew yet, as Thomas Morris the falconer is sick. <sup>2</sup> The croaks.

<sup>3</sup> A Jack Merlin, i.e. a male Merlin, would be considered too small for flying at partridges unless they were quite young birds, for otherwise they would be too heavy to hold. What the writer doubtless intended to convey was that partridges were so scarce that season, that the falconers could not find enough to feed a Merlin, much less a larger hawk like a Lanner. The Lanner no doubt was imported, although allusions may be found in old works on Falconry—e.g. that of Simon Latham—to the supposed former nesting of this hawk in England. From the descriptions given by some old authors, it would seem that the bird which they called 'Lanner' was probably an immature male Peregrine, or as we should now term it in the jargon of falconers, a red tiercel.

27 Novr. 1563 JOHN REPPS, Walpole in Marshland  
to [BASSINGBOURN GAWDY.]

p. 5 Sends a crane with two mallards, which is all the fowl they can  
no. 26 get, it is so scarce. Has spoken for knot, which will cost 5s the  
dozen. These fowl are commonly taken at Terrington where has been such  
great loss of sheep, owing to the last storm breaking their banks, that  
fowlers have no leisure to lay for fowl.

So much for the manuscripts of the family of Gawdy, 1509—1675. As to the correspondence and documents relating to the family of Oliver Le Neve, of Witchingham, Norfolk,—1675—1743—the name is an old one in the county and in the opinion of Mr. Rye probably shows descent from a 'neif' or female or *nativa* villein. The family was not, however, of any great importance in the county till a comparatively recent period, for the name does not appear among the Inquisitions *post mortem* till the reign of Henry VIII., and then without the *Le* which was readopted by the Heralds.

For an account of the family, the reader may be referred to Mr. Rye's preface to the Calendar of family papers. It will suffice for our present purpose to state that Oliver Le Neve, whose brother Peter was the celebrated Norfolk herald and genealogist, was born about 1661—62, matriculated at Oxford in January 1679—80, and at the age of twenty-eight or so was living at Mannington Hall. He married Anne, the daughter of Sir John Gawdy, thus cementing the friendship of the two families. In 1698 he got into a sad scrape. An altercation with Sir Henry Hobart led to a challenge and a duel upon Cawston Heath, when Hobart was killed, and Le Neve had to fly the country for some time. His first wife having died, he married for his second wife in July, 1707, Elizabeth Sheffield, daughter of Robert Sheffield, of Kensington (whose name is still perpetuated in 'Sheffield Terrace'), and settled down at Witchingham. The letters received by him, and now printed, were addressed to him for the most part at Witchingham or in London, where he occasionally sojourned at Mr. Thomas Rose's, a sword cutler, at "The Two Golden Eagles" in Ludgate Street. His life was that of a typical country gentleman of his time. He seems to have been devoted to hunting and horseracing, not averse to the pleasures of the table, and a great gardener and planter.

An interesting analysis of some of the entries under these heads is given by Mr. Rye in his preface to the volume of correspondence, but attention must here be confined to those only which relate to the subject of this paper. The following are worth quoting :—

19 Oct. 1693 LUKE SINGLETON, Custom House London  
to OLIVER LE NEVE Witchingham.

p. 20 "The ships coming into Bristol detained Luke; he is only  
no. 1314 just back and is at Le Neve's service. Does not hear of any  
hawks late imported from hence."

From this it would seem that the falconers of Norfolk were wont to inquire from time to time at the Custom House regarding the importation of foreign Hawks. The writer, Luke Singleton had written in the previous month of March from "Willys Coff House, near the Custom House, London" that he would like Le Neve to know when any hawks are brought into the port London, and would like to know what sort (p. 17, no. 1292).

7 January 1694—5 JOHN MILLICENT of Barham,  
to OLIVER LE NEVE, Witchingham.

p. 28 "Cannot get a deep mouthed hound for Le Neve.  
no. 1372 Mr. Stubbin's small pack is the only one about there. A short trussed slow beagle can be got at Cambridge, or the hound in Surrey through Peter Le Neve's interest with Mr. Shertrudge. Wonder Le Neve wishes to set up a pack, as he can hunt at so many other men's charge, and might himself enjoy the rarer and less expensive sport of Hawking. Still if Le Neve can get good store of flesh or other dog meat 'tis near as cheap hunting hounds as hawks, and more pleasure to hunt with one's own pack."

It is doubtless owing to Oliver Le Neve's greater love for Hunting that we find fewer allusions to Hawking than are to be met with in the Gawdy papers. Mr. Rye, in his preface to the Le Neve correspondence, hints that possibly similar calendars of the Kuyvet and Hare families, which form the remainder of the series, "may some day see the light." It is to be hoped that this intention may be speedily realised.

## IV.

## ON THE ORNITHOLOGY OF SWITZERLAND.

BY J. H. GURNEY, F.L.S., V.-P.

*Read 24th November, 1896.*

all the charming spots in rugged Switzerland, none are better known to our countrymen than the crescent Lake of Geneva, *Cygnus lemanus*. The writings which specially refer to the ornithology of this great inland water are Necker's out of date,—but still standard,—'Memoire sur les Oiseaux,' 1864, and Forel's 'Lac Léman, précis scientifique.' The latter has a mere List of Birds, and the following paragraph on the so-called Polish Swan, *Cygnus cygnus mutabilis*, an albinistic variety which has been supposed to be first produced in England, is very interesting. "In 1868 an interesting variety of *Cygnus olor* began to appear on our lake, and every year some could be seen; the young ones in this variety have their first down yellowish white, and their first feathers pure white." On this it may be remarked, that those bred in Norfolk by my father, had their first feathers a dull cinnamon colour, but I believe this very quickly disappeared. I did not learn if there were still any on the lake, nor has Mr. Howard Saunders any information to give on this point ('Ibis,' 1891, p. 185) in his valuable list, to be further referred to.

The limited area of low ground to the north of the Lake of Geneva,—and probably all the plains,—is essentially a place of rendezvous for birds on passage, where migration can be studied; but owing to the vicinity of the mountains it would be a little difficult to determine what winds favour the birds most. However, every bird is a "voyageur" down to the Black Kite, the Starling, and the very common Goldfinch. In spring, these are three of the

foremost heralds ; and judging from one season, the next to follow are the White Wagtail and the Black Redstart, males first. In 1896, the "Rossignol de Muraille" (*R. titys*) soon became ubiquitous, and much commoner than the Redstart. After them came a miscellaneous following of Wrynecks, Blackcaps, Whitethroats, Pied Flycatchers, &c., and soon the Greyheaded Wagtail, the Grey Wagtail (which at once began to breed), the Cuckoo (an hepatic variety at M. Gillieron's), and a Thrush or two. Then to wind up the army came the Tree Sparrow, Whinchat, Spotted Flycatcher, Turtle Dove, Swift, and Serin Finch, preserving the same order as in England. The Serin Finch (*Serinus hortulanus*) may have arrived sooner than supposed ; for it is a small bird, unobtrusive, and much the colour of foliage, though the cock's yellow back is bright enough in spring.\* I saw one Citril Finch produced for sale from a birdcatcher's stocking, but had not the luck to see one in a state of nature.

The Nuthatch breeds, making its usual plaster nest, but there are no reeds for the River Warblers on this lake.† The Green Woodpecker, with its laughing cry and undulating flight, is common at and near Vevey ; but to see the rare Middle Spotted Woodpecker (*Picus medius*), it is necessary to go a little way up the Rhone Valley, where among the gnarled old Chestnut trees there are many spreading giants. Here this species finds a congenial

\* It had arrived at Boan on April 14th (Zool. 1897, p. 63).

† We stopped at Amiens in France, in returning to England. Outside the city, and beside the river Somme are some marshy 'etangs,' formed, I believe, by digging out the soil for peat fuel. On one of these ponds, not half a mile from the Cathedral itself, there are a great many edible Frogs, which make a din which nearly drowns all the Warbler tribe, consisting of a pair or two of Aquatic and Marsh Warblers, and a few very fine Great Reed Warblers. These giants of the Warbler tribe, locally termed 'Cracas,' receive a visitor with noisy vociferations, no doubt because in May they are nesting, but I suppose only building on the 18th, as one or two were seen carrying in their beaks portions of the feathered reedtops, most likely for the lining of their nests. It is pretty to see them engaged in detaching this material from the tall swaying Reed, hanging in many graceful attitudes over the water, looking red in the evening light. Another noteworthy item is the presence of the Crested Lark at Boulogne, and Cape Grisnez, within sight of Shakespeare's Cliff and Dover Castle—a bird which is practically unknown in England. It was not afraid to come quite into the village of Wimereux.

secure home ; but its loud cry in May and unmistakable flight in wavy dips betray it, even if the brilliancy of its red head is not seen flashing among the Chestnut stems. Its method of concealment is full of instinct ; viz., in the first instance to remain perfectly still, trusting to the general harmony of the woodland tints. When it does leave its tree, it commences the ascent of the next one at the bottom, easily succeeding by its spiral course in keeping the trunk between itself and the observer. Once its dark eye was fixed upon us, as it loudly tapped the bole of a large Cherry tree, and then remained perfectly motionless, until I gradually drew up to within a few yards, with fixed opera-glasses which revealed its every feature. Naumann says this Woodpecker cracks cherry-stones, and prefers hard-wood trees to conifers.

In the same place a few Crag Martins (*Cotyle rupestris*)—an old Algerian acquaintance—haunt the gorges, and in company with Kestrels manifest displeasure at man's intrusion into their domain. At the other end of the lake *Cotyle rupestris* would appear from Necker's remarks to be very rare, and neither Mr. Howard Saunders ('Ibis,' 1891, p. 168) nor Mr. Aplin ('Zoologist,' 1892, p. 66) met with it at all. It appears, however, from Fatio's map,\* to breed all up the Rhone Valley, and to be common in Tessin and Rhin. Only once was the Hooded Crow seen—on April 26th—which Mr. Howard Saunders, in his list, speaks of as rare ; but the Carrion Crow is extremely common around, and even in the towns, sometimes actually perching on chimney-tops ! Not until I had seen these partaking of dead fish and other animal matter, could I divest my mind from the idea that they were Black-faced Rooks, which had not shed their bristles, but Mr. Saunders has decided that they are real Crows (*Corvus corone*, L.). The querulous Alpine Chough (*Pyrrhocorax alpinus*), whose rolling note Mr. Saunders likens to "tir-kee tirkee," is at home to those who like to climb six thousand feet to see him, where he wheels about in the air, showing his lemon-coloured bill afar, and anon the whole flock settle on some uncovered patch where the snow is wasting, or seek their food in the vicinity of some mountain hotel. The Nutcracker must also be sought for high up, the Jay taking its place in the plains. In hard weather, I am told the Choughs come down to

\* 'Catalogue des Oiseaux de la Suisse,' par Dr. Fatio et le Dr. T. Studer, 1889—1894.

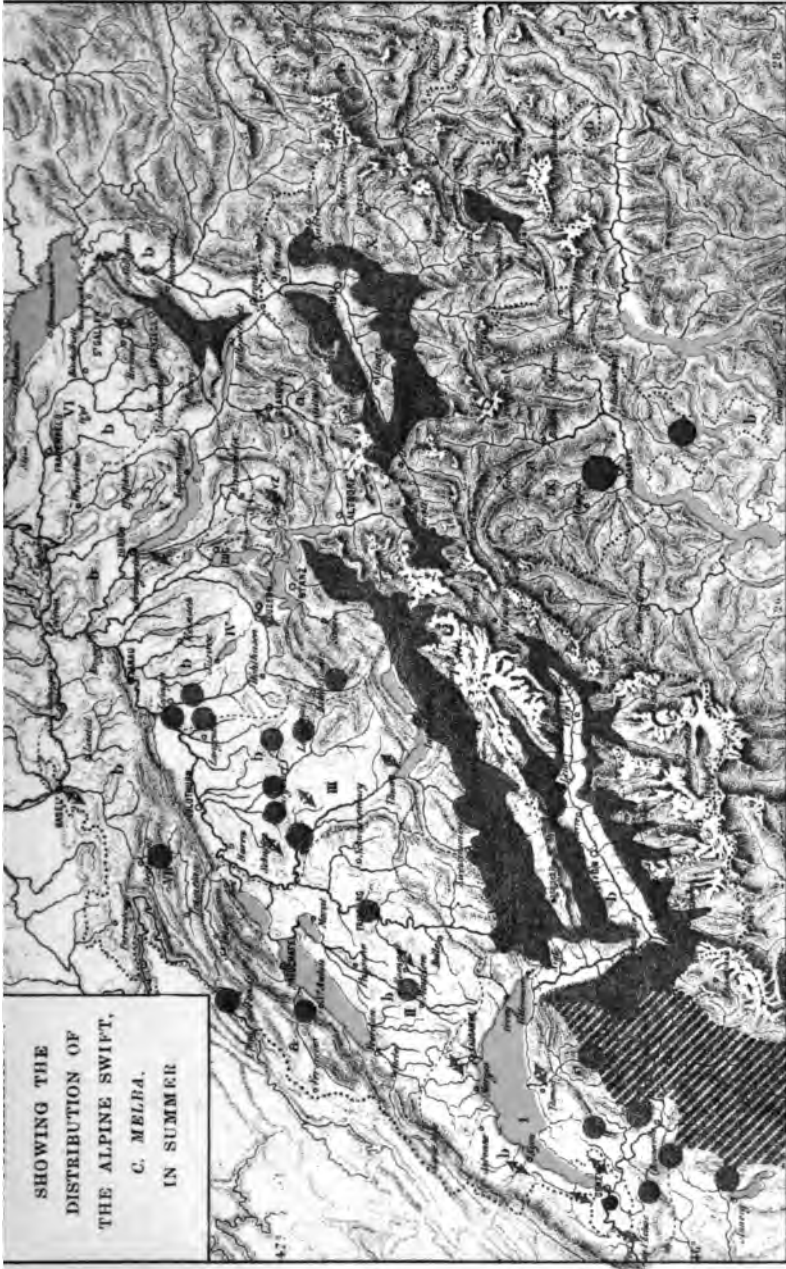
the plains and vineyards at Montreux, and in such time of severity the Eagle Owl is sometimes even shot by the lake. A furrier at Vevey said he had had four, driven perhaps from the Gorge du Chauderon.

Berne, the capital of Switzerland, is a picturesque and beautiful city, worth a visit if for no other reason than to see the Alpine Swifts (*Cypselus melba*), whose distribution is pretty wide, as will be seen from the accompanying map after Fatio and Studer (*l.c.*). The dark represents the area where they habitually breed, where it is crossed with white is where they sometimes breed, and the arrowheads mean that they pass on migration, or are seen during the summer, habitually or at intervals. These authors have published similar maps of several species of birds of prey, very valuable for study in a country like Switzerland.

The entire spire of the Cathedral at Berne is quite new, being in fact not entirely finished; and the former fine colony of two hundred and more 'Grands Martinets' is reduced to about two pair, and even these, according to the head bellringer, had not bred, and my son and I could see no signs of a nest. Some, however, were passing in and out of the holes in the tower of Nydeck Church, hard by the bridge. Mr. J. Grimm, taxidermist, who kindly gave much information, said there had always been two or three other places besides the Cathedral, where they nested, in Berne, notably on one of the two high clock-towers, and in a large 'Caserne' by the station.

The nests are circular, substantial, saucer-shaped structures, built up of sticky mud, and further welded together by the birds' saliva, bound with straw, bents of grass, pieces of paper, and morsels of cloth; all substances which have been whirled high up in the air, except the mud. As it is said this long-winged bird dare not settle on the ground, it is not clear how it gets the mud, but much of it may be, in reality, a mucous secretion from the salivary glands. Several nests are to be seen in the Town Museum, with nests of the Common Swift beside them, but the Alpine Swifts' nests are half as large again. A full complement of eggs is stated to be three or four, and incubation to last about twenty days, which is more than in *Cypselus apus* (*cf.* 'Ibis,' 1891, p. 64). The nestlings have decidedly capacious mouths, which Mr. Grimm said in life were yellow. The first feathers begin to appear on the





*Cypselus melba.*

NOV. 1914

Vertical line of text or markings on the left side of the page.

Small mark or signature at the bottom right corner.

foreneck, while the body is still covered with thick sooty down; the whole head is next protected, by which time the sprouting feathers of the tail are half-an-inch long. I had the pleasure of bringing some back for the Natural History Museum in this stage, with an old bird picked up in the Cathedral in May, 1876, at which time Mr. Grimm says a good many were destroyed by a sudden change of temperature, a circumstance which has happened on three or four occasions before to his knowledge in Berne. Insects soon disappear in cold weather, and the quantity they require for themselves and young is estimated at thousands by Zehntner (as quoted by M. Fatio), who often found 80 to 100 in their mouths, and once counted 220, of which 30 were *Tabanus bovinus*. No wonder, therefore, that they sometimes perish for lack of what is to them the staff of life, and for the same reason our English Swifts are often made to suffer. Zehntner, whose account is admirable, on different occasions found seven Painted Lady Butterflies in their mouths, and this he ascertained by catching the old Swifts at their nests, and letting them go again; but for many further details I must refer to his narrative as given in the "Catalogue des Oiseaux de la Suisse."

The only Birds of Prey which call for special mention,\* for it is unnecessary to repeat what has been already better said by Saunders, are the Black Kites, *Milvus migrans* (Bodd). They were abundant on the Lake of Geneva by the 15th of April, but I am very much surprised that Mr. Saunders never saw the Red Kite, *M. ictinus*. Both of these seem to breed in a small mountain behind the town of Vevey, at any rate, I feel sure the Black Kite does, although the locality is not among those indicated in Fatio and Studer's ornithological maps. In civilised Switzerland, Kites are not the scavengers of towns that they still are in Cairo, and once were in London; but they pick up what they can get, and that is miscellaneous enough.

Perhaps the Red Kite never fishes, as does its congener the Black Kite, for the silvery "L'Ablette," a small fish about the size of a Sardine, abundant round the sides of the Lake of Geneva. On the

\* Dr. A. Girtanner, who has especially interested himself in those grand Vultures, the Lämmergeyer, does not believe that any still breed in Switzerland, but a few migrants visit the more lofty mountains. It is, perhaps, still also found in the Maritime Alps, cf. 'Ibis,' 1896, p. 282.

contrary, the prey of the former is a dead dog on the shore, or some such animal, which it shares with the Carrion Crows. Both Kites, according to the Swiss, eat Frogs, of which there are plenty, but probably not the unpalatable yellow-bellied Toad. The Black Kite, being so common, was a constant source of pleasure to my son and me, from the ease with which it could rise into the atmosphere, and that inimitably graceful gliding flight, whence the old English names, "glead" and "gled" are said to be derived. Also from its bold daring in picking up fish or flesh close to the shore, dead or alive, in defiance of its natural enemy man; and when not doing that, quartering the lake backwards and forwards, generally in couples, until sundown. Among English visitors, it commonly passes for a Buzzard, a much rarer Raptorial which we only saw once. The Black Kite has but a superficial resemblance to the Common Kite on the wing, being a smaller bird with far darker wings, and a somewhat shorter tail, less forked, and I need hardly say it has no resemblance at all to a Buzzard. There is a country where Kites and their habits can be even better studied than Switzerland, and where I have spent many an hour watching them with glass and gun. No village in Egypt would be complete without its *Hiddayer*, the Arabic name of *Milvus aegyptius*, Gmel., *M. parasiticus*, Daud., literally, "the father of snatchers." This Arabic name, which is in universal provincial use in Egypt and Palestine (Tristram, N. H. Bible, p. 181), is evidence that the Hebrew words *dââh* and *ayyâh* in the Old Testament should be translated Kite and not Vulture, which latter is called a *rackh* on the Nile. There are four sorts of Vultures in Egypt, but commonly as they are the Kites are commoner, and it is most interesting to watch them wheeling about, and rising into the air, up and up, by some inscrutable power which science cannot give a name to. In sultry Egypt, Kites perform the part of scavengers, and most useful are these feathered sanitary inspectors in clearing away what the native *fellahin* are too busy to bury or burn. When a river-boat is at anchor on the Nile they will pass and repass within a few feet attracted by any meat, or the bodies of birds which have been skinned by Englishmen and thrown out of the window. One brushed Lord de Clifford's cheek with its wing in its eager swoop at a Woiran Lizzard (*Monitor niloticus*), which was in the process of skinning on our "Diabeyha."

The top of a "Diabeyha" mast if flat, is rather a favourite perch for a Kite to carry prey to, and was so it seems four thousand years ago, for Sir G. Wilkinson gives a representation of a Nile boat, and on the mast a Kite ('Ancient Egyptians,' vol. iii. p. 37). In the mountains, away from the river, they naturally prey largely on reptiles, and may often be seen on the wing with wriggling Snakes and Lizards, tight in their talons, and though flying they have the adroitness to deliver into their mouth the food which they hold in one foot. One shot had surfeited on Locusts, having come across a flight of them evidently, and stuffed itself with these delicacies. Unclean, as one knows the Kite to be, there is something undeniably exquisite about its slow sailing flight, with pinions which seem to be almost motionless, and widespread rudder-like tail. This sort of bird, says the observant Pliny, seems to have taught men the art of steering a ship by the turning of their tails, nature showing in the air what was needful to be done in the deep, and man could have had no better model. Pliny served his first military campaign in Africa, and must have been familiar enough with them. During winter, Kites are rather shy in Lower Egypt, except near towns, but as spring draws on, they, like other birds, think about making a nest. Indeed, a few take the trouble to nest twice or thrice, and the noise of young being fed may occasionally be heard in January. Their nests are untidy fabrics, chiefly sticks and rags, and perhaps a bit of paper, put together anything but neatly, generally in trees, sometimes in cliffs, or even on houses. The eggs are white, blotched with rufous at the large end, measuring 2.50 x 1.50, and Mr. E. C. Taylor says two is the complement. On the lofty cliffs of Gebel-Abou-Fœder on the Nile, they nest in company with the Griffon Vulture and the Egyptian Goose, but the latter breed at a lower elevation than the Kites. They also nest on the Pyramids, and the tombs of the Caliphs, and even on the trees in the public gardens in Cairo, where in 1896 I understand they were still as common as ever, and as much at home.

To give the Yellow-billed Kites credit for one cleanly habit, they may be seen at times standing in the water and enjoying a good wash. They are often on the sandbanks left by the great river, perhaps on the look-out for a dead fish, perhaps resting awhile with crops distended with the last meal. It is not usual to see many together, but there was one big flock in a high wind at Minieh,

and a still larger one of sixty or seventy at Siout, not together, but sitting apart at intervals, lazy and quiet. But the largest congregation of all was at a place just outside Cairo. Here on the 18th of February, 1874, just after we had "shot" the bridge, and Rhoda was opening into view, a surprising flock of Kites, and about a hundred Egyptian Vultures, wheeling in circles, soared farther than the eye could follow them into the blue vault of heaven. I suspect this is the place called "Rohveli" (once the square for executing capital offenders), mentioned by Hasselquist.

## V.

FURTHER NOTES ON THE REPRODUCTION OF THE  
COMMON EEL, *ANGUILLA VULGARIS*.

BY THOMAS SOUTHWELL, F.Z.S., V.-P.

*Read 26th January, 1897.*

In the session of 1884 (Trans. vol. iv. p. 3) I had the pleasure of exhibiting to the Society a dissection of a female Eel, in which the ovaries were more extensively developed than in any which I had up to that time met with; and by means of a microscopic preparation, for which I was indebted to our late friend Frederick Kitton, I was enabled to show the contained ova without difficulty. I then proceeded to call attention to the investigations of Drs. Syrski and Jacoby, by whom the sexual organs of the Common Eel were first fully described, and epitomised the conclusions to which the latter authority had arrived, which were briefly as follows:—(1) The development of the organs

of generation in the Eel takes place in salt water, and in the autumn they accordingly proceed to the sea. (2) This development takes place in the deep sea, not near the coast, and is probably rapidly accomplished. (3) The young fry develop to the mature form on the spawning beds, and ascend the rivers as "elvers" in the spring. (4) He was also of the opinion that the rapid development of the reproductive organs of the old fish exhausts them to such an extent that they die soon after having spawned. Jacoby's investigations, although a great advance upon what had previously been known with regard to the life-history of this fish, still left open to conjecture, the events which took place during the period that intervened between its retirement to the salt sea and the return of the offspring in the elver form, and nothing was known by actual observation of the ova and the early stages of its development. That this ignorance with regard to so important a period in the life-history of so common a fish was a reproach to modern naturalists goes without saying, but the difficulties in the way of further investigations seemed insuperable, and have now only been overcome through the existence of a physical peculiarity in the tidal currents in a portion of the Mediterranean Sea, the nature of which will be explained further on. This circumstance was fully utilised by Professor Grassi and Dr. Calandruccio of Rome, who by means of material received from the Strait of Messina, have been enabled to trace the development of the ova of the Eel through all its stages, and although the entire series of changes have not been witnessed in the same individual, the material at their disposal has been so abundant as to leave no doubt whatever as to the correctness of their conclusions.

The confusion which has arisen with regard to the Common Eel is a most instructive example of the dangers attending what may be styled the purely empirical method, *i.e.*, descriptions of specimens "simply as they appear," by which imperfect means "different forms are called different species without any consideration of the relations they bear to each other, and without regard to such questions as: are the specimens adult or larval? or, may not many of the different forms be the same animal at different ages or in different sexes?"\*

\* Cunningham, "Larva of the Eel," Jour. Marine Bio. Ass., new series, vol. iii. p. 279.

The force of these observations will occur to us when we consider that, of our common freshwater Eel, three or four species have been described, all of which are mere variations, sexual or otherwise, and possibly only the natural stages in the normal progress towards maturity. The liabilities to error attending such a method will be still further illustrated when considering the multiplication of supposed species in the larval form of the same fish. The methods of investigation pursued by Grassi have been strictly scientific, and on the lines known as "bionomics"; they were (1) anatomical, by comparison of the structures in all the various stages; (2) natural, the finding in nature of all the required transitional stages; and (3) experimental, by which means he followed, step by step, the metamorphosis in aquariums.

Very little fresh light had been thrown on this obscure period of the life of the Eel between the time when I last addressed you and the discoveries of which I am about to speak. On the 27th December, 1892, a female had been captured, twelve miles south of the Eddystone, the ova of which were apparently quite ready for exclusion, as recorded by Mr. Calderwood in the *Ann. and Mag. of Nat. Hist.* (vol. xii., sixth series, p. 35), thus confirming the belief that *Anguilla* spawns in salt-water and at considerable depths. But the first definite information of the discovery of the larval form was made known in a preliminary notice by Drs. Grassi and Calandruccio, in a journal called 'Neptunia' in 1894, and this called forth a paper by Mr. J. T. Cunningham, which appeared in the 'Journal of the Marine Biological Association' issued in February, 1895; but a further contribution by Professor Grassi was read at the meeting of the Royal Society on the 19th November, 1896, communicated by Professor Ray Lankester, in which he gives a preliminary account of his four years' continuous researches on the subject; this will be followed in due course by a more extended account of his interesting experiments.

There has long been known to science a number of "strange, colourless, transparent, thin-bodied creatures, with blood destitute of red corpuscles," which have by some been regarded as a special family of fishes, under the name of *Leptocephalidae* or "Glass-eels." A considerable number of so-called species were recognised, only one of which was known to occur on our coast: this is figured and



described by Yarrell (1836), under the name of *Leptocephalus morrisii*, from an Anglesea specimen. Many other specimens have since been taken in our seas, but this is the only species met with here. These Leptocephali have been by others regarded as the larval forms of various kinds of marine fish, or as representing an arrested form of development taking place at a very early period of their life before the characters of the adult form were developed. It may suffice to say, that our *Leptocephalus morrisii* has been satisfactorily proved to be the larva of the Conger Eel (*Conger vulgaris*), and that the first result of the researches of Professor Grassi is to lead him to suppress the whole family of Leptocephalida, "the various forms of which are, in fact, the normal larvæ of the various Murænoïds." The number of supposed species had been greatly increased by the casual observation of the larva of the same species at different periods of its development.

We may now turn to the discoveries made by Dr. Grassi with regard to the development of *Anguilla vulgaris*. It has been pointed out that the great difficulty in pursuing observations with regard to the reproduction of this fish arises from the fact that the process takes place far from land and in the abysses of the sea. "Fortunately," says Dr. Grassi, "along a part of the coast of Sicily strong currents occur, which must be ascribed to tide, producing very large displacements of the water in the narrow Strait of Messina . . . . In consequence of the strong currents sometimes . . . . not only many deep-sea fishes, but also all stages of the development of the Murænoïds are met with in the surface-water." To this circumstance mainly, he owes the abundant material which enabled him to make his interesting investigations. He found that these currents occasionally carried to the surface, sometimes in large numbers, a form of *Leptocephalus* known as *L. brevirostris*, and it was in working out the life-history of this curious little animal, that he discovered it to be the larval form of the Common Eel. Dr. Grassi then proceeds to describe the progressive development of this singular little organism into the "elver," which returns in the spring to stock the freshwater streams from whence its parents passed into the sea. These changes are extremely interesting, and some of them very extraordinary, but too technical to repeat here.

It will be asked, seeing that Eels are so common, why has not their larval form been found in our own seas as well as in the Mediterranean? I should not like to say that such has not been the case, but certainly they have not been observed. The answer must be, that their habit of concealing themselves in the sand or mud at the bottom of the sea at considerable depths is not favourable to their discovery, and that we have no such rasping currents as those which occasionally prevail in the Strait of Messina to bring them to the surface. One source of supply, however, which Dr. Grassi found very productive, would seem to indicate a direction in which search should here be made. In the Strait of Messina there is a fishery for the Sunfish (*Orthogoriscus mola*), and in the intestine of this fish he was certain of finding a very large number of specimens. I would therefore suggest that the intestines of our deep-sea bottom feeding fish might also be found to yield us a like supply.

There is another point in the life-history of the Eel with regard to which Dr. Grassi makes some very interesting remarks, and which I think conclusively settles the much vexed subject of the strange variations observed in the characters of the freshwater Eel, so marked, indeed, as to have even given rise to the opinion that more than one species exists. I would refer you to a paper on the subject by the late Dr. Day, in vol. iv. of our 'Transactions,' p. 333. I also made some observations on the subject in a paper published in Longman's 'Magazine' in 1892, from which the following is an extract: "It will be remembered that I stated only the sharp-nosed Eels were taken in the Eel-sets, and that *they only* ran down to the sea. Many Eels are compelled by circumstances to remain either in isolated ponds, or in the waters where they have been nourished; these continue to feed ravenously whenever the weather is open, and large numbers are taken by means of worms and other baits; they differ very considerably in form, colour, and general appearance from the Sharp-nosed Eel, and from the form of the head are known as Broad-nosed Eels. These are barren females, but whether permanently barren is not certain." These yellow coarse-looking Eels are very different in many respects to the "Silver-Eels" which are taken in the Eel-sets when on their way to the sea. With regard to these remarkable differences, Dr. Grassi remarks: "As a result of the observations of Petersen,

we know now that the Common Eel develops a bridal coloration or 'mating habit,' which is chiefly characterised by the silver pigment without trace of yellow, and by the more or less black colour of the pectoral fin, and finally by the large eyes." Petersen's inference that this was the bridal coloration, was derived from the largely developed state of the reproductive organs, and by their ceasing to take nourishment. "Here," says Dr. Grassi, "Petersen's observations cease and mine begin. The same currents at Messina which bring us the *Leptocephali*, bring us also many specimens of the Common Eel, all of which exhibit the silver coloration, and not a few of them present the characters described by Petersen in an exaggerated condition, that is to say, the eyes are larger and nearly round instead of elliptical, whilst the pectoral fins are of an intense black . . . Undoubtedly the most important of these changes is that of the increase of the diameter of the eye, because it finds its physiological explanation in the circumstance, that the Eel matures in the depths of the sea." We thus arrive at the last stage of the development of the Eel, which is not accomplished until it reaches the salt-water of the deep sea, and performs its appointed function of re-production.

Dr. Grassi thus concludes his most interesting contribution to the life-history of this remarkable fish. "To sum up, *Anguilla vulgaris*, the Common Eel, matures in the depths of the sea, where it acquires larger eyes than are ever observed in individuals, which have not yet migrated to deep water . . . The abysses of the sea are the spawning places of the Common Eel: its eggs float in the sea water. In developing from the egg, it undergoes a metamorphosis, that is to say, it passes through a larval form denominated *Leptocephalus brevirostris*. What length of time this development requires is very difficult to establish. So far we have only the following data:—First, *Anguilla vulgaris* migrates to the sea from the month of October to the month of January; second, the currents, such as those of Messina, throw up, from the abysses of the sea, specimens which, from the commencement of November to the end of July, are observed to be more advanced in development than at other times, but not yet arrived at total maturity; third, eggs, which according to every probability belong to the Common Eel, are found in the sea from the month of August to that of January inclusive; fourth, the

*Leptocephalus brevirostris* abounds from February to September. As to other months, we are in some uncertainty, because during them our only natural fisherman, the *Orthagoriscus mola* [in the intestine of which his chief supply of larvæ were found], appears very rarely; fifth, I am inclined to believe that the elvers ascending our rivers are already one year old, and I have observed that in an aquarium specimens of *L. brevirostris* can transform themselves into young elvers in one month's time."

Thus through the indefatigable investigations of this talented Italian naturalist, the veil has at length been withdrawn from the obscure passages in the life-history of one of our most common fishes, much which was before unknown has been revealed, and much more that was only matter of conjecture has been verified.

It may be interesting to know that Dr. Grassi had already highly distinguished himself by his investigations with regard to the life-history of certain species of Termites, and that his services to biological research have been recognised by the presentation of the Darwin Medal of the Royal Society.

---

## VI.

## NOTES ON THE HERRING FISHERY OF 1896.

BY G. H. HARRIS.

*Read 26th January, 1897.*

THE Herring Fishery of 1896 has been notable, both in Yarmouth and Lowestoft, for two things, large catches and low prices. Unfortunately the largeness of the catch never affects the cost price in the same proportion as it does the selling price, with the result that whenever "gluts," or unusually large catches occur, prices fall readily and quickly below profit-bearing value. Therefore the Herring Fishery of 1896 has been, to those engaged in it, despite its large catch, as disappointing and almost as calamitous as though it had been a fishing ruled by small catches and heavy weather. The weather in the autumn of 1896 was as good as can ever be expected of our treacherous English winters, and no small consolation has been derived by the owners from the fact, that the losses of gear have been inconsiderable. Nor have we had any deplorable wrecks of Scotch boats with loss of life. Indeed, their season was a good one; and the discrepancy between the takings of the Scotch and of the Yarmouth boats at the end of the voyage was considerable. I have been informed on good authority, that this is mainly due to the importation of Norwegian Herring. These fish, caught at a trifling cost in the fjords of Norway, have, for some years past been swamping the markets, proving themselves formidable competitors. And the unfortunate part of it is, that they are not the less formidable, because they are bad fish. Imported here, and depreciating prices on the home markets, they are also exported by the Norwegians to the Continent, where they threaten to damage English fish as much as here. For, so far as I know, they are, as regards appearance, indistinguishable to the

The following table shows the amount of work done by the various groups of workers in the Tarnoch district during the year 1914. It is interesting to note that the work done by the various groups of workers is very similar to that done in the other districts of the county. The total amount of work done by the various groups of workers is about 80 per cent of the total work done in the county. This is due to the fact that the Tarnoch district is one of the most important districts in the county. The work done by the various groups of workers is as follows:

lament the bad times, is certainly a remarkable thing in the face of the fact, that the Yarmouth catch per boat was twice as heavy as the Scotch catch.

Turning to the Lowestoft catch, we find the total caught throughout the year to have been 8191 lasts. Of these, however, the Spring and Summer fishing are accountable for 688 lasts. The Spring and Summer fishing in Yarmouth were together so small as to be almost negligible, amounting to no more than 267 lasts.

I have not been able to get returns showing the separate catches made by Lowestoft and Scotch boats, so am unable to see whether the moral pointed by my figures above finds any verification in Lowestoft.

In Lowestoft the total number of boats employed were:—

	Lowestoft.	Scotch.
In the Spring . . .	14	—
„ Summer . . .	182	42
„ Autumn . . .	192	64

A somewhat puzzling discrepancy occurs between the average catches per boat, of boats fishing from Yarmouth and Lowestoft respectively.

There were landed at Yarmouth Wharf during the Autumn fishing 19,000 lasts, roughly speaking. To catch these, 274 Yarmouth and Scotch boats were employed, giving an average of 68 lasts to the boat. At Lowestoft Wharf, on the other hand, during the Autumn fishing 7502 lasts were landed, caught by 256 boats, giving an average of only 29 lasts to the boat, as compared with the Yarmouth average of 68.

On referring to Mr. Southwell's report for 1892, I find much the same state of things prevailing. In that year, the Autumn fishing at Yarmouth was productive of 16,800 lasts, caught by 266 boats, giving an average of 63 lasts per boat; whilst in Lowestoft 6610 were landed, caught by 239 boats, giving an average of 28 lasts only per boat. This discrepancy would appear difficult to account for, were it not that the Lowestoft boats land a large proportion of their fish on Yarmouth Wharf. Of course this affects to a certain extent, any calculation made as to the average catch of the Yarmouth boats.

Taking the two ports together, we find the average catch per boat, English and Scotch, to have been 50 lasts. The average

price at Lowestoft was about £7 15s. per last; at Yarmouth it would rule rather higher.

When the enormous number of fish landed, viz., two hundred and fifty-four millions, is taken into account, it seems rather an extraordinary thing that the old practice of "telling" should be adhered to, that is, literally counting the fish, not in ones, but, I believe, in fours. They are counted into baskets or mounds on deck, which are slid along planks lying between the boat and the quay. Each basket or mound is then carried across the road and emptied into a "swill," twenty of which should go to a last. A basket should contain 33 warp of Herring, four Herring to a warp, so the 33 warp make up the 132 Herring, which go to make up the "long tale" or "long tell" hundred. The tellers remuneration is 3s. per last.

My thanks are due to the late Mr. W. J. Nutman, the Yarmouth Borough Accountant, and to Mr. Henderson of Lowestoft, for the statistical information in this article.

RETURN OF HERRINGS LANDED AT YARMOUTH AND LOWESTOFT  
FISH-WHARVES IN 1896.

		YARMOUTH.			LOWESTOFT.		
		Lasts (13,300)	Thousands (1820)	Hundreds (182)	Lasts (13,300)	Thousands (1820)	Hundreds (182)
Spring Fishing	January	—	—	—	—	—	—
	February	—	—	—	—	4	4
	March	—	—	—	81	3	9
	April	—	—	—	259	7	—
	May	5	6	4	159	1	9
Mid- Summer Fishing	June	164	8	9	172	1	6
	July	96	4	8	15	1	2
North Sea Fishing	August	1262	9	9	62	6	6
	September	2527	6	5	108	5	3
Autumn •Home Voyage	October	5912	9	9	2055	8	5
	November	8920	5	5	4977	9	6
	December	360	—	—	298	2	6
	Yarmouth	19,251	1	9	8191	2	6
	Lowestoft	8191	2	6			
	Total	27,442	4	5			



## VII.

## METEOROLOGICAL NOTES, 1896.

(From observations taken at Bradestone House, Brundall, Norfolk.)

BY ARTHUR W. PRESTON, F. R. MET. SOC.

*Read 26th January, 1897.*

## JANUARY.

THIS was a mild month, with the mean temperature about 2 degrees above the average, 7 degrees higher than in the previous January, but 1.5 degrees lower than in 1890. The chief feature of the month was the high state of the barometer. On the 9th it stood (corrected and reduced) at 30.900 in., which is the highest recorded here since 1882, and in the last week of the month there was a second period of high pressure, the maximum observed being 30.830 in. on the 30th. As in 1882, these high readings were accompanied by more or less cloudy and misty weather, and but little frost.

## FEBRUARY.

HAD 1896 not been leap year the rainfall of February would have been only a quarter of an inch; but as the 29th was a wet day that amount was nearly doubled, although in ordinary years the rainfall measured on that day would have been carried to March. Notwithstanding the common appellation of "Fill-dyke," it is a remarkable circumstance that out of the last thirteen Februaries, seven have given a rainfall of less than an inch. The mean height of the barometer was nearly identical with that of January. While being above 30 in. on every day except the 19th, 20th, and 21st, it at no time attained the unusual height recorded in January. Temperature was considerably above the average, and the contrast between this month and the previous February was remarkable.

## MARCH.

This was the mildest March since 1882, and the wettest since 1888, rain falling on 26 days to the depth of 3.02 in. There was much stormy weather, but a sudden outburst of summer warmth occurred on the 22nd, and continued until the 26th. There was a thunderstorm on the evening of the 22nd, which was of a severe character in some parts of the county, and distant thunder and lightning also occurred on the evening of the 24th. Mean temperature of the month was about 4 degrees above the average.

## APRIL.

There was but little warm weather until after the 16th, the earlier days of the month being cold and bleak, with much rough north-westerly winds. Thunder occurred on the 17th and 29th. The last week was warm, with growing showers rendering vegetation very forward, though slightly later than in 1893 and 1894.

## MAY.

This month gave an unusual amount of N.E. wind, beyond even what is usual at this season of the year. The parching character of these winds, and the deficiency of rain (the month's fall being but 0.73 in.) dried the soil to an unusual extent, and rain was badly wanted at the close of the month. On some days there was a great range of temperature, and the sudden jumps of the thermometer were almost phenomenal. On the 12th the temperature fell 23 degrees between 4.30 and 8.30 p.m., and on the 14th after a fall to 34.4 degrees in the morning, by the afternoon it was standing at 76 degrees in the shade, or a range of 41.6 degrees. This was the greatest range of temperature recorded in any one day since these observations were commenced. The barometer stood above 30 in. almost throughout the month. Notwithstanding the cold bleak winds the foliage developed rapidly, and was much more luxuriant than in the previous year.

## JUNE.

This month gave the highest mean temperature recorded in any June since 1877. Although the rainfall slightly exceeded the average, rain was only registered on eight days, the bulk of it

having fallen on the 10th instant, on which day 1.63 in. was gauged between midnight and 5 p.m. The weather of the greater part of the month was exceedingly fine, and many days were very warm, the thermometer touching 80 degrees on the 2nd and 16th. A thunderstorm of some severity occurred on the early morning of the 10th.

#### JULY.

This was the warmest July since 1887 and the hottest month since August, 1893. The thermometer exceeded 80 degrees on seven days, and reached 84 degrees on the 14th and 20th, and 85 degrees on the 21st. The latter was the highest reading of the thermometer since 18th August, 1893, when it touched 90 degrees. Rain fell on eight days only, but the combined fall amounted to an inch, which, after the previous abnormal dryness, went for nothing, and the surface of the soil was much scorched and parched in the hot sunshine. There was an unusual absence of thunderstorms, for which this month is generally noted; the only storms recorded being distant ones on the early mornings of the 8th and 15th. Although the heaviest fall of rain registered during the month (0.23 in.) fell on St. Swithin's day, the succeeding drought has once more proved the fallacy of the proverbial forty days' wet weather, which is still firmly believed in by many. The total fall for the month (one inch) was the least in any July since 1885, when 0.86 in. only fell, but in 1886, 1888, 1889, 1890, 1891, and 1894 over four inches were recorded.

#### AUGUST.

Although the mean barometric pressure was nearly identical with that of July, the month was much less settled, and was generally much cooler, with a greater prevalence of cloud. The showers, though frequent, were generally slight, and only on three days did the fall exceed 0.20 in. The mean temperature was lower than in any August since 1888, and the rainfall less than since 1885. There was again but little thunder, no storm of any intensity being developed, except on the afternoon and evening of the 26th, when there were severe electric discharges in the north-east and east. These storms passed in the direction of Acle and Yarmouth, where they were severely felt. At the close of the month the year's rainfall was between four and five inches deficient.

## SEPTEMBER.

Stormy, wet, and unsettled weather characterised this month throughout. There was much cloud, and generally the weather was in marked contrast with that of the previous September, when the thermometer reached 70 degrees on 20 days, and sunshine was almost unbroken. The rainfall, which amounted to 3.63 in., was about an inch above the average, but fell considerably short of the quantities measured in London and at some of the stations in the South of England. The rough winds and low and fluctuating state of the barometer in the week ending the 27th were remarkable for so early in the season. On the evening of the 22nd the barometer stood at 29.01 in.; by the morning of the 24th it had risen to 29.76 in., and by the following morning it had fallen to 28.80 in., an unusually low reading for September. An almost continuous rise then set in, till by the evening of the 30th it stood at 30.51 in., or 1.71 in. higher than five days previously. Thus we had a range of barometric pressure in five days greater than that which sometimes occurs in twelve months.

## OCTOBER.

This was a damp, depressing month, with a great frequency of rain, although the falls were at no time exceptionally heavy, in fact the total fall for the month was 0.62 in. less than in the previous October, and as much as 4.24 in. less than in October, 1892. The greatest frequency of rain was in the middle of the month, and by the 25th rain had been measured on sixteen consecutive days, a feature not recorded since 1890. Sharp thunderstorms occurred on the morning of the 14th, somewhat unusual so late in the season, and in the neighbourhood of the valley of the Waveney these storms were of considerable violence. The mean temperature of the month was about two degrees under the average, and was nearly the same as that of the previous October.

## NOVEMBER.

The mean temperature of this month was about 1.5 degrees below the average; no day was really mild, and the highest reading for the month (50.4 degrees) was the lowest maximum

recorded in November for many years. It was a dry month, the rainfall being about half the average, and the barometer was generally high.

#### DECEMBER.

During the first fortnight the weather was exceedingly gloomy, damp, and dismal, with rain daily. A colder period ensued from the 15th to the 24th, with some frost and snow, but the frosts were by no means severe, and the snow did not remain long upon the ground. The last week was stormy and changeable, mild, bright days alternating with stormy winds and heavy rains. On the whole the month was a mild one, with a great excess of rainy days, though the falls were at no time abnormal.

#### THE SEASONS.

The following Tables show the mean temperature and rainfall for the four seasons, together with those of the five previous years, and of a twenty-year approximate average. Winter comprises the three months, December to February inclusive; Spring, March to May; Summer, June to August; and Autumn, September to November.

TEMPERATURE.								
Seasons.	1891.	1892.	1893.	1894.	1895.	1896.	20-year average.	Departure of 1896 from average.
	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.
Winter ...	39.9	37.0	36.5	39.2	34.7	39.6	37.8	+ 1.8
Spring ...	44.0	44.9	49.1	47.7	47.6	48.0	46.2	+ 1.8
Summer ...	58.9	58.3	61.2	59.3	60.4	61.1	60.2	+ 0.9
Autumn ...	50.9	48.8	50.0	50.1	51.4	48.5	49.5	- 1.0
Year ...	47.7	46.9	49.6	49.2	48.4	49.3	48.4	+ 0.9

RAINFALL.								
Seasons.	1891.	1892.	1893.	1894.	1895.	1896.	20-year average.	Departure of 1896 from average.
	in.	in.	in.	in.	in.	in.	in.	in.
Winter ...	3.10	6.36	5.80	4.81	7.35	3.28	6.02	- 2.74
Spring ...	6.64	5.10	1.61	5.62	4.15	5.18	5.21	- 0.03
Summer ...	9.39	10.20	5.37	8.74	7.51	4.88	7.17	- 2.29
Autumn ...	7.00	11.15	6.10	7.12	7.13	8.49	8.50	- 0.01
Year ...	28.35	31.05	19.66	27.32	24.91	23.28	26.90	- 3.62

It will be seen from the above that the Winter, Spring, and Summer were all warmer than usual, and the Autumn somewhat colder. Rainfall was considerably deficient both in the Winter and Summer, but that of the Spring and Autumn was almost in exact agreement with the average, the wetness of September and October being counteracted by the dryness of November.

#### THE YEAR.

The first four months were all warmer than usual, in fact the mean temperature of the six months ending April 30th, was as much as 2.6 degrees in excess of the average. The winter was of a type that had not prevailed for some time past, and much resembled those of 1881—2 and 1883—4, particularly the former, the long periods of exceptionally high barometric pressure, accompanied by mildness and absence of snow, being very similar in each of those seasons. May was cold, but June and July were exceedingly warm. August, October, and November were each cold for the season, whereas September and December were slightly in excess of the average. The mean of the entire year was about a degree warmer than usual, was about a degree warmer than 1895, nearly similar to 1894, slightly lower than 1893, and higher than any of the years 1885 to 1892 inclusive. The rainfall of the year was between three and four inches deficient, the months giving the least rain being January, February, May, and July, each of which yielded an inch or less. The drought was very severe from April 1st, to August 4th. During this period of 18 weeks, if we except the heavy rainfall of June 9th—10th (1.63 in.), there was only 3.86 in. of rain, which fell on 38 days. Consequently there were 86 absolutely rainless days during the period. The latter part of the year was attended with frequent rains, which although at no time exceptionally heavy, fell on an unusually large number of days. Taking the 18 weeks from August 24th to December 28th, rain fell on no less than 85 days, and consequently only 41 days were absolutely rainless, forming a great contrast to the above mentioned dry period of a similar length. The total fall of the second period was 12.17 in. All the months, except May, June, and July, were more cloudy than usual. The absence of severe thunderstorms during the summer was also a feature which deserves to be chronicled.

MONTH.	Highest.	Date.	Lowest.	Date.	Mean.	Highest.	Date.	Lowest.	Date.	Mean.	Relative Humidity, 9 a.m.	Estimated proportion	Inches.	No. of days.	Direction.								Mean force.	
															N	E	S	W	N	E	S	W		N
JAN.	30.90	9	29.24	14	30.328	52.0	2	24.8	21	39.7	94	7.4	1.01	16	4	2	4	2	7	3	2.0			
FEB.	30.74	3	29.75	20	30.319	56.2	19	26.6	26	39.9	92	7.3	0.47	8	2	3	5	4	2	6	4	3	2.5	
MARCH	30.29	10	28.77	3	29.768	65.6	22	29.2	13	45.2	88	7.3	3.02	26	5	2	0	0	5	9	6	4	4.0	
APRIL	30.53	21	29.65	29	30.116	68.4	27	31.0	3	47.4	79	6.6	1.48	16	5	3	0	1	0	1	8	12	2.7	
MAY	30.47	25	29.78	20	30.227	76.0	14	34.2	5	51.3	81	5.8	0.73	7	7	15	3	0	0	2	1	3	2.9	
JUNE	30.22	19	29.48	10	29.939	81.0	16	36.8	1	61.7	82	5.9	2.24	8	2	3	2	3	7	2	4	7	2.4	
JULY	30.32	11	29.68	26	30.009	85.0	21	41.4	3	62.8	75	4.8	1.00	8	4	2	0	4	6	4	6	5	3.1	
Aug.	30.24	10	29.58	26	30.011	78.2	13	41.2	27	58.9	84	7.3	1.64	17	9	4	0	1	1	2	7	7	2.1	
SEPT.	30.51	30	28.84	25	29.756	72.0	9	40.0	21	57.6	89	7.1	3.63	21	1	1	3	4	7	5	7	2	3.7	
OCT.	30.49	1	29.18	20	29.713	64.4	3	29.0	30	46.9	92	7.3	3.38	24	5	2	1	2	3	10	2	6	3.1	
NOV.	30.65	24	29.26	15	30.188	50.4	12	24.2	30	41.0	92	6.5	1.48	13	2	7	7	1	2	2	6	3	2.3	
DEC.	30.37	27	28.83	6	29.785	52.2	26	24.8	19	38.7	94	7.6	3.25	26	4	0	2	6	3	6	8	2	3.0	
MEANS					30.009					49.3	87	6.7											2.8	
EXTREMES & TOTALS	30.90	Jan. 9th	28.77 3rd			85.0	July 21st	24.2	Nov. 30th				23.28	190	50	44	25	30	38	56	66	57		

## VIII.

NOTES ON PALLAS'S WILLOW WARBLER AND SOME  
OTHER RARE EUROPEAN WARBLERS.

BY H. E. DRESSER, F.L.S., F.Z.S.

*Read 23rd February, 1897.*

ONE of the most interesting additions that has of late been made to the avifauna of the British Islands is certainly that of Pallas's Willow Warbler, *Phylloscopus proregulus*, a single example of which was shot at Cley-next-the-Sea, Norfolk, on the 31st October, 1896, by Mr. Ramm, who forwarded it to Mr. Thomas Southwell, and informed that gentleman that he "found it amongst the long grass on the bank or sea-wall, not far from the sea at Cley, a locality which has produced many rare migrants, and at first took it for a Goldcrest, but on approaching to within two or three yards, the bird being very tame, he thought he recognised a Yellow-browed Warbler, a species he had seen before, and therefore secured it." Mr. Southwell identified it correctly as Pallas's Willow Warbler, but forwarded it to me for confirmation, and at his request I exhibited it at a meeting of the Zoological Society on the 1st December last. On comparing this bird with those in my collection from Siberia and the Himalayas, it agrees most closely with a fully adult bird from Siberia; and I may here state that it is an adult female in very fresh plumage, and is quite as bright in tinge of colour as any Siberian specimen I have seen. Mr. Gätke, whose recent death, though at a ripe old age, has deprived European ornithologists of one of its best and most reliable out-door observers, held the view that the form from Siberia was sufficiently distinguishable from that found in th





Milner Bros. (1914)

PALLAS'S WILLOW-WARBLER.

*Phylloscopus proregulus* (Pallas)





Himalayas to admit of specific separation, and proposed for the southern form ('Ibis,' 1889, p. 578) the name, *Phylloscopus newtoni*, retaining that of *Phylloscopus proregeulus* for the Siberian form. I found, however, on comparing a series of examples, that it was impossible to separate them specifically, though, as a rule, Siberian examples are brighter-coloured than the average run of specimens from the Himalayas. According to Mr. Gätke, "the Siberian bird differs from that of India in general colour of plumage, which in the former is suffused with a bright lemon yellow, approaching and partly surpassing that of *P. sibilatrix*, whereas the colour of the latter consists entirely of a dull brownish olive yellow, verging in many instances towards ash grey" . . . "In the Siberian bird the second quill is of equal length with the eighth, in the Indian bird with the tenth; in the former bird the second quill is only six millimetres shorter than the point of the closed wing; in the latter this difference amounts to ten millimetres; and whilst in the Indian bird the second quill is of equal length with the longest of the three posterior quills, it is in the Siberian from six to seven millimetres longer." "Further, in the Siberian bird the third, fourth, and fifth quills are of equal length, and form the point of the closed wing, whereas in the Indian one such is the case with the fourth, fifth, and sixth quills, the third being three millimetres shorter than these." With regard to this supposed difference in wing formula, all I can say is, that on examining a large series, I find that the wing formula varies so much that it cannot in my opinion be looked on as a good character, and I cannot therefore recognise *P. newtoni* as a valid sub-species, any more than I can *Phylloscopus humei* as a valid sub-species of *Phylloscopus superciliosus*.

With regard to the range of Pallas's Willow Warbler, it was until comparatively recently looked on as strictly an Asiatic species which had on one or two occasions strayed into Europe proper, but Mr. Zarudny has found that it occurs regularly on the western slopes of the Ural. He obtained a single specimen near Orenburg in 1879 and another in 1884; and in 1887 he believes that a partial migration took place near there, as on the 3rd October a pair was observed in the Protopen Grove; and on the 4th of October about fifteen were observed together with several Goldcrests, and one was also seen in a flock of Coal Tits, and to

judge from the characteristic call-note it was observed earlier, between the 28th of September and 4th of October in the woods on the other side of the Ural. In 1888 it again appeared near Orenburg, though in smaller numbers, and on the 23rd of October a flock of five were seen, and one shot, at the village of Neshenka. It has also been recorded from the Upper and Central Lena, and on the Witim. The other records of its occurrence in Europe are as follows:—One by Gould (B. of Eur. vol. ii. p. 149), of a male sent to him by Baron Feldegg of Frankfort, said to have been shot in Dalmatia in 1829; and according to Mr. Gätke (Vogelw. Helgoland, p. 304), one was killed by Aeuckens in October, 1845, and another seen but not obtained in October, 1875, on Heligoland.

This Warbler was first described by Pallas in 1811 (Zoogr. Ross. As. vol. i. p. 499), from Siberia, and in 1837 Gould (*l. c.*) redescribed it from a specimen, said to have been obtained in Dalmatia, under the name of *Regulus modestus*. In 1838 (Ann. Nat. Hist. vol. ii. p. 310) the late Mr. John Hancock recorded under the name of *Regulus modestus*, Gould, the occurrence of a Warbler, which was shot on the banks near Hartley on the coast of Northumberland, on the 26th of September, 1838, which, however, was subsequently ('Ibis,' 1867, p. 252) shown by him to be the Yellow-browed Warbler, *Phylloscopus superciliosus* (Gmel.), and not the present species, this being the first occurrence in Great Britain of that species, which however has been subsequently obtained here on at least eleven occasions.

The range of Pallas's Willow Warbler in Asia is, as stated in my supplement to the 'Birds of Europe,' p. 74, very extensive. It does not appear to have been recorded from Western Siberia, but is not uncommon throughout Eastern Siberia. The references to its occurrence near Lake Baikal are tolerably numerous. Schwedoff observed it on passage in the public gardens at Irkutsk and on the banks of the Uschakovka, about forty versts from that town, and his identifications have been verified by Dr. Severtzoff. According to Dybowski it is not rare at Kultuk, but does not appear to breed there, as nests were only found at Petrovsk, beyond Lake Baikal, on the left bank of the Sselenga; a specimen obtained by him is in the British Museum. Mr. Molleson records this Warbler on passage from near the town of Troitzkossavsk,

opposite Kjachta, late in August, 1885, and Pallas's original specimen came from the Ingoda River in Transbaikal. Dr. Dybowski records it from the mineral springs of Darasun; and Dr. Radde observed it on the Tarei-nor near the frontier station Kulus-sutajefskoje, but confused it with *P. superciliosus*. Not far from here is the frontier station Tsuruchaitui, where Dr. Dybowski met with it. We must also refer to the records of von Middendorff from the Stanowoi Mountains and from the Ussuri country. As, however, von Middendorff mixed up the two Siberian Willow Warblers, I must refer only to his two undoubted specimens of *P. proregulus*. These came from the Stanowoi Mountains—one from the Ssalurnai River, and the other from Markul. With regard to the occurrence of this bird in the Southern Ussuri country, Mr. Maximowicz obtained the most northerly recorded specimen at Stanitz Busse. Prjevalski records it as tolerably common in the vicinity of Lake Chanka, though it is not included in his account of his journey, because he mistook the only specimen he brought back for *superciliosus*. Dorries sent specimens to Europe from the station of Baranowskij, in the Ssuifun Valley; and Mr. Poljakoff from the mouth of the Retschnoje River. Finally, the brothers Dorries and Mr. Jankovski record this species from the Island of Askold.

Pallas's Willow Warbler breeds also in the Himalayas at considerable altitudes; and Captain Cock took several nests with eggs at Sonamerg in Kashmir; Colonel Biddulph records it from Gilgit in January; and, according to Mr. Oates (Birds Brit. Ind. vol. i. p. 408), "it is distributed throughout the Himalayas from Hazara and Kashmir to Bhutan, and also occurs probably only as a winter visitor in the Khási and Naga Hills, in Manipur, and in the Salween district of Tenasserim among the pine-forests. It occasionally descends to such low levels as the Dehra Doon."

According to Abbé David (Ois. Chine, p. 275) it frequently passes the winter in Central and Southern China; and Mr. Styan ('Ibis,' 1891, p. 339), in his article on the birds of the Lower Yangtse Basin, says that it "begins to arrive early in March, and soon after its sweet and powerful song is heard throughout the day from the tops of the Bamboos and Firs; its call-note is a loud Canary-like *hweet*. Most of them pass on by the middle of April; in October they re-appear, and I have obtained one at Kiukiang as late as December."

The only available records of the nidification of the present species are those by Dr. Dybowski and Captain Cock, the former of whom writes (J. F. O., 1872, p. 361) as follows:—"Although not uncommon, we did not find its nests in Kultuk, but found them in Petrowsk, beyond the Baikal, on the left bank of the Sselenga River. The nests were placed on young Pines or old moss-covered Cedars on the branches near the stem, three to four metres high, and were neatly constructed of fine grass-bents and green moss, oven-shaped, the opening being towards the trunk of the tree, and lined with feathers and horse- or cattle-hair; the nest is also higher than it is broad. About the middle of June the female lays five or six eggs, and commences sitting directly the first egg is laid, so that in the same clutch one finds quite fresh as well as incubated eggs. The female sits close, and can easily be caught on the nest. While she is sitting the male perches on the top of a tree and sings incessantly. The eggs are white, with dots and small spots of violet, ash-grey, and red, which are chiefly collected so as to form a not very close wreath round the larger end, and measure from 14 by 11 to 15 by 10.5 millimetres, being broadest in the middle." These eggs described by Dr. Dybowski were figured in the 'Journal für Ornithologie,' 1873, plate I. fig. 10.

Captain Cock, who found it breeding at Sonamerg, four marches up the valley of the Sind River, late in May and early in June, says that its nest is placed on the outer end of the branch of a Fir tree at from six to forty feet elevation, and sometimes on a small sapling Pine where the junction of the bough with the stem takes place. The nest is partially domed, the outer portion consisting of moss and lichen, so arranged as to harmonise with the bough on which it is placed, and lined with feathers and thin birch-bark strips, never with hair; and the eggs, five in number, are pure white, richly marked with dark brownish red, particularly at the larger end, forming there a fine zone on most of the eggs, and intermingled with these spots, and especially on the zone, are some spots and blotches of deep purple-grey. In size the eggs vary from 0.53 by 0.43 to 0.55 by 0.44.

Although Pallas's Willow Warbler cannot be separated specifically from the *Phylloscopi*, it approaches very nearly in its general habits and nidification to the Golden Crested Wren. It frequents Pine woods, and those of mixed Pine and Birch in hilly districts,

sometimes ranging in the mountains as high as the border of tree growth, and it is also to be met with in the bush-covered valleys Godlevski says that its call-note, which is seldom repeated, may be rendered as *tsii*, shriller and more prolonged than the call-note of *P. superciliosus*, and the song of the male, which is continued for hours without intermission, is melodious and varied, and of a very high order. Dr. Dybowski also writes (J. F. O., 1872, p. 361), that "its note is melodious and powerful, and its song varied and sweet, and so loud that it rings through the forest, and is astonishing as coming from so small bird." Mr. W. E. Brooks, who has had frequent opportunities of hearing the call-note of this Warbler, says ('Ibis,' 1869, p. 236) that "it is very different from that of *P. superciliosus*, and is extremely shrill, feeble, and tinkling. There are two notes in the call, the second considerably above the first, D to F sharp; and in uttering its call the bird keeps the two notes quite distinct, and not slurred into each other, like the call of *P. superciliosus*." Of the rarer Eastern Warblers which have occurred in Great Britain, Pallas's Willow Warbler most nearly resembles the Yellow-browed Warbler, but differs widely from that species in having a conspicuous lemon-yellow stripe passing from the base of the bill along the centre of the crown to the nape, besides having the two superciliary stripes as in the Yellow-browed Warbler. It has also two conspicuous pale sulphur bars crossing the wing, and the rump is bright sulphur yellow.

It may not be out of place here to add a few remarks on other Eastern Warblers, which have strayed as far west as the British Islands. Of these the Yellow-browed Warbler, *Phylloscopus superciliosus* (Gmel.), has occurred most often, and one was obtained at Cley, Norfolk, as recently as the 1st October, 1894. Another Eastern Warbler which has lately been added to the British list, is the Greenish Willow Warbler, *Phylloscopus viridanus*, Blyth, a single example of which was obtained at North Cotes, Lincolnshire, on September 5th, 1896, by Mr. G. H. Caton Haigh. This Warbler inhabits the Altai range, Turkestan, the Himalayas, Eastern European Russia, and in all probability the Caucasus. It is said to be common in the Perm Government, and it also inhabits during the summer season those of Olonetz, Jaroslaf, and Orenburg. That it breeds in the Perm Government is certain, as

I received a young, not fully fledged, bird from Mr. Meves, who shot it at Tjubuk on the 21st July, but up to the present time no particulars of its nidification have been published beyond that by Mr. W. E. Brooks (Str. Feath. vol. vii. p. 510), who found a newly made nest in Kashmir, which he describes as being domed, and placed on the steep bank-side of a ravine full of small Birch trees, at an elevation of about eleven thousand feet. Unfortunately this nest was empty. Until the above cited occurrence in Great Britain, this Warbler had not been known to occur west of Russia, except on Heligoland, where according to Mr. Gätke it has been obtained on three occasions, viz., a young bird on the 25th September, 1878, an adult male on the 30th May, 1879, and a female on the 3rd June, 1880. It winters, I may add, in India, at which season it is to be met with over the whole peninsula, with the exception of Sind and Western Rajputana, as far south as Ceylon.

This Warbler is said to frequent mixed groves and woods; and, according to Severtzoff, it is to be met with amongst bushes and the tall steppe grass. Dr. Scully noticed it amongst the Tamarisk and Willow bushes, and remarks that it seemed very restless, continually flitting from spray to spray. Both Blyth and Dr. Scully state that its voice is weak, and the former describes the note as *tiss-yip, tiss-yip*, frequently uttered. Sabaniëff, however, says that the voice of this bird consists of so loud and strong a trill that it can scarcely be recognised as the song of a Leaf Warbler, and its call-note, which is a short and shrill *psi, psi*, closely resembles that of the Yellow Wagtail.

Another Warbler, which though not a distinct species, and which has lately been obtained in Great Britain, is interesting as showing that Eastern forms often visit these islands, is the small form of the Common Chiffchaff, which was described by von Homeyer (Erinn. a. d. Samml. Deutschl. Ornith., 1870, p. 48) as a distinct species under the name of *Phylloscopus brehmi*, but is only a diminutive race of our Common Chiffchaff, which I have hitherto only seen from Eastern and South-Eastern Europe. Compared with our birds it looks quite distinct, but in a series from different parts of Europe the variations in size are so great that this difference vanishes, and I cannot look on it as worthy of specific rank.



It would appear as if Heligoland were a stage on the way to Western Europe for these Asiatic Warblers, as all those which have occurred here have previously on more than one occasion been obtained on Heligoland, therefore we may probably look to obtain sooner or later such other Eastern Warblers as have been recorded from that island, and have not yet, so far as we know, visited the British Islands. These are:—

1. *Phylloscopus tristis*, Blyth, the Siberian Chiffchaff, which was once obtained on Heligoland in October, 1846, and which inhabits North-East European Russia and Siberia, and winters in India, ranging as far east as Thibet. Messrs. Seebohm and Harvie-Brown found it breeding on the Petchora River, and the former gentleman also found it nesting in some numbers on the Yenesei.

2. *Phylloscopus borealis*, Blasius, Eversmanns Warbler, which has been shot once on Heligoland on the 6th October, 1854, and Mr. Gätke says that another was seen there on the 1st June, 1859. It inhabits Northern Russia and Northern Norway, ranging right across Siberia to Alaska, and in winter is found in India and China and as far south as the islands of the Malay Archipelago. It has been found breeding on the Varanger and Porsanger fjords in Norway.

3. *Phylloscopus nitidus*, Blyth, the Bright-green Willow Warbler, has been only once obtained on Heligoland, on the 11th October, 1867. It inhabits the Caucasus, where Mr. Lorenz found it breeding, the Transcaspian district and the Himalayas, where it, in all probability, breeds at high altitudes, and in Kashmir, and in winter is found throughout India down to Ceylon.

4. *Acrocephalus agricola*, Jerdon, Paddyfield Warbler. Has once occurred on Heligoland, on the 12th June, 1864. It inhabits during the breeding season the Southern and Central Ural, the Altai, Eastern and Western Turkestan, Transcaspia, the Himalayas from Kashmir to Nepal, and winters on the plains of India. When I wrote the article on this species in the 'Birds of Europe,' nothing definite was known respecting its nidification. Since then, however, the nest and eggs have been sent from the Kirghis steppes in Southern Russia, and are described by Mr. Pleske (Orn. Ross. p. 558). The nest, he says, was woven or fastened to six slender aquatic stems, and is constructed entirely of plant strips, chiefly dark brown in colour, and measures, outer diameter

64 millimetres, internal diameter 42 millimetres, height 130 millimetres, depth 65 millimetres. The eggs resemble those of the Reed Warbler (*Acrocephalus streperus*), but are smaller in size.

5. *Locustella certhiola* (Pall.). Pallas's Warbler has been obtained on one occasion only on Heligoland; a young bird in first autumn dress having been caught at the lighthouse, in the night between the 12th and 13th August, 1856. It inhabits during the summer season the Altai range and the whole of Siberia from the Yenesei to the Pacific, northward to the mouth of the Amoor. In winter it migrates to China, India, and Ceylon, ranging as far south as the islands of the Malay Archipelago.

Two other Eastern Warblers are included by Mr. Gätke in his history of the birds of Heligoland, viz., *Phylloscopus fuscatus* (Blyth), which Mr. Gätke says he saw, but did not obtain, on the 24th October, 1876, and *Phylloscopus coronatus* (Temm. and Schleg.), which was said to have been obtained there by Reymers on the 4th October, 1843, and passed into the hands of Brandt, the dealer, in Hamburg, and has since been lost sight of. As regards the former of these, I can only say with Wheelwright, the Old Bushman, that "what's hit is history, and what's missed is mystery;" and as regards *Phylloscopus coronatus*, it seems to me very improbable that the bird obtained by Reymers belonged to that species, and in both cases it will, I think, be wise to exclude these birds from the European list, until undoubted specimens are obtained.

It is quite possible that one or other of the above Warblers may have visited the British Islands, and been overlooked, and it may therefore be of interest and use to give the distinctive characters as follows:—

*Phylloscopus superciliosus* is very small, scarcely larger than the Golderest, has the upper parts dull yellowish green, a distinct yellowish stripe over each eye, and two yellowish bands crossing each wing, and the under-parts are whitewashed with greenish grey on the flanks; total length about 3.5 inches, wing 2.1 inches.

*Phylloscopus proregulus* is about the same size as, and coloured like *P. superciliosus*, but may readily be distinguished by having a broad median line passing from the base of the bill to the nape, besides the superciliary stripes, and the rump and upper tail-coverts are lemon yellow; total length about 3.5 inches, wing 2.1 inches.

*Phylloscopus tristis* resembles our Common Chiffchaff, but is slightly smaller, browner above and rather whiter on the under-parts, the legs are blackish brown, nearly black instead of light brown; total length 4 inches, wing 2.3 inches. The third, fourth, and fifth quills are nearly equal, the fourth being a trifle the longest, and is the longest of the primaries.

*Phylloscopus borealis* is about the same size as, and is coloured like, our Common Willow Wren, but has a broad superciliary line passing over each eye to the nape. The wings are crossed by two bars, the bastard primary is very small, the exposed portions measuring about 0.32 inch, the third and fourth primaries are longest, the fifth much shorter, the sixth considerably shorter than the fifth, the second intermediate between the fifth and sixth; total length about 4.8 inches, wing 2.7 inches.

*Phylloscopus viridanus* is coloured much like the Willow Wren, but is rather brighter and greener in tone of colour on the upper parts. It has, however, a clearly defined buffy yellow streak over each eye, and the larger wing-coverts are broadly tipped with dull white forming a single alar bar; total length about  $4\frac{1}{2}$  inches, wing 2.35 inches. The third, fourth, and fifth quills are the longest, the fourth being if anything the longer, the second is intermediate between the seventh and eighth, and the bastard primary is tolerably large, the exposed portion measuring fully half an inch.

*Phylloscopus nitidus* has the upper parts bright green, the under-parts sulphur yellow, thus more closely resembling the Wood Wren in tone of colour; it has, like the preceding species, a distinct superciliary stripe, sulphur yellow in colour, and it has two pale yellow bands crossing the wing; total length about 4.65 inches, wing 2.4 inches; second primary shorter than the sixth.

*Acrocephalus agricola* resembles the Reed Warbler, and may be mistaken for that species unless carefully examined. It is however smaller, the upper parts are pale warm rufous brown, brightest on the rump, and the under-parts are white, tinged with warm buff on the flanks and lower abdomen; over each eye a light, almost white streak passes; total length about 5 inches, wing 2.25; wing short and rounded, the secondaries only 0.45 inch shorter than the longest primary; first primary narrow and short, about 0.15 inch longer than the wing-coverts, second intermediate

in length between the sixth and seventh, third and fourth nearly equal, and these two are the longest ; tail much rounded.

*Locustella certhiola* is a Grasshopper Warbler, but differs greatly from our Common Grasshopper Warbler. It has the crown and nape blackish brown, striped with buffy grey ; back and wing-coverts warm ochreous brown broadly blotched with blackish brown, most of the feathers being blackish brown edged with ochreous brown ; rump, dull reddish ochreous brown, with a few obsolete markings, darkening on the upper tail-coverts ; wings and tail brown with lighter margins, the tail much rounded, darkening towards the tip, and tipped with dull greyish white ; primaries margined with reddish buff, the secondaries and larger wing-coverts more broadly margined with buffy white ; sides of the head and neck pale greyish brown ; a distinct greyish white stripe passes from the base of the bill over the eye ; chin and throat pure white ; breast pale buff ; flanks and under tail-coverts warm buff, the latter tipped with white ; middle of abdomen pure white ; total length about 5.25 inches, wing 2.8 inches.

NOTE.—The accompanying figure is from the specimen here described, now in the collection of Mr. Connop, and is reproduced with the kind permission of Lord Lilford, from the "Colored Figures of the Birds of the British Islands," at the expense of Mr. J. H. Gurney, who is good enough to present the plate to the Society's 'Transactions.'—ED.

IX.

NATURAL HISTORY NOTES FROM YARMOUTH.

By A. PATTERSON.

*Read 6th April, 1897.*

BIRDS.

**ROOKS.**—In April, 1896, a pair of Rooks settled on some trees visible from the Market Place, and built a nest. Young were hatched, but some mischievous person climbed up on the night of the 26th May and sawed off the limb. The young were killed. They have not attempted to build this year (1897).

**RINGED PLOVERS.**—About 150 of these birds in a flock on Breydon, May 23rd, 1896.

**SPOONBILL.**—An example on Breydon, June 6th. Another on Breydon, July 15th.

**KENTISH CROWS.**—Six seen by Mr. Bond on the Caister marshes, June 22nd. An exceptionally early record.

**BLACKBIRDS.**—Owing to the dryness of the season in July, the Snails and Slugs in certain districts gathered into the strawberry-beds; thither the Blackbirds followed them to the indignation of the market gardeners, who at once accused them of stealing Strawberries, and immediately commenced a warfare on them. Many scores were slaughtered, and their carcasses hung up as a warning to others. What was done by Slugs upon the finest of the berries was laid to the Blackbirds' charge. Notwithstanding, many quarts of Strawberries perished for want of gathering. It is a great pity, this unwise slaughter of useful birds.

**GOLDEN PLOVER.**—My earliest record of an autumn visitor was on July 14th, when I saw one of these birds on a Bure-side marsh.

**HERONS.**—Was pleased to observe thirty Herons flying over Heigham Sounds on August 4th.

BEARDED TITS.—Young birds appeared unusually numerous amongst the Reeds in Heigham Sounds in August. Their *ping, ping*, was continuously being heard around whilst I was fishing in that neighbourhood.

BLACK-TAILED GODWITS.—Seven killed on Breydon August 6th, two on September 1st.

CORMORANTS.—Saw two on Breydon, August 17th.

RED-NECKED GREBE.—On a stall in the Market, August 18th.

GREY PLOVERS AND OTHER MIGRANTS.—The air was literally alive with them on the night of September 4th. Almost every one noticed their incessant whistling. They again filled space on the night of October 13th.

LITTLE BITTERN.—Shot at Horsey, October 1st.

IMMIGRATION.—Very pronounced on October 13th. Birds of many species coming in wholesale.

WOODCOCK.—First seen in this neighbourhood on October 13th.

TWITES.—Unusual numbers in October.

SMALL HAWKS.—Arriving October 14th.

SHORELARKS.—Not so plentiful this winter. Four shot on North Denes, October 16th.

LARKS.—A White Lark was observed in the vicinity of Potter Heigham on October 13th. Unusual immigrations occurred on February 2nd and 13th, 1897.

LITTLE GULL.—On a Market stall on November 14th.

OYSTERCATCHERS.—Seven were obtained on Breydon on January 9th, 1897. A rather unusual number at that time of the year.

WILD SWANS.—Three Wild Swans flew over the town on January 11th. A Polish Swan shot, January 20th.

SHELDRAKES.—Seventeen seen on Breydon on January 13th. Seven were shot up to noon of 14th, and subsequently the whole flock was "accounted for." Twelve hung in a row on a poulterer's stall on January 16th.

REDSHANK.—This bird is unusual here until late in February. Occasionally one is seen in the depth of winter. One was killed here on January 14th.

BITTERN.—A young specimen, very badly shot, was brought to market on January 23rd, 1897.

TURDIDÆ.—Continuous flocks (with Larks) coming over on February 2nd. Very bad weather followed.

**LITTLE AUK.**—The only one of the winter was found dead on the North Denes on February 2nd, it having struck a shed near to the Rifle Butts, and killed itself.

**VOLES AND FISH.**—The fact that the Water Vole (*Arvicola amphibia*) is somewhat carnivorously inclined, or rather, is piscivorous, I am fully satisfied by observing them on several occasions devouring small fish left on a "rond" beside my house-boat when moored in Kendall Dyke in August. They simply cleared the flesh from the bones. Sir E. Newton, in a letter some time previous, suggested the number of broken fresh-water Mussel shells as being the work of Voles. On September 12th, I examined a number at Lound, when I was led to the conclusion that these animals were actually responsible. One valve only was broken, and that always on one particular side,—presumably the easier side broken. The excrement of Voles lay against every little batch of broken mollusk.

#### FISHES.

**SALMON (*Salmo salar*).**—A trawler brought in on February 27th, 1896, a fine 42-inch Salmon which had been taken in the trawl-net. An 8-inch example was taken in a draw-net on May 6th.

**STREAKED GURNARD (*Trigla lineata*).**—A 12-inch specimen was bought amongst a trunk of Gurnards at Lowestoft, on March 9th, 1896. Length 12 inches. Is said to have been taken just off Lowestoft, which statement its fresh appearance seemed to corroborate.

**POWER COD (*Gadus minutus*).**—At intervals this compact little fellow turns up. Amongst a number of small Whittings and Longshore Herrings, a 7½-inch Power Cod was taken on March 16th in a local draw-net.

**LONG ROUGH DAB (*Hippoglossoides lemandoides*).** Saw an 8½-inch example on the Fish Wharf, on March 31st, 1896.

**HALIBUT (*Hippoglossus vulgaris*).** Often very large fish are brought here from the neighbourhood of Grimsby in April. On April 1st, a local fishmonger purchased an example seven feet in length.

**TROUT (*Salmo fario*).** Mr. Salinger, a local angler, very unexpectedly hooked and landed a 2 lb. 9 oz. Trout, length 18½ inches, on Filby Broad, on April 7th, 1896. It was a survivor of a small

consignment turned off by the late Rev. C. J. Lucas some few years ago. The fish took a lobworm; its maw contained several worms that had been thrown over as groundbait.

**BASS** (*Perca labrax*). This fish in the adult state is not common here. Occasionally a big fellow gets into the draw-net, as happened to one 10 lbs. in weight, on May 18th, 1896.

**SURMULLET** (*Mullus surmulletus*).—Quite a number taken in the trawl-nets in the North Sea in May and June, 1896. Two beauties taken with Mackerel, September 28th.

**SUNFISH** (*Orthogoriscus mola*).—A few miles off Yarmouth on the 11th or 12th September, 1896. A specimen of the Short Sunfish was taken in a "dyle" (a kind of landing net), over the side of the trawler "Result." Length 18 inches. From extremity of dorsal to extremity of anal, 2 feet 4 inches. Weight 10 lbs.

**SOLE** (*Solea vulgaris*). A Sole 1½ lbs. in weight was taken on a hook baited with lugworm off Britannia Pier.

**SCRIBBLED MACKEREL** (*S. scomber* var. *scriptus*). Since local fish-salesmen and fishmongers have become acquainted with this variety, a keener look-out has been kept, with the result that this is now found yearly. A beauty taken in a drift-net on September 26th. Length 18 inches. Yet another 15½ inches long, taken on October 15th.

**SWORDFISH** (*Xiphias gladius*). An example taken into Lowestoft, September 27th.

**COLEFISH** (*Gadus carbonnarius*). Some "pounders" taken in the River Yare, October 1st, 1896. Whittings, turned up too, in some numbers.

**DORY** (*Zeus faber*). One, 2 feet long and 8¼ lbs. in weight, was taken amongst Herrings in a drift-net off Yarmouth, on October 2nd. A very unusual take in that manner. Its maw contained seven Herrings.

**SCADS** (*Scomber trachurus*). As is usual in October, some small examples washed up on beach on the 14th.

**STING RAY** (*Raia pastinaca*). Example measuring two feet, with a double "sting" or barbed dart, on the Fish Wharf on January 5th, 1897. Presented by Mr. J. W. de Caux to the Yarmouth Museum.

**LEMON SOLE** (*Solea lascaris*). On January 21st, 1897, I met with a small example on the Fish Wharf.



CUCKOO RAY (*Raia miraletus*). A very fresh, clean example, a female, was brought to the Wharf by a long line boat on February 4th, 1897. I found it full of ova, in size ranging from hempseed to chestnuts. A smaller, a male, was brought in on February 16th. They were both taken in the North Sea; and as the fishermen "worked" between Yarmouth and Grimsby, some doubt exists as to the claim this species has to a place in the local list.

POLE OR CRAIG FLUKE (*Platessa cynoglossus*). An example on the Wharf on February 16th. Locally known as the "Witch." Sometimes sold for Sole. Becomes more plentiful further northward.

LUMP SUCKER (*Cyclopterus lumpus*). A 26-lb. specimen taken in a draw-net on the beach, February 24th, 1897.

BRILL TURBOT (?). I was asked to go to the Fish Wharf on February 26th, as a Turbot quite unusual and unknown to the fisherfolk was to be seen. It was thought to be a "bastard" fish. Certainly it had a curious blending of Turbot and Brill, the former of which it resembled in shape except about the head, which was a Brill's; and the upper side was brill-coloured, and deficient of the spines which distinguish the Turbot. It was, undoubtedly, an extremely interesting variety of the Turbot.

DOUBLE TURBOTS.—On November 6th two very large specimens of this quaint variety were brought to the Fish Wharf. After evisceration they weighed respectively 11 lbs. and 12 lbs.

## X.

SOME ADDITIONS TO  
THE NORWICH CASTLE-MUSEUM IN 1896.

BY THOMAS SOUTHWELL, F.Z.S., V.-P.

*Read 6th April, 1897.*

It is gratifying in the extreme to find that the interest in the beautiful Museum, which has found so fitting a home in the grand old Castle, is fully maintained, and that according to the Report for the year 1896, issued by the Committee, the goodly number of 159,400 persons visited the building in that year. Although at times almost inconveniently crowded, not a single case of wilful damage to any object in the Museum or of misconduct has been reported, and the intelligent interest evinced in the various collections by young people of both sexes has been very marked. An official Guide Book to the collections has been issued, which it is hoped will be found useful to those whose object is really to profit by the opportunities afforded them; and many of the principal objects in the various sections have been photographed, these are on sale at reasonable prices, and appear to be much appreciated by the visitors.

Through the kindness of Mr. Charles Hose of Baram, Borneo, who has long been a liberal benefactor to the Museum of his native county, the collection of Quadrumana has been enriched by the addition of several Bornean species, including *Semnopithecus hosei*, *S. natunæ*, and *S. femoralis*; *Hylobates mülleri*, *Nasalis larvatus*, and *Macacus cynomolgus*. Four Squirrels, *Sciurus prevosti*, *S. notatus*, *S. tenuis*, and *S. bicolor* var. *bangoranenses*; also a Flying Squirrel, *Steromys nitidus*, all from Borneo. Mr. Bostock has also continued to send such of the animals which have died in his travelling collection as are of use to us, amongst others we

have received a very fine example of the Great Kangaroo (*Macropus rufus*), and a female Tiger, both of which have been mounted for the collection. Good specimens of the Australian Koala (*Phascolarctus cinereus*), and of the Sooty Phalanger (*Phalanger fuliginosus*) from Tasmania have also been presented, the former by Mr. James Trackson and the latter by Mr. R. G. Warnes. The Committee are also indebted to Mr. A. H. Cocks for a British example of a Grey Seal in its first coat. The above are the more notable of the additions to the collection of Mammals.

Mr. Gurney has favoured me with the following notes on some of the additions to the Birds of Prey:—

“The principal addition to the Raptorial collection during 1896 is, perhaps, the *Melierax mechowi*, Cab., presented by Professor du Bocage, Director of the Lisbon Museum, who remarks on this species:—‘Bien distinct du *M. Polyzonus*, per ses teintes plus foncées et par l’absence de vermiculations claires sur les couvertures des ailes.’ It is also a little larger than *M. Polyzonus*, from which it seems to be deservedly separated.

“We have also admitted a female *Tinnunculus moluccensis* from Kalso Island, as being the form separated by Meyer and Wigglesworth under the trinomial designation of *T. M. occidentalis*. Mr. E. Hartert calls it ‘the very distinct Celebes form’ (Nov. Zool. vol. iii. p. 162), but new species are set up on very slight characters now, and this Kestrel can claim little more than the lighter underparts, and whitish-grey ear-coverts as characteristic of it.

“In February we procured *Ninox ochracea*, Schl., from the Celebes group, described in 1866, and figured in B. M. Catalogue, vol. ii., pl. xi., but which is still an Owl of extreme rarity. Dr. Meyer, through whose intervention it was obtained, only knows of eight other specimens besides this one, four of which are in the Museum at Dresden, and three at Leiden. Our bird was killed at Tonkean, N.E. Celebes, in August, 1895, and is apparently adult, with a tail only three inches long, whereas Dr. Sharpe, probably by a misprint, gives it as five inches in the British Museum Catalogue, a difference of two inches.

“In ‘The Birds and Mammals collected by the Menage Scientific Expedition to the Philippine Islands,’ Messrs. Burns and

Worcester describe a new Owl as *Ninox spilonotus*, but do not particularise wherein it differs from *N. spilocephala*, Tw., with which, however, their new species has been compared. It is evident that this variable species comes very close to *N. spilonotus*, and I am confirmed in so thinking by the skin labeled 'Cebu, March 17th, 1888, female,' which Mr. Worcester kindly sent to Norwich some time ago, and which has been added to the Museum, and mounted for our growing series of *Ninox*.

"Two photographs of a couple of Californian Vulture's Eggs, one from Obisko country and the other from near Cambria, have been given by Mr. G. Freat Morcom, who has ascertained that this grand Condor occasionally has two young ones. Happily he has also ascertained that there are two or three little known haunts where *Pseudogryphus californianus* is still far from being exterminated. Writing under date of July, 1896, Mr. Morcom says, that only six eggs are known to him in collections, of which one is at Norwich, where on the shelf by the photographs it will be found in a box."

In addition to the species above mentioned, which are new to the collection, the Museum has received eleven Birds of Prey, the most noteworthy of which are *Lophotriorchis kieneri*, and *Bulaca leptogrammica* from Baram; *Hieraglaux punctulata* and *Strix rosenbergii* from Celebes; two large Hornbills (*Rhytidoceros subruficollis* and *Anorrhinus comatus*), also specimens of *Argusianus grayi*, *Euplocomus nobilis*, *Plotus melanogaster*, *Treron nasica*, and *Pitta baudi*, all from Sarawak, cf. 'Ibis,' 1893, p. 381, for which, with several other species, in all forty-six skins of Mammals and Birds from Borneo and Celebes, all of which are sent to the Museum, the Committee are indebted to the liberality of Mr. Charles Hose, of Baram, Borneo. Mr. Gurney has also contributed a few other desiderata, among which are a specimen of *Apteryx bulleri* and the curious Wry-billed Sandpiper (*Anarhynchus frontalis*) from New Zealand. A very good specimen of the singular Kakapo or Owl Parrot (*Stringops habroptilus*) has been presented by Mr. James Reeve, which has been placed in the general collection, the other specimens possessed by the Museum being in a separate case in the centre of the room. Many other additions are recorded in the Report which do not call for special mention.

Mr. Gurney has placed in the cases, charts coloured to indicate the distribution of the Families and Genera of the Birds of Prey which are exceedingly useful and instructive, and it is to be hoped that the same plan may shortly be adopted with regard to the general collections of Birds and Mammals; he has also placed in a butterfly screen, maps showing the distribution as a whole of the Serpenteridæ, the Old and New World Vultures, and of the Falconidæ and Pandionidæ, also of the Butonidæ and Strigidæ, and coloured drawings of the heads of an example in each order, with some of the peculiar anatomical features, and eggs of selected examples. These beautiful coloured drawings by Mr. Keulemans, illustrating the systematic arrangement of the orders Accipitres and Striges, as finally adopted by the late Mr. Gurney in the arrangement of the Raptores, are most useful additions, forming a key to the two groups, and will be a great assistance to the student. Nor has Mr. Gurney's liberality ceased here, he has added twenty-seven eggs of Birds of Prey, including the following species, viz. :— *Cathartes aura* from Orange Country, United States, *Antenor uncinatus* from Guadaloupe, *Buteo swainsoni* from Montana, *B. albicaudatus* from Arizona, *B. borealis* and *B. pennsylvanicus*, from Hebron, New York, *Archibuteo ferrugineus* from Wyoming, *Pholeoptyx cunicularia* from Florida, and *P. hypogæa* from California. Nests of the Whydah Finch from Natal, and Twite from Ireland, also of the Ruff, Grasshopper Warbler, Willow Warbler, and Reed-bunting have been added, the last four having been presented by Mr. J. A. Cole.

A few additions to the ICHTHYOLOGICAL collection have been made, but in this department there is nothing special to report; the Baroness Berners has also contributed some four hundred specimens of foreign marine Shells to the already rich CONCHOLOGICAL collection.

Some progress has been made in re-arranging and naming the departments of GEOLOGY and MINERALOGY, in which the assistance of the authorities of the British Museum is gratefully acknowledged; to the Trustees of that Institution the Committee are also indebted for the addition of upwards of two hundred species of Palæozoic fossils, and to Professor T. Rupert Jones for a set of Tertiary and Cretaceous Foraminifera and Entomostraca, principally from the Chalk and Chalk-marl.

The additions to the Library have been numerous and valuable, and although it does not come strictly within our province, it would not be right to omit the splendid gift of a collection of three hundred and fifty-one works of art in oil and water-colour, together with numerous fine examples of British and Foreign Pottery and Bronzes, made by Mr. J. W. Walker, an artist of note and a native of Norwich, more especially as some of the drawings by Mrs. Pauline Walker are exquisite representations of Natural History subjects. Nor should the addition to the ETHNOLOGICAL collection in the shape of Weapons and domestic articles, chiefly from the South Sea Islands and the Cape, presented by Mr. J. Trackson and Mr. F. Lambert be altogether overlooked.

---

XI.

A LIST OF THE VERTEBRATE ANIMALS FOUND  
IN THE NEIGHBOURHOOD OF THETFORD.

By W. G. CLARKE.

*Read 6th April, 1897.*

THE Town of Thetford is situate within the confines of the Breck district, which Stevenson describes in his invaluable 'Birds of Norfolk,' as consisting of "wide open fields of light land, mixed with some of the wildest and most extensive tracts in the county of heath, fir-covert, warren, and sheep-walk." The six-mile radius from Thetford, which I have taken to comprise the district, contains in Norfolk, the villages of Rushford, Riddlesworth, Brettenham, Bridgham, Roudham, Kilverstone, Illington, East and West Wretham, Croxton, Santon, West Tofts, and Weeting; and in Suffolk, the villages of Brandon, Santon Downham, Elveden, Barnham, Euston, Fakenham, Honington, and Sapiston. The district is pre-eminent for its wildness, for in no other district of like size in Norfolk or Suffolk is there such a sparsity of inhabited

houses. Within the radius there are twenty-one villages, and the borough of Thetford, with a total population of 10,469 (Thetford, 4247; villages, 6222); whilst in a district of like size around Harleston, Norfolk, there are fifty-five villages, with a population of 23,000 (Harleston 1500). Heathland, covered with bracken, gorse, and heather; huge fir plantations and "belts"; lonely meres and lakes; sinuous streams with a marshy borderland; woods and meadows, with a certain amount of arable land—of such does Breckland consist. There are twenty large heaths within the district, besides many others of less area, with six parks and parts of three others. Nine landowners own sixteen complete parishes, and share the remaining six with nine others. The preservation of game is too often their sole object. The rivers, Little Ouse and Thet, which have their confluence in the heart of Thetford, together with a tributary of the former entering near Euston, and flowing through Sapiston and Fakenham, are the principal streams. The "meres," however, which vary from about twenty rods to fifty acres in extent, have a far greater attraction for waterfowl, probably on account of their extreme solitude. These curious sheets of water are chiefly found at Wretham, north of Thetford, and are held by geologists to have been formed by the glacial erosion of the beds above the Chalk.

The MAMMALS of the district number 25, of which 13 are classed as common, 5 as rather rare, 7 as rare. Instances are given of the recent occurrence of the Polecat and Badger, and also of a Norfolk specimen of the Pine Marten.

There are no herds of Fallow Deer in the district now, the nearest being those at Ampton and at Didlington. At the latter place there are also some Red Deer (*Cervus elaphus*). A herd was kept in Euston Park until 1845—6. The poet Bloomfield mentions this herd in his poem, "The Fakenham Ghost."

"The dappled herd of grazing deer,  
That sought the shades by day,  
Now started from her path with fear,  
And gave the stranger way."

Shadwell Park also contained a herd until about 1880, which at one time contained over 100 head.

REPTILES and AMPHIBIANS number 11; two of which, however, are doubtful, 4 are common, 2 rather rare, and 3 rare. 184 species of BIRDS have occurred in the district, and 4 which must be

classed as semi-domesticated. These species have been divided into 53 common, 43 rather rare, 29 rare, and 59 accidental, in which division also, those birds which are now practically extinct have been placed. The large proportion of 102 species are known to breed in the district. The most curious feature in the fauna of Thetford district is the occurrence on our inland heaths and warrens, of plants, insects, and birds, whose habitat is generally confined to the sea coast. Many eminent authorities, amongst them Professor Newton and the late Dr. Hind of Honington, Suffolk, think that an arm of the Wash may have reached Thetford from the west by the present Little Ouse valley, in the post-glacial epoch, and that these heaths are formed of the coast sands—a very probable theory. It is thought unlikely that the sea could have come in from the eastward. According to this theory, it is hereditary instinct which has brought the Ringed Plovers inland each year with the return of spring, a habit transmitted to generation after generation from the post-glacial period. The first President of the Norfolk and Norwich Naturalists' Society, in his presidential address in March, 1870, remarked: "I would further hazard an opinion that with the death of the last of these warren-haunting Plovers, would cease altogether the appearance of that species (Ringed Plover) on the 'breck' sands of Norfolk and Suffolk." Another particularly noteworthy fact is the inland breeding of seven species of Wild Duck, on the meres of Wretham Heath and Park; and also the nesting of the Redshank on one particular meadow in the district yearly.

Twenty-four species of FISH have been identified, of which 18 are classed as common, 3 as rather rare, and 2 as rare; whilst the Sturgeon is practically extinct. That fish are plentiful in the meres as well as rivers is proved by the fact that an angler in Fowlmere caught over one hundredweight of coarse fish in one day in 1897.

During the present century, Thetford district has rarely been without some resident naturalists of repute. Perhaps the most famous of these, as a resident, was John Drew Salmon, F.L.S., a well-known oologist and botanist, who resided in Norfolk, at Stoke Ferry and Thetford, from 1825 to 1837, living at Thetford the last four years; he died in London in 1859. Part of his oological collection he left to the Linnean Society, and his herbarium and diary to Norwich Museum, of which he was an honorary member. He contributed much to 'Loudon's Magazine of Natural History.'



In a letter from the Rev. Richard Lubbock to Yarrell he says: "I have sent also a few observations made by Mr. Salmon, a very accurate observer, on Birds in the vicinity of Thetford." He was the author of a rare octavo pamphlet, entitled, 'Notice of the Arrival of twenty-nine Migratory Birds in the neighbourhood of Thetford, Norfolk; together with some of the scarcer species that have been met with in the same vicinity during the years 1834 and 1835, and the Spring of 1836, with Observations, etc.' Professor Alfred Newton, F.R.S., and his brother, Sir Edward Newton, K.C.M.G., F.L.S., lived for several years at Elveden, where the foundation of their lasting love of natural history was laid. Amongst local naturalists who rendered valuable assistance to Mr. Stevenson in his 'Birds of Norfolk,' were Mr. Dix, West Harling; Mr. E. C. Newcome, Feltwell; Mr. Partridge, Hockham; Mr. R. Reynolds, Thetford; and Mr. Ringer, West Harling. The Rev. Richard Lubbock, author of the 'Fauna of Norfolk' (1845), was rector of Eccles, near Larlingford, from 1837 to 1876. This place is just outside the borders of the district, as is also Cockfield, near Bury St. Edmunds, where the Rev. Churchill Babington, D.D., author of a 'Catalogue of the Birds of Suffolk,' lived. Lord Walsingham of Merton Hall, and H. M. Upcher, Esq., F.Z.S., of Feltwell, also reside just beyond the boundaries I have chosen.

For invaluable assistance in the compilation of this work, I must thank the Rev. R. B. Caton of Great Fakenham, Rev. D. P. Harrison of Ixworth, and Messrs. F. Norgate of Bury St. Edmunds, W. H. Tuck of Tostock, and D. Newby, F. Russell, and F. Claxton of Thetford, and many others who have also assisted me on minor points.

## REFERENCES.

- (B. of N.)=The Birds of Norfolk, vols. i., ii. by H. Stevenson, 1866—70.  
Vol. iii. by T. Southwell, 1890.  
(B. of S.)=Catalogue of the Birds of Suffolk by Churchill Babington, D.D.,  
Rector of Cockfield (1884—1886).  
(Trans.)=Transactions of the Norfolk and Norwich Naturalists' Society,  
1869—1896.  
(G. & S.)=Messrs. Gurney and Southwell's List of Norfolk Birds in the same.  
(M).=Martin's History of Thetford (1779).

C. indicates that the species is fairly common. R.R. rather rare. R. rare. A. accidental. E. extinct as residents. The local names are given after the specific name.

All notes which are not followed by their source in parentheses are by the author.

## I. MAMMALIA.

1. LONG-EARED BAT (*Plecotus auritus*). R. "Have noticed no rarer mammal than the Long-eared Bat" (F. Norgate *in litt.*)
2. NOCTULE OR GREAT BAT (*Vesperugo noctula*). R.R.
3. PIPISTRELLE OR COMMON BAT (*Vesperugo pipistrellus*). C.
4. HEDGEHOG (*Erinaceus europæus*). R.R.
5. COMMON MOLE (*Talpa europæus*). Very common. "Cream-coloured specimens at Roudham" (Trans.) Cream-coloured Moles occur at Elveden, but have not been seen on Barnham Common (where they were formerly plentiful) for two years.
6. COMMON SHREW (*Sorex vulgaris*). "Ranny." C.
7. LESSER SHREW (*Sorex pygmaeus*). R. "Mr. E. Bidwell has albino specimen from Thetford" (Trans.)
8. WATER SHREW (*Crossopus fodiens*). R. Have seen it more frequently by Shadwell Lake than in other localities.
9. FOX (*Canis vulpes*). R.R. Most frequent at Wretham, Rushford, and Elveden.
10. PINE MARTEN (*Mustela martes*). R. "A Marten trapped in Blackwater Carr is preserved at Riddlesworth Hall" (Mr. W. H. Tuck *in litt.*)
11. POLECAT (*Mustela putorius*). R. "Caught many years ago at Fakenham and on Grange Farm, Euston" (Rev. R. B. Caton, *v.v.*) "Saw an unusually large Polecat, big enough for a full-grown Marten; I could not be sure which species, as it ran out of a rabbit hole on Barnham Heath into the pine belt on the Elveden boundary, so straight away from me that though I was very near it, I could not form any idea of the length of its tail" (F. Norgate *in litt.*) One seen five years ago near Croxton Road Bridge, Thetford.
12. STOAT OR ERMINE (*Mustela erminea*). C. "In bird-stuffer's at Thetford in 1882, counted forty-one white or nearly white Stoats, not all killed in one year, but a fair accumulation" (Southwell, Trans.) Two hundred were trapped on Thetford Warren in 1893, in six weeks.
13. WEASEL (*Mustela vulgaris*). C.
14. BADGER (*Meles taxus*). R. "Badgers formerly lived in a spinney on the Honington side of Fakenham" (Rev. R. B. Caton, *v.v.*) In days of yore one formerly lived in the

corner of Shadwell Forest, where the road leads down to Rushford. One was trapped at West Wretham, which was suckling two young ones, in the latter end of April, 1895. The mother was stuffed and is preserved at the hall. An attempt was made to rear the two cubs at the Home Farm, but did not succeed.

15. COMMON OTTER (*Lutra vulgaris*). R.R. One was killed on January 13th, 1891, in the middle of Magdalen Street, Thetford, more than a quarter-mile from any river. Several were procured in 1889, and also in the winter of 1896—7. Much more common than generally supposed. "I have noticed the 'seal' of a decidedly large Otter in the snow on the Weeting side of the river Little Ouse" (F. Norgate *in litt.*)

16. COMMON SQUIRREL (*Sciurus vulgaris*). C. "Puggy." An albino specimen has been caught near Thetford.

17. HARVEST MOUSE (*Mus minutus*). C.

18. LONG-TAILED FIELD OR WOOD MOUSE (*Mus sylvaticus*). R.R.

19. COMMON MOUSE (*Mus musculus*). C.

20. BROWN RAT (*Mus decumanus*). C.

21. COMMON FIELD VOLE (*Microtus agrestis*). C.

22. BANK VOLE (*Microtus glareolus*). R. "Have noticed the Bank Vole when fishing near Thetford" (Rev. D. P. Harrison *in litt.*) "July, 26th, 1885. I saw a Red Bank Vole in Santon Downham, and have since caught several in my garden at Bury St. Edmunds" (F. Norgate *in litt.*)

23. WATER VOLE (*Microtus amphibius*). C.

24. COMMON HARE (*Lepus europæus*). C. "I often have varieties white and nearly white" (F. Claxton, *v.v.*)

25. RABBIT (*Lepus cuniculus*). C. "March 7th, 1837. Walked across Thetford Warren to see Mr. Gardiner's new stock of Rabbits. They come from Lincolnshire, and are of silver-blue colour. The fur is considered of more value than the common grey" (Salmon's Diary, Trans.) "The beautiful variety known as the Silver Sprig has long been established in some localities—notably Thetford Warren" (Southwell, Trans. 1871). In the time of Mr. Baring, twenty thousand were sent annually from Thetford Warren to London; now, the variety is virtually extinct in the neighbourhood, its place having been taken by the commoner grey and black Rabbits.

## II. REPTILES AND AMPHIBIANS.

1. COMMON LIZARD (*Zootoca vivipara*). C. "Swift."
2. (?) SAND LIZARD (*Lacerta agilis*). R.
3. GREEN LIZARD (*Lacerta viridis*). R.R.
4. SLOW WORM (*Anguis fragilis*). R.
5. VIPER (*Pelias berus*). R.R. Many have been killed on the various heaths of the neighbourhood.
6. RINGED SNAKE (*Tropidonotus natrix*). R.R. Have been caught on Roudham Heath and in a few other localities.
7. COMMON FROG (*Rana temporaria*). C.
8. (?) EDIBLE FROG (*Rana esculenta*). Has been captured commonly in places a mile or two beyond the bounds of the district, but have no proof of its actual capture within the district.
9. COMMON TOAD (*Bufo vulgaris*). C.
10. GREAT CRESTED TRITON (*Triton cristatus*). ?
11. SMOOTH SPOTTED NEWT (*Lissotriton punctatus*). C.

## III. BIRDS.

\* Indicates that the species breeds in the district.

1. \* MISTLE THRUSH (*Turdus viscivorus*). "Fulfer." C.
2. \* SONG THRUSH (*Turdus musicus*). "Mavis." C. "A dun and cream-coloured one shot at Euston" (B. of S.)
3. REDWING (*Turdus iliacus*). R.R. Doubt seems to have existed as to the occurrence of this species in the district, owing to Salmon's not having seen it; but Mr. Newby has had them to stuff, shot near Thetford, and the Rev. R. B. Caton has seen them in spring and autumn near "Burnt Hall," Fakenham; and myself and other observers have noted them near Thetford.
4. FIELDFARE (*Turdus pilaris*). "Fulfer." C.
5. \* BLACKBIRD (*Turdus merula*). C. One shot at Elveden in February, 1895, with white breast and white primaries.
6. RING OUZEL (*Turdus torquatus*). R. Migrant. "One shot at Brandon, April 26th, 1834. Occurred at Elveden but rarely" (B. of S.)
7. \* WHEATEAR (*Saxicola œnanthe*). "White rump." C. "Female variety killed at Thetford in July, 1850, wings pure white save a few feathers on the shoulders, and two or three adjoining

primaries in the centre of each wing which are pale buff" (B. of S.)  
Extremely common on the heaths and warrens of the district.

8. \* WHINCHAT (*Pratincola rubetra*). "Furchuck" or "Furze-chuck." R.R.
9. \* STONECHAT (*Pratincola rubicola*). "Stonechuck." R.R.
10. \* REDSTART (*Ruticilla phœnicurus*). "Firetail." R.R.
11. \* REDBREAST (*Erithacus rubecula*). "Robin." C.
12. \* NIGHTINGALE (*Daulias luscinia*). C.
13. \* WHITETHROAT (*Sylvia cinerea*). "Hayjack." R.R.
14. LESSER WHITETHROAT (*Sylvia curruca*). "Hayjack." R.R.
15. \* BLACKCAP (*Sylvia atricapilla*). "Hayjack." R.R.
16. \* GARDEN WARBLER (*Sylvia hortensis*). R. "Salmon thought it did not visit Thetford district, but Newton found it breeding at Elveden in May, 1844" (B. of S.) Local, but regular migrant.
17. \* GOLDEN CRESTED WREN (*Regulus cristatus*). "Teapot,"—probably first applied to its nest" (F. Norgate). C.
18. \* CHIFFCHAFF (*Phylloscopus rufus*). R.R.
19. \* WILLOW WREN (*Phylloscopus trochilus*). "Ground Wren." C. "Perhaps hardly exceeded in number in any other part of England" (B. of N.)
20. \* WOOD WREN (*Phylloscopus sibilatrix*). R. "Extremely local at Elveden, but frequenting same Oak plantations from year to year" (B. of N.)
21. \* REED WARBLER (*Acrocephalus streperus*). R.R. Nests favoured localities in the higher reaches of the Little Ouse and Thet. "Salmon found nest near Euston bridge on June 30th, 1834" (B. of S.)
22. \* SEDGE WARBLER (*Acrocephalus phragmitis*). C.
23. \* GRASSHOPPER WARBLER (*Locustella naevia*). R. "Quite unknown in neighbourhood of Thetford" according to the 'Birds of Suffolk,' but Rev. and Mrs. Caton have heard it in Broom hill covert at Fakenham, and Mr. F. Russell has heard it at Thetford. For many years past I have also heard it in the Osier Bed below Thetford, during the nesting season.
24. \* HEDGE SPARROW (*Accentor modularis*). "Hedge Betty." C.
25. DIPPER (*Cinclus aquaticus*). A. "Has been shot in district" (Newby *in litt.*)

26. \* LONG-TAILED TITMOUSE (*Acredula rosea*). "Long-tailed caper, Titty long-tail caper, and Caper long-tail." C.

27. \* GREAT TITMOUSE (*Parus major*). "Oxeye Tit" and "Pickcheese." C.

28. \* COAL TITMOUSE (*Parus britannicus*). R.R. "Breed in Elveden in nests about a foot below the ground, amongst the roots of an old stump" (B. of N.)

29. \* MARSH TITMOUSE (*Parus palustris*). R.R. The Rev. D. P. Harrison thinks that, in this district, the Marsh Tit takes the place of the Coal Tit as the commoner species. My own experience is contrary to this; the Coal Tit being more generally distributed.

30. \* BLUE TITMOUSE (*Parus cæruleus*). "Blue Jimmy" and "Pickcheese." C.

31. \* NUTHATCH (*Sitta cæsia*). R.R. "Almost white variety shot at Riddlesworth, August 17th, 1834" (B. of S.)

32. \* WREN (*Troglodytes parvulus*). "Titmeg, Tittyreen, Titreen, Jenny Wren, Tom Tit, Tom Stag." C.

33. \* TREE CREEPER (*Certhia familiaris*). R.R.

34. \* PIED WAGTAIL (*Motacilla lugubris*). "Penny Wagtail." C.

35. GREY WAGTAIL (*Motacilla melanope*). R.R. "Regularly visits banks of Thet in spring and autumn" (Trans. vol. i.) "More or less rare at Thetford in winter (Salmon)" (B. of S.)

36. \* YELLOW WAGTAIL (*Motacilla raii*). C.

37. \* TREE PIPIT (*Anthus trivialis*). R.R.

38. \* MEADOW PIPIT (*Anthus pratensis*). "Titlark." C. One of our most common birds on heath and common land.

39. GOLDEN ORIOLE (*Oriolus galbula*). A. "Has been shot at Rushford" (Newby *in litt.*)

40. GREAT GREY SHRIKE (*Lanius excubitor*). A. "Has been shot at Snarehill" (Newby *in litt.*) "November 19th, 1882. Newby received this month Great Grey Shrike ♂ from Rushford" (F. Norgate *in litt.*)

41. \* RED-BACKED SHRIKE (*Lanius collurio*). "Butcher bird." R. Much rarer than formerly, owing to low-cut hedges and closer cultivation. Have taken both red and grey spotted varieties of eggs in the district. Fairly common at Fakenham.

42. WAXWING (*Ampelis garrulus*). A. "One shot at Snarehill, and four others taken near Thetford, January, 1835; Thetford,

January, 1856" (B. of S.) Also at Croxton, Rushford, and Thetford in February, 1893, and two at Kilverstone in May, 1893.

43. **PIED FLYCATCHER** (*Muscicapa atricapilla*). A. One shot at Elveden on April 23rd, 1859.

44. \***SPOTTED FLYCATCHER** (*Muscicapa grisola*). "Bee-bird." R.R.

45. \***SWALLOW** (*Hirundo rustica*). C.

46. \***HOUSE MARTIN** (*Chelidon urbica*). C.

47. \***SAND MARTIN** (*Cotile riparia*). "Pit Martin." C. "Nest in sawdust heaps at Brandon Station, 1876" (Trans. vol. ii). "November 20th, 1882, I saw many Sand Martins' nest-holes in steep, cliff-like sides of vast mound of sawdust at Brandon" (F. Norgate *in litt.*)

48. \***GREENFINCH** (*Ligurinus chloris*). "Green Linnet." C.

49. \***HAWFINCH** (*Coccothraustes vulgare*). R.R. "October 10th, 1882, Newby had stuffed specimens of several shot in the neighbourhood of Thetford" (F. Norgate *in litt.*) "A nest of Hawfinches in my grounds in 1895" (Rev. R. B. Caton *in litt.*) Six shot at Rushford in June and July, 1893, which probably nested there. "Nests regularly (several pairs) at Santon Downham, Brandon, and West Tofts" (F. Norgate).

50. \***GOLDFINCH** (*Carduelis elegans*). "King Harry." R.R.

51. **SISKIN**. (*Chrysomitris spinus*). R.

52. \***HOUSE SPARROW** (*Passer domesticus*). C.

53. \***TREE SPARROW** (*Passer montanus*). R.R. "Nests plentifully at Santon and Santon Downham" (F. Norgate).

54. \***CHAFFINCH** (*Fringilla caelebs*). "Spink" or "Common Finch." C.

55. **BRAMBLING** (*Fringilla montifringilla*). R.R. "Many feed in company with Chaffinches on Fakenham Rectory lawn in winter" (Rev. R. B. Caton *in litt.*) "Common in hard winter of 1894-5. On June 13th, 1895, I saw a pair of these birds in Euston Park, and by their movements suspected a nest, but a game-watcher disturbed them" (Rev. D. P. Harrison *in litt.*) "Very common at Thetford in the winter of 1895-6; one hundred taken in snares in one day" (F. Claxton, *v.v.*)

56 \***LINNET** (*Linota cannabina*). "Grey, Red, or Blood Linnet." C. "Almost white variety shot at Thetford" (B. of S.) Nest in hundreds on the furze-clad heaths and commons of the

district. Have a nest from Lakenheath which is built on the dome of a Wren's nest; both birds using their nests at the same time.

57. MEALY REDPOLL (*Linota linaria*). A. "Male specimen, in full breeding plumage, shot at Riddlesworth, in July, 1848" (B. of N.) "Elveden, March, 1840, and December, 1847" (B. of S.)

58. \*LESSER REDPOLL (*Linota rufescens*). R.R. "Near Thetford, where it breeds yearly, the nests are placed close to the trunks of the tree in plantations of young Larches of no great height" (B. of N.) Nests not uncommon throughout the district.

59. \*BULLFINCH (*Pyrrhula europæa*). "Olf" ♀; "Bloodolf" ♂. R.R. "Nests regularly (several pairs) at Santon Downham" (F. Norgate).

60. \*CROSSBILL (*Loxia curvirostra*). "Robin Hawk." R.R. "Seen at Elveden, 1846 to 1848. Four shot January, 1846. Two near Brandon, March, 1864; thirty in 1868-9" (B. of S.) "Seven specimens killed on trees near Brandon railway station, on October 24th, 1863" (B. of N.) "Nested at Santon Downham in 1885-7" (Trans.) "December 27th, 1894, specimen in adult plumage picked up by Mr. Houchen between Thetford and Barnham. Two killed on Euston estate" (Rev. R. B. Caton *in litt.*) "Saw them in Fir trees near Rushford, in January, 1895" (Rev. D. P. Harrison). "Nested at Rushford in 1886" (F. Russell). "Crossbills are in some years numerous around Thetford. I have seen ten nests of this species within about a six-mile radius, and have heard of many more" (Norgate *in litt.*) May now be classed as a regular winter visitor, staying to breed at Brandon, Santon Downham and Rushford.

[PARROT CROSSBILL (*Loxia pityopsittacus*). North European variety. "Red male shot at Riddlesworth Hall, 1851—the first Norfolk specimen known." B. of N. vol. iii. p. 391].

61. \*CORN BUNTING (*Emberiza miliaria*). "Bunt-lark." C.

62. \*YELLOW BUNTING (*Emberiza citrinella*). "Yellow-hammet." C.

63. \*REED BUNTING (*Emberiza schœniclus*). "Reed Sparrow or Reed-bird." R.R.

64. SNOW BUNTING (*Plectrophenax nivalis*). "Snow Sparrow." R. "Flock at Thetford, November, 1834" (B. of S.)

65. \*STARLING (*Sturnus vulgaris*). C. "Cream-coloured variety, shot at Brandon" (B. of S.) January 19th, 1895. Nest found at Santon Downham containing five young birds.



5. ROSE-COLOURED STARLING (*Pastor roseus*). A. "One shot at Thetford in September, 1843, perched on a tree in a churchyard—probably St. Mary's" (B. of S.)
7. \*JAY (*Garrulus glandarius*). R.R. "Great numbers at Thetford in 1846-7" (B. of S.) "Plentiful in Fakenham wood" (R. B. Caton *in litt.*) Fairly common in the well-wooded portions of the district, where they also nest yearly.
3. \*MAGPIE (*Pica rustica*). R. "Large number visited Thetford winter, 1846-7. Nested at Elveden in April, 1849, and gently since that time" (B. of S.) These birds still nest in Fakenham wood, but are by no means common.
9. \*JACKDAW (*Corvus monedula*). R.R.
10. RAVEN (*Corvus corax*). A. Formerly nested in the district, now extinct as a resident. "Bred at Icklingham from time memorial to 1857, when the nest was removed to Elveden; the few years the nest was built sometimes at Elveden, sometimes at Icklingham. About 1864 the birds were destroyed, but young taken in 1852 were believed to be alive in 1884" (B. of S.) There were also nests at Shadwell, and in Rubbing-house Spinney, Fakenham Park.
11. \*CARRION CROW (*Corvus corone*). R.R. "Spring and summer visitants to western end of county" (B. of N.)
12. HOODED CROW (*Corvus cornix*). "Grey-backed Crow." C. Winter visitant.
13. \*ROOK (*Corvus frugilegus*). C.
14. \*SKYLARK (*Alauda arvensis*). C.
15. \*WOODLARK (*Alauda arborea*). C. "In the neighbourhood of Thetford, the birds are most partial to old sheep-walks in the vicinity of Scotch Fir trees. Mr. R. Reynolds of Thetford had specimens shot at Rushford in December" (B. of N.) "Not so common as a summer visitant about Brandon, Thetford and Icklingham" (Trans.) "Have found several Woodlarks' nests" (Norgate *in litt.*) Is also fairly common at Fakenham.
16. \*SWIFT (*Cypselus apus*). "Shriek Owl, Screech Owl, Shriek Owl, squeaker." C.
17. \*NIGHTJAR (*Caprimulgus europæus*). "Nighthawk, Jar." "A cream-coloured specimen shot at Brandon" (F. Claxton, *v.v.*) "We heard five of these birds crooning within one hundred yards of each other at the same time, near the Two-mile bottom."

Have known of nests beneath the Furzè bushes on Barnham common.

78. \* WRYNECK (*Iynx torquilla*). "Cuckoo Leader." R.R. April 13th, 1893. One flew against telegraph wires in Thetford and was killed.

79. \* GREAT SPOTTED WOODPECKER (*Dendrocopus major*). R. "Female caught with a trap baited with an egg, and set for the purpose of catching a Jay, at Elveden, on the 20th May, 1851" (Trans.) "Seen near Brandon, February, 1884. Male shot at Elveden. Breeds at Fakenham yearly" (B. of S.) "October 10th, 1882. Newby had several stuffed specimens shot in neighbourhood of Thetford" (F. Norgate *in litt.*) "Have seen it at different times in Fakenham wood" (Rev. R. B. Caton *in litt.*)

80. \* LESSER SPOTTED WOODPECKER (*Dendrocopus minor*). "Woodjar." R. "Have found one nest of L.S.W." (F. Norgate *in litt.*) "Seen at different times in Fakenham wood and Fakenham Rectory garden" (Rev. R. B. Caton *in litt.*) Has been seen in gardens in the heart of Thetford.

81. \* GREEN WOODPECKER (*Gecinus viridis*). "Wood-sprite, Picker." C. "Must have been fifty at Thetford birdstuffer's, when we (Messrs. Gurney and Southwell) visited him together" (Trans.)

82. \* KINGFISHER (*Alcedo ispida*). R. Much rarer than formerly, owing to incessant persecution. Still nests in a few favoured localities.

83. HOOPOE (*Upupa epops*). A. "One found dead on Thetford Warren in December, 1846" (B. of S.) "April 1st, 1859, one shot at Thetford" (B. of N.)

84. \* CUCKOO (*Cuculus canorus*). C.

85. \* BARN OWL (*Strix flammea*). "White Owl." C.

86. \* LONG-EARED OWL (*Asio otus*). "Horned Owl." C. "The most plentiful species of Owl hereabouts, and there are few plantations of any size that do not contain a pair" (B. of N.) Very common in local collections.

87. \* (†) SHORT-EARED OWL (*Asio accipitrinus*). "Woodcock Owl." R. "In the first week of August, 1854, A. and E. Newton found on a heath at Elveden two young birds nearly full grown but unable to fly" (B. of N.) "About twelve years ago, thirteen were flushed from one Pine tree at Wretham; ten were shot"

(F. Claxton, *v.c.*). "November 18th, 1882. Mr. W. M. Crowfoot told me of a Short-eared Owl's nest in a rabbit-hole, between Brandon and Mildenhall" (F. Norgate *in litt.*)

88. \*TAWNY OWL (*Syrnium aluco*). "Grey Owl, Brown Owl." R. "A pair nested regularly in the vicinity of Elveden Hall, from 1844 to 1859" (B. of N.) "Found in coverts at Fakenham" (Rev. R. B. Caton *in litt.*)

89. MARSH HARRIER (*Circus aeruginosus*). A. "One shot on Thetford Warren" (Newby *in litt.*)

90. HEN HARRIER (*Circus cyaneus*). A. "Elveden, 1844 and 1850" (B. of S.) Immature specimen in my possession, shot on the Abbey estate, Thetford.

91. MONTAGU'S HARRIER (*Circus cineraceus*). "Martin-hawk." ? A. "Nests formerly found in neighbourhood of Thetford" (B. of N.) "Male at Elveden, June, 1844. One at Elveden, November, 1885. Fine adult at Euston, December, 1876; two young birds ditto, in August, 1877" (B. of S.)

92. BUZZARD (*Buteo vulgaris*). A. "Dark-coloured female in the Dennis collection at Bury, killed near Thetford in 1852" (B. of N.) "One at Elveden, December 11th, 1850" (B. of S.)

93. ROUGH-LEGGED BUZZARD (*Buteo lagopus*). R. "Two on Thetford Warren, February and April, 1835. Adult from Thetford Warren, November, 1857" (B. of S.) "Trapped at Santon Downham in July, 1848. During November, December, January, 1839—40 no less than forty-seven specimens were ascertained to have been taken within eight miles of the town of Thetford. October, 1858—twenty specimens obtained, chiefly in the neighbourhood of Thetford and Yarmouth" (B. of N.) "Adult, Brandon, January, 1885, another adult at Brandon, 1874 or 1875; very rare in this state" (B. of S.) "On heaths at Fakenham" (Rev. R. B. Caton *in litt.*)

94. WHITE-TAILED EAGLE (*Haliaëtus albicilla*). A. "Two trapped on Thetford Warren in winter of 1832—3. Female shot on warren at Elveden, January, 1843. One shot at Barnham" (B. of S.) "At Lynford, the keeper (Jamieson) showed me a fine Sea Eagle shot at Lynford and stuffed by him. P. Mackenzie, Esq., of Santon Downham, has stuffed specimens of two which I understood were obtained thereabouts" (F. Norgate *in*

*litt.*) One shot on Wretham Decoy in (? 1892), now in possession of Sydney Morris, Esq. All immature.

95. GOSHAWK (*Astur palumbarius*). A. "Young bird trapped at Riddlesworth in the autumn of 1853" (B. of N.) "One killed at Elveden, November or December, 1854" (B. of S.).

96. \*SPARROW HAWK (*Accipiter nisus*). "Partridge Hawk"? C. "Young male perfectly white, excepting few dark feathers on back, killed at Riddlesworth in 1851" (B. of N.) "With Kestrels, seem to lay a larger number of eggs in the Thetford neighbourhood than they appear to do in other places; at least I have known several clutches of seven eggs and one Sparrow Hawk's of nine" (F. Norgate *in litt.*) "Common at Fakenham" (Rev. R. B. Caton *in litt.*)

97. KITE (*Milvus iclinus*). A. "Thetford Warren was a favourite locality for 'Kite Hawking.' Female trapped at Croxton, November, 1852" (B. of N.) "One killed on Thetford Warren in 1857. Three at Elveden, 1878, 1881, and about 1861" (B. of S.) "One preserved at Shadwell Court" (W. H. Tuck *in litt.*)

98. HONEY BUZZARD (*Pernis apivorus*). A. "Specimen shot at Lynford in 1851; in its throat were fragments of eggs of Song Thrush" (B. of N.) "October 10th, 1882. Newby had Honey Buzzard shot in the neighbourhood of Thetford" (F. Norgate *in litt.*)

99. SCANDINAVIAN GYR-FALCON (*Falco gyrfalco*). A. "A young bird killed on Thetford Warren in the spring of 1883, in possession of Dr. Churchill Babington" (Trans. G. and S. List). "Dr. Gadov of Cambridge pronounced to be Gyr-Falcon" (B. of S.)

100. PEREGRINE FALCON (*Falco peregrinus*). R. "Three adult specimens—two males and one female—killed near Thetford in the spring of 1848. In the following spring a very fine pair in perfect plumage were killed near the same place, and one or more old birds are still seen there every year, usually in March, the adjacent warren having peculiar attractions" (B. of N.) "Adult shot at Brandon, November 18th, 1879" (Trans.) "Two killed at Fakenham in first week of 1895" (Rev. R. B. Caton *in litt.*) "Mr. H. Claxton has two shot in district" (F. Claxton, *v.c.*).

“ April 21st, 1885, I brought home a Peregrine Falcon ♂ trapped eight days ago on Thetford Warren, and hung ‘in terrorem’ on wire fence in broiling sun. I made a skin of it, and found filariæ in its abdomen. March 19th, 1886. Received a Peregrine Falcon adult ♀ trapped yesterday on Thetford Warren” (F. Norgate *in litt.*). Several specimens are either seen or procured annually in the district in winter or early spring.

101. HOBBY (*Falco subbuteo*). R. “ October 10th, 1882, Mr. Newby showed me stuffed specimens of two Hobbies killed recently in Thetford neighbourhood” (F. Norgate *in litt.*) One shot at Rushford, May, 1893. A rare migrant.

102. MERLIN (*Falco aesalon*). R. “ One shot at Elveden, October, 1859. Frequently shot or trapped by the keeper at Elveden” (B. of S.)

103. \*KESTREL (*Falco tinnunculus*). C. (*Vide* Sparrow Hawk, No. 96).

104. OSPREY (*Pandion haliaëtus*). A. “ October, 1859. Four or five were observed in the neighbourhood of Thetford” (B. of N.) “ One killed at Euston; preserved at the hall” (B. of S.) “ October 10th, 1882. Newby had stuffed specimen, shot in the neighbourhood. November 19th, 1882. Newby tells me he has received this month one Osprey ♂ from Wretham. May 18th, 1883. At Santon Downham, as I was in a boat on the river, I saw what I believe was an Osprey about two hundred yards off, sitting on the topmost twig of a dead Willow, from which it sailed off in large graceful circles or curves, hardly ever flapping its wings. Its under-parts seemed almost white” (F. Norgate *in litt.*)

105. CORMORANT (*Phalacrocorax carbo*). A. “ Two taken within three or four miles of Thetford; Newby has one of them” (B. of S.) “ One shot at Wretham” (F. Claxton. *v.v.*)

106. \*HERON, COMMON (*Ardea cinerea*). “ Hern, or Hernser.” R.R. “ Herons nested in trees within sight of my abode at Santon Downham” (F. Norgate *in litt.*)

107. BITTERN (*Botaurus stellaris*). A. “ During three past winters, 1833—4, 1834—5, 1835—6, two or three specimens of this bird have been annually captured; it is considered a bird of rare occurrence, although formerly rather plentiful in this district”

(Salmon's List.) "An aged keeper assured Mr. Lubbock in 1843, that he had known a party 'fen shooting' at Downham, kill twenty or thirty Bitterns in one morning" (G. and S. List). "One killed about December, 1846, at Brandon" (B. of S.) "Mr. H. Claxton shot two at Brandon" (F. Claxton, *v.v.*)

108. WHITE STORK (*Ciconia alba*). A. "One killed at Wretham in 1838" (B. of N.)

109. GREY LAG GOOSE (*Anser cinereus*). A. "Fakenham, December 19th, 1890" (Rev. R. B. Caton *in litt.*)

110. WHITE-FRONTED GOOSE (*Anser albifrons*). A. "A flock once extremely well seen at Elveden" (B. of S.)

111. BEAN GOOSE (*Anser segetum*). R.R. "Met with in large numbers far inland at Wretham" (B. of N.)

112. PINK-FOOTED BEAN GOOSE (*Anser brachyrhyncus*). R.R. "Frequent open country about Wretham Heath. Mr. A. W. Partridge saw a flock of two hundred to two hundred and fifty Wild Geese at Wretham on some young Rye—bagged one, which proved to be pink-footed" (B. of N.)

113. WHOOPER SWAN (*Cygnus musicus*). A. "On the 12th December, 1890, two killed near the fourth staunch on the Little Ouse" (Rev. R. B. Caton *in litt.*)

114. \*MUTE SWAN (*Cygnus olor*). R.R. Large flocks on the rivers in the Middle Ages, particularly in the locality of monasteries. In Martin's History of Thetford, five Swan-marks are given. (1) The Prior of the Canon's mark. (2) Binknorth's mark. (3) The Prioress's mark. (4) Sir Richard Fulmerstone's mark. (5) The Channon's mark (H. of T. p. 293). Breeds in a semi-domesticated state in various parts of the district.

115. COMMON SHELD DUCK (*Tadorna cornuta*). A. "Probably bred formerly on the warrens about Thetford" (B. of N.) "One shot on the Euston river, April 7th, 1894" (Rev. R. B. Caton *in litt.*)

116. \*MALLARD OR WILD DUCK (*Anas boschas*). C. The only working decoy in the district proper is at Wretham, but that at Didlington is on the outskirts.

117. \*GADWALL (*Anas strepera*). R.R. "Gadwall on the meres on Wretham Heath in 1882" (B. of N.) "Breed in large numbers on the meres" (Trans.) "One shot at Brandon,

- January, 1885" (B. of S.) "Have found one Gadwall's nest in district" (F. Norgate *in litt.*) "Plentiful at West Wretham" (Claxton, *v.r.*)
118. \*SHOVELER (*Spatula clypeata*). R.R. "A pair shot on river near Thetford, March 7th, 1871. Nestling from Elveden, 75, in Cambridge Museum" (B. of S.) "Mr. Southwell shot eight drake Shovelers on Langmere, April 15th, 1876" (of N.) "Have found one Shoveler's nest in neighbourhood" (Norgate *in litt.*) Breed on the meres of Wretham Heath.
119. PINTAIL (*Dasyla acuta*). R.R. "One shot at Euston, January, 1895" (Rev. R. B. Caton *in litt.*) An annual winter visitant to the Breckland meres and the river Little Ouse.
20. \*TEAL (*Querquedula crecca*). R.R. "Some seen at Elveden in 1853" (Trans.) "Breed on inland waters at Wretham, etc. Mr. Norgate saw Teal's nest on Santon Warren containing eight Teal's, one Duck's, and several Pheasants' Eggs" (of N.) Breed throughout the district in suitable localities.
21. \*GARGANEY (*Querquedula circia*). R. "On Fowlmere was visited by Stevenson" (Trans.) "Have been killed near Thetford (Newby)" (B. of S.) Breed on the meres.
22. WIGEON (*Mareca penelope*). R.R. Winter visitant to the district. Most frequent at Wretham.
23. \*POCHARD (*Fuligula ferina*). R.R. "Professor Newton's brother saw male Pochard on mere on Wretham Heath in 1853" (B. of N.) "Nest annually in goodly numbers on the meres" (G. and S. List). "Have found between thirty and forty nests of Pochards and Tufted Ducks in Thetford district" (Norgate *in litt.*) "Euston river, 20th January, 1892" (Rev. R. B. Caton *in litt.*)
24. \*TUFTED DUCK (*Fuligula cristata*). R.R. "26th June, 1853. Counted three distinct broods on one mere at Wretham, two on another" (G. and S.)
25. SCAUP DUCK (*Fuligula marila*). A. "Has been shot in district" (Newby *in litt.*)
26. GOLDENEYE (*Clangula glaucion*). A. "Killed near Thetford (Newby) and at Elveden (Camb. Museum)" (B. of S.)
27. COMMON SCOTER (*Eidemia fusca*). A. "One shot at Euston on by Mr. B. W. Cooper. Another preserved at Euston" (B. of S.)

128. GOOSANDER (*Mergus merganser*). A. "One shot at Elveden in Cambridge Museum" (B. of S.) "Several have been shot at Wretham" (F. Claxton, *v.v.*)

129. SMEW (*Mergus albellus*). A. "Three shot near Thetford in winter of 1846-7, one an adult male" (B. of S.) "One female shot at Wretham, 1870-1" (B. of N.)

130. \*RING DOVE OR WOOD PIGEON (*Columba palumbus*). "Ring-dow or Ring-doo." C. "Not welcomed on large flock farms near Thetford, where they destroy turnip-tops used for feeding young lambs" (B. of N.)

131. \*STOCK DOVE (*Columba oenas*). "Blue Rock, Blue Pigeon, or Sand Pigeon." C. "Multitudes bred about 1780, in rabbit-burrows on sandy plains about Brandon. Breeds in March at Thetford, leaving about end of October, in rabbit-holes and under thick Furze bushes" (B. of S.) "Pair of eggs laid at Elveden on branch of Scotch Fir tree, twelve feet from ground without any nest" (B. of N.) Mr. Norgate has found the eggs till first week in November.

132. \*TURTLE DOVE (*Turter communis*). "Dove." C. Extremely common in the district.

133. PALLAS'S SAND GROUSE (*Syrhaptes paradoxus*). A. "June 6th, 1863, a male taken alive at Elveden. Male killed at Croxton. Mr. E. N. Cole says: 'It was killed on my farm by one of the boys about the 10th July last. There were four of them together at the time feeding on turnip seed; the three remaining ones were seen once afterwards, but could not be shot. Once or twice when riding I got within shot, but never when walking. Their flight is peculiar—very sharp and quick with a humming sound.' Three killed at Santon Downham in June or July" (B. of N.) "December 14th, 1888. Four seen by shooting party at Thetford" (B. of N.) Newby had a ♀ in December, 1888, from the Thetford Warren flock, and two flocks of one hundred each were said to have been at Barnham since March of the same year (F. Norgate). Three seen at Rushford flying in an easterly direction, in February, 1892 ('Field,' February 20th, 1892, vol. 79, p. 248).

134. BLACK GROUSE (*Tetrao tetrix*). R. "Dead female found at Elveden in mouth of rabbit-hole, October 12th, 1844" (B. of S.) "Six brace turned out by W. D. Mackenzie near Thetford, in the autumn of 1885" (G. and S.) "A grey hen in triangle covert,



uston, 6th December, 1893; a cock killed in the park, 1895" (Rev. R. B. Caton *in litt.*)

135. \*PHEASANT (*Phasianus colchicus*). C. White Pheasant killed near Thetford about 1850. Very abundant, and in many varieties, in this strictly preserved game country.

136. \*PARTRIDGE (*Perdix cinerea*). C.

137. \*RED-LEGGED PARTRIDGE (*Cuccabix rufa*). "French Partridge." C. "One weighing twenty-two ounces shot at Brandon" ('Field,' January 16th, 1897).

138. \*QUAIL (*Coturnix communis*). R. "October, 1846, at Eveden. Eggs about May 20th, 1849, and June 25th, 1851" (B. of S.) "Two nests found at Euston in 1881" (B. of S.) "I occasionally hear a Quail or two near the larger warrens, and obtained a clutch of ten eggs which had been exposed by grass-worming, about three miles south of Thetford" (F. Norgate *in litt.*) "I have been shot near Thetford at various times."

139. \*CORN CRAKE OR LAND RAIL (*Crex pratensis*). R. "One found dead under telegraph wires at Brandon, May 12th, 1833" (Trans.) "Do not seem to breed in the 'breck' district, though they occur here in autumn" (B. of N.) "Decidedly rare at Fakenham; we very seldom hear it" (Rev. R. B. Caton *in litt.*) "Eggs have been found at Fakenham, and Mr. Russell and myself have noted their cry in the district every year about the middle of May, so that undoubtedly some do breed in the 'breck' district."

140. SPOTTED CRAKE (*Porzana maruetta*). A. "In October, 1846, a bird was picked up dead at Thetford, killed by flying against the telegraph wires of the Norfolk Railway." (B. of N.)

141. \*WATER RAIL (*Rallus aquaticus*). R. "15th May, 1853, a nest with nine eggs was found at Santon Downham, close to the river which there divides this county from Suffolk. A live Water-rail was taken to A. Newton at Eveden, on 16th February, 1856, during frosty weather, but only lived a short time" (B. of N.) Nests at Downham, Brandon, Euston, Fakenham, etc.

142. \*MOOR HEN (*Gallinula chloropus*). "Water Hen." C. "Very abundant on the quieter parts of the rivers. Feed with the fowls of the Canons, Thetford, during winter."

143. \*COMMON COOT (*Fulica atra*). C. Common on the rivers and meres of the district, Fowlmere especially having great attractions for this species. On January 19th, 1893, forty were in sight on the Little Ouse at one time, near the Two-mile bottom.

144. CRANE (*Grus communis*). A. "One shot at Wretham, September 1st, 1873. Male, immature; weighed 10 lbs. 13 ozs." (Trans.)

145. GREAT BUSTARD (*Otis tarda*). E. "Sir John Shelley, a veteran sportsman, says that forty years ago (*i.e.*, 1805), parties used to be made to go and look at the Bustards by those who visited the Duke of Grafton and other great houses in the neighbourhood, and that a distant view of some of these birds could always be obtained" (Lubbock's Fauna). "In 1832, there is reason to believe that a nest found on the borders of Thetford Warren, was the last known in Suffolk. Probably the last Bustard in Norfolk was at Bridgham in 1842. There were two great 'droves' in Norfolk—Thetford and Swaffham. Thetford 'drove' extended from Brettenham and Snarehill, to Barnham, North Stow, and Icklingham. Bustards were probably as numerous here as anywhere in England. Mr F. J. Nash, of Bishop's Stortford, remembers when a young man seeing nine flights of Bustards in one day near Thetford. Two were caught on the Place Farm, Thetford, in 1820" (abridged from B. of N.) "A migrant was seen on Blackdyke Fen, Hockwold, on January 24th, 1877. It was seen at Elveden on February 25th, but not again" (Trans.)

146. LITTLE BUSTARD (*Otis tetrax*). A. "One caught in a rabbit-trap on Thetford Warren about Christmas, 1861" (B. of N.)

147. \*STONE CURLEW (*Ælicnemus scolopax*). "Cullew, Sandpiper, and Willie Reeve." C. "First made known in a graphic form to British ornithologists by Sir Thomas Browne, who, about the year 1674, forwarded a drawing of it to the celebrated John Ray, taken from a specimen killed near Thetford. He also says 'it breeds about Thetford, above the stones and shingles of the river.' A footnote in Ray's book upon Sir Thomas Browne's picture, read: 'A Stone Curlew from about Thetford, whereabouts they breed. It hath a remarkable eye, and note somewhat like a Green Plover'" (B. of N.) In Martin's

'History of Thetford' (1779), this is correctly quoted as a "*Stone Curlew*," but in Britten's 'Description of the County of Norfolk' (1809) it is referred to as a "*Petrified Curlew*."

The Stone Curlew still holds its place as the most characteristic bird of the "breck" district, generally arriving about the end of March, and departing early in October. Salmon, however, started one on December 9th, 1834, and I distinctly heard one on Barnham common, December 12th, 1894. Lubbock also noted that in mild seasons it stayed to the end of November, or beginning of December, assembling in parties of from eighty to one hundred before migration. A Stone Curlew was twice heard and seen at Great Fakenham, in the last week of February, 1897, and a pair were taken at Thetford, in March, 1853, during deep snow. It still breeds in fairly large numbers on the heaths and "brecks" of the district, its eggs, however, being but rarely found. Flocks of from twelve to twenty may be seen in the daytime on Thetford Warren during the summer, but soon after sunset almost all the birds fly down to the lowlands. Their shrill whistle is not usually heard during the daytime, save whilst rain is falling, when their whistling is incessant; and if perchance one of the meres is near by, they may be seen flying down to it from all directions.

148. DOTTEREL (*Eudromias morinellus*). R. "Formerly abundant at Thetford; decreasing in 1836 and 1840. One killed May, 1851" (B. of S.) "Few 'trips' generally observed on Thetford Warren, sometimes amounting to about a dozen birds, but rarely as many as twenty. Appear in autumn in the vicinity of Thetford, at the end of August or beginning of September" (B. of N.) "October 10th, 1882. Newby had stuffed specimens of two Dotterel shot in neighbourhood of Thetford" (F. Norgate *in litt.*).

149. \*RINGED PLOVER (*Ægialitis hiaticula*). "Stonehatch or Ring Dotterel." R. "Breeds from March to June on Thetford Warren. 7th February earliest, and 1st September the latest seen" (B. of N.) "Very abundant at Thetford in 1836. Bred at Elveden, May, 1884. Seen in small numbers in 1863. Specimens killed at Euston; eggs from Barnham" (B. of S.) "Still breeds in reduced numbers on Thetford Warren, also on some 'brecks' the Norfolk side of the border" (G. and S.)

Extremely local; but breeds annually on several heaths and warrens (*Vide* Introduction p. 302). Three pairs nested this year (1897) on a corner of Roudham Heath.

150. GOLDEN PLOVER (*Charadrius pluvialis*). R. "In 1852, a small 'trip' of five seen on Thetford Warren on July 30th, by the Newtons. Between 17th and 20th August following, saw 'trips' of from thirty to fifty birds in same locality" (B. of N.) November 17th, 1894. A huge flock,—probably numbering several thousands—passed over Thetford in the early morn in a south-westerly direction.

151. \*LAPWING (*Vanellus vulgaris*). "Lapin or Peewit." C. "Tolerably numerous at Thetford in 1836 (Salmon), though of late years very much decreased in consequence of their eggs being so successfully gathered. At Thetford (1870), Mr. Bartlett says: 'Seen only in scores, where formerly in hundreds'" (B. of N.) "Female, white variety, resorted to Thetford Warren in 1834—5" (Salmon). Breeds generally throughout the district. Huge flocks in winter.

152. GREY PHALAROPE (*Phalaropus fulicarius*). A. "Four on the pond belonging to the farm at Fowlmere on the Wretham estate in the winter of 1846; one afterwards killed on a mere near the hall" (B. of N.)

153. \*WOODCOCK (*Scolopax rusticula*). R.R. "Nest with four eggs found at Riddlesworth by a man cutting reeds in 1848 (Newton). Mr. Newton had heard of them breeding in Fakenham wood. Mean number killed at Elveden in the ten seasons ending 1853 was 37.1" (B. of N.) "Mr. H. Claxton has found eggs near Brandon" (F. Claxton, *v.v.*)

154. GREAT SNIPE (*Gallinago major*). A. "One distinct seen March 13th, 1865, on Little Ouse at Thetford (B. of S.) "Five seen in one day at Euston in 1876" (B. of S.)

155. \*COMMON SNIPE (*Gallinago caelestis*). C. "Formerly bred in large numbers on Hunhill-lows between Barnham and Elveden; also breed in the swampy margins of the meres" (F. N.) "Mr. H. Claxton shot one Snipe which flew off a tree, also says that they stayed all the year round until the winter of 1860, when they departed, and ever since have got the first frost" (F. Claxton, *v.v.*) April 1st, 1893. Saw s

together over the marshy part of Thetford Warren. Breeds in many localities in the district.

156. JACK SNIBE (*Gallinago gallinula*). R. Have been shot in the district at various times; appear yearly at Fakenham.

157. DUNLIN (*Tringa alpina*). A. "Stray birds occasionally seen on Thetford Warren, as on 24th May, 1850, and 19th May, 1851" (B. of N.)

158. LITTLE STINT (*Tringa minuta*). A. "Male and female obtained at Thetford, in Newcome collection" (B. of S.)

159. RUFF (*Machetes pugnax*). A. Exceeding rare migrant, but formerly bred in the district. "A Ruff and Reeve killed on the Euston estate (Rushford river), in my possession" (Rev. R. B. Caton in litt.)

160. COMMON SANDPIPER (*Totanus hypoleucus*). R.R. Regular spring and autumn migrant.

161. GREEN SANDPIPER (*Totanus ochropus*). R. "Several seen near Thetford in 1835 and 1836" (B. of N.) "Shot at Elveden, September, 1843, and August, 1852" (B. of S.)

162. \* REDSHANK (*Totanus calidris*). R. "Has been shot at Euston" (Newby in litt.) Breeds annually in one riverside meadow in the district.

163. SPOTTED REDSHANK (*Totanus fuscus*). A. "One killed at Elveden by General Newton, August 10th, 1836. Presented to Norwich Museum" (B. of S.)

164. GREENSHANK (*Totanus canescens*). A. "One taken within two miles of Thetford" (B. of S.)

165. BLACK-TAILED GODWIT (*Limosa belgica*). A. "One shot near Brandon, January 9th, 1886" (B. of S.)

166. COMMON CURLEW (*Numenius arquata*). A. "20th May, 1851. I saw seven Curlews flying within gunshot of the ground towards Elveden Warren (Newton)" (Trans.)

167. WHIMBREL (*Numenius phaeopus*). A. "Two or three taken near Thetford" (B. of S.)

168. COMMON TERN (*Sterna fluviatilis*). R. A regular spring visitor, although in small numbers.

169. BLACK TERN (*Hydrochelidon nigra*). A. "A Black Tern flew slowly past me three times within about five yards, near Broomhill Mere, Weeting" (F. Norgate in litt.)

170. \*BLACK-HEADED GULL (*Larus ridibundus*). "Scoulton Peewit." R.R. "Formerly nested in large numbers at Stanford Water, and 'Bagmoor,' a pond on the Thetford and Stanford road" (B. of N.) "June 8th, 1883. At Langmere, I found about fifty nests of Black-headed Gull, most of which contained from one to three eggs. I cannot hear that this species has ever nested there before or since" (F. Norgate *in litt.*) A spring visitant at Fakenham (Rev. R. B. Caton), and to most other places in the district, being more frequent the nearer the locality to Scoulton Mere. They nest sporadically by the meres and heathland ponds north of Thetford.

171. COMMON GULL (*Larus canus*). A. "Has occurred at Elveden" (B. of S.) "Fakenham" (Rev. R. B. Caton *in litt.*)

172. HERRING GULL (*Larus argentatus*). "Sea Crow." A. "One, immature, shot at Fakenham by H. Lovelace" (Rev. R. B. Caton *in litt.*)

173. KITTIWAKE GULL (*Rissa tridactyla*). A. "Immature specimen accompanying Ducks to be fed, closely observed at Elveden, January 31st, 1854 (Newton)" (B. of S.)

174. POMATORHINE SKUA (*Stercorarius pomatorhinus*). A. "30th October, 1848. One shot at Elveden; now in Cambridge University Museum" (B. of N.)

175. ARCTIC OR RICHARDSON'S SKUA (*Stercorarius crepidatus*). A. "26th September, 1819. At beginning of month, Mr. Sabine procured a young Arctic Gull, from a warren near Brandon, Suffolk" (B. of N.)

176. GUILLEMOT (*Uria troile*). A. "One shot at or near Euston, preserved at hall" (B. of S.) One was knocked over with an oar and killed near the second staunch, Thetford, in January, 1897 (D. Newby, *v.v.*)

177. LITTLE AUK (*Mergulus alle*). A. "Elveden, December, 1859, in Cam. Museum. Taken on Suffolk side of Thetford" (B. of S.) "January 21st, 1895. A Little Auk, alive but very exhausted, picked up at Fakenham" (Rev. R. B. Caton *in litt.*) "One picked up at Honington, in February, 1895" (Rev. D. P. Harrison *in litt.*) One at Thetford, January 22nd, 1895.

178. GREAT NORTHERN DIVER (*Colymbus glacialis*). A. One shot at Brandon in February, 1897, just after severe floods.

179. RED-THROATED DIVER (*Colymbus septentrionalis*). A. "One shot at Elveden ; skeleton in Cambridge Museum" (B. of S.)
180. \* GREAT CRESTED GREBE (*Podiceps cristatus*). R.R. "Breed regularly on some of the Wretham meres" (B. of N.)  
Also breed on Shadwell Lake and Ampton Water.
181. \* LITTLE GREBE (*Podiceps fluviatilis*). "Dabchick, Didopper, or Deeve Dipper." C. Breeds commonly throughout the district. Sometimes very plentiful on the meres.
182. MANX SHEARWATER (*Puffinus anglorum*). A. "October 10th, 1882. Mr. Newby had one to stuff, shot near Thetford" (B. of N.) "September 18th, 1896. One of these birds picked up alive but exhausted, in a field above Fakenham" (Rev. R. B. Caton *in litt.*).
183. STORM PETREL (*Procellaria pelagica*). A. "Elveden ; skeleton in Camb. Museum" (B. of S.)

## SEMI-DOMESTICATED.

- CANADA GOOSE. "Kept and bred at Riddlesworth and Culford" (B. of S.)
- BARBARY PARTRIDGE. "Male killed at Elveden about 1882" (B. of S.) "October 10th, 1882. Newby had many shot in neighbourhood of Thetford, also one hybrid Barbary and Red-legged Partridge, killed near Elveden, where they may have been turned out by Duleep Singh" (F. Norgate *in litt.*)
- VIRGINIAN COLIN. "Male at Elveden, 1882, preserved by Newby" (B. of S.) "I heard a Virginian Colin at Santon Downham, and saw one, a ♂ on Eriswell Heath" (F. Norgate *in litt.*)
- SUMMER DUCK. "Male shot at Elveden" (B. of S.)

## IV. FISH.

1. THREE-SPINED STICKLEBACK (*Gasterosteus aculeatus*). C.
2. TEN-SPINED STICKLEBACK (*Gasterosteus pungitius*). C.
3. PERCH (*Perca fluviatilis*). C. "Have been caught in Fowlmere" (Trans.) Common and of good size in the rivers.
4. RUFF (*Acerina vulgaris*). "Sand-sticker." C. Very common in the rivers, more especially where sewers have their outlet. Several score are sometimes taken with one cast of a net.

5. MILLER'S THUMB (*Cottus gobio*). C.
6. BURBOLT (*Lota vulgaris*). "Eel-pout." C. "Abundant in the Thet, which flows by Larlingford and Thetford. Pailsful have been taken from Harling mill-pool, when the water has been let off that the brick-work might be repaired" (Lubbock). "The figure in Day's British Fishes (Pt. iv. p. 312) is from one caught in the river Thet, where it is not uncommon" (Trans.) "Seldom caught; taken out of holes in the banks of the river, and accounted very delicate and wholesome" (Martin).  
[SALMON (*Salmo salar*). Martin says: "Have been taken in great plenty," but no records have occurred in recent years.]
7. SALMON TROUT (*Salmo trutta*). R. Common in the time of Martin; only occur occasionally now. Mr. J. Kirk caught one between the first and second staunches, weighing 3½ lbs., on February 5th, 1892.
8. COMMON TROUT (*Salmo fario*). R. Mr. R. Howard caught one weighing 12 ozs. at the fourth staunch.
9. PIKE (*Esox lucius*). C. "At Westmere, Pike up to 24 and 22 lbs. have been taken with rod and line" (B. of N.) "Caught in great plenty; four score have been taken at one throw of a casting net" (Martin). Mr. R. Howard has specimens of 23 lbs. and 18 lbs. from Shadwell Lake, and the records of fish over the latter weight are extremely numerous.
10. CARP (*Cyprinus carpio*). R.R.
11. GUDGEON (*Gobio fluviatilis*). C.
12. ROACH (*Leuciscus rutilus*). C.
13. CHUB (*Leuciscus cephalus*). R.R. "Chevin." "Very large in some Norfolk rivers—the Ouse, the Thet, and the Wissey, near Stoke Ferry" (Lubbock). "April 28th, 1884. In Santon Downham I saw a Chub of about 7 lbs. weight, which seemed to have been just fresh landed, and mauled by a very large Otter" (F. Norgate *in litt.*). Are found in deep pools beneath overhanging trees.
14. RUDD (*Leuciscus erythrophthalmus*). C. "February 13th, 1892. Large shoals of Rudd in Shadwell Lake" ('Field.') Also found in the local rivers.
15. DACE (*Leuciscus vulgaris*). C. This is almost as common a species locally as the Roach.



16. MINNOW (*Leuciscus phoxinus*). C. "Silver-belly."
17. TENCH (*Tinca vulgaris*). R.R. "Lord Walsingham took one Bagmoor (a pond on the Thetford and Stanford Road), in 158, Tench weighing over 6 lbs." (B. of N.) "Have seen Tench Shadwell Lake" (Rev. P. H. Davis *in litt.*) Tench of large size is caught in Fowlmere, and a shepherd's dog there will go in the water and fetch them out with his mouth.
18. LAKE BREAM (*Abramis brama*). C. "Brandon river (little Ouse), very abundant and attaining a large size" (Trans.)
19. WHITE BREAM (*Abramis blicca*). C. Both this, and the preceding species are very plentiful in Shadwell Lake.
20. BLEAK (*Leuciscus alburnus*). C.
21. COMMON EEL (*Anguilla vulgaris*). C.
22. STURGEON (*Acipenser sturio*). Does not now occur, owing to the staunches between Thetford and the sea. "April 7th, 1715. One caught in the river at Thetford; weight 13 stone 10 lbs.; length 8 in. long; 1 yd. 2 in. girth; contained three pecks of spawn. Once then, another above 6 ft. long and weighing about 11 stone. First taken in April, 1737; weight 13 stone 10½ lbs.; girth 1 yd. 3 in." (Martin).
23. LAMPERN (*Petromyzon fluviatilis*). "Lamp Eel or Lamper."  
 "March 3rd, 1884. We caught in an hour about one hundred lamperns in Santon Downham, viz., *P. fluviatilis*, and *P. planeri*, and every possible intermediate variety between these forms, proving that they are but one species. I afterwards heard that Dr. Günther had arrived at the same conclusion, independently of my catch" (F. Norgate *in litt.*)

## XII.

## MISCELLANEOUS NOTES AND OBSERVATIONS.

PARADOXOCARPUS CARINATUS, NEHRING.—Referring to my paper on *Paradoxocarpus carinatus* in our 'Transactions' (vol. v. p. 382) it has recently been discovered by Dr. K. Keilhack that the much-debated fruit, not uncommon in the Cromer Forest-bed, is that of our Water-aloë, *Stratiotes aloides* (see 'Naturwissenschaftliche Wochenschrift,' 18th October, 1896). Dr. Keilhack has kindly sent me ripe fruits of the recent plant, and these leave no doubt as to the correctness of his determination, which is also accepted by Professor Nehring. I have never been able to obtain ripe fruits of *Stratiotes* in this country, and in Germany also it does not appear to fruit at all freely. The determination of this plant makes it probable that the species of *Folliculites*, so common in Eocene and Oligocene strata, belong also to the isolated and essentially aquatic order of the *Hydrocharideæ*.—CLEMENT REID.

ACULEATE-HYMENOPTERA, AT TOSTOCK NEAR BURY ST. EDMUNDS.—During the past autumn I had some very profitable field work—in spite of a wet September—and I give a list of my best captures. I added five new species to my parish list of Aculeate-Hymenoptera, viz. :—

*Ceropales maculatus*, Fab. August 4th, on Wild Parsley.

*Mimesa equestris*, Fab. July 26th, in a sand-pit.

*Crabro anxius*, Wesm. August 11th, on Parsley.

*Andrena gwynana*, var. *bicolor*, Fab. August 5th, on Bramble bloom.

*Cælioxys elongata*, Lep. August 5th, on Wild Bryony.

This brings my list up to 181, viz., Ants 9, Fossores 52, Wasps 13, Bees 107.

In studying this subject I have from time to time found and bred from the various nests examined many rare Diptera. This long

neglected order is now rapidly coming to the front, and there are now over one hundred workers at it.

I give my best captures for 1895—6, named by Dr. Meade. *Stratiomys potamida*. I took two specimens of this fine Fly in June on Parsley blooms in the kitchen garden. *Thereva annulata*, *Chilosia pigra*, \**Xylota segnis*, *Chrysotoxum 8-maculatum*, \**Phyocephala rufipes*, \**Cyrtoneura pascuorum*, \**Brachychoma devia*, \**Acanthiptera inanis*, *Limnea marginata*, \**Phora rufipes*, \**P. florea*, \**P. nigricornis*, *Stenopteryx hirundinis*. The last named, a thing not unlike a Spider, has a curious history. A neighbour found two Swallows in his bedroom which he turned out. The night after, on going to bed, he was disturbed by this parasite fastening upon his foot. It is figured by Curtis.

I took a good Hemipteron, *Cyllocoris flavo-notatus*, upon an Oak tree, also *Cixius cunicularius* on rough herbage, and *Tetraphleps vittatus* on Fir. In Coleoptera Mr. Frank Norgate again sent me in June the best thing of the year, *Ocypus cyaneus*, found running on the road near Bury St. Edmunds. In June one of our members, Mr. Claude Morley of Ipswich, came over for the day, and in about three hours we got over seventy kinds of Beetles by sweeping, and looking round the ponds. Mr. Morley is making out a list for Suffolk which stands at present at 1575 against 1728 for Norfolk, and 3241 for England.

In the general list of captures I may mention *Trechus obtusus*, *Philonthus fimetarius*, *Leistotrophus murinus*, *Anthicus antherinus*, *Timarcha tenebricosa*, *Choleva kirbyi*, *Thyamis suturalis*, *Aphodius oblitteratus*, *Tillus elongatus*, *Ochina hederæ*, *Apion spencei*, *Orchestes fagi*, *Phyllobius calcaratus*, and *Athous niger*.

From Fungi, which were this season very early and abundant, I had in June the fine *Triplax russica* and *Pocadius ferrugineus*. Later on I took *Mycetophagus 4-guttatus* (one specimen). *M. 4-pustulatus* in numbers, including one variety with the spots longitudinally confluent. Also *Læmophlæus ferrugineus*, *Cis nitidus*, and *Xylophilus populneus*.

I was singularly fortunate in my captures of Inquiline Beetles.

I opened up forty-one nests of *Vespa vulgaris*, and found *Metæcus paradoxus* in twelve of the nests (12, 2, 8, 2, 2, 2, 1, 7, 4,

\* Bred from the nests.

4, 4, 1), total 49. From the same Wasp, I had *Homalium exiguum*, *Notiophilus palustris*, and *Homalota sodalis*. From *V. germanica*, the very rare *Quedius brevicornis*; from *V. crabro*, *Lathridius minutus* and *Cryptophagus scanicus*; from *Bombus terrestris*, *Antherophagus nigricornis*, and *Heterothrops 4-punctatus*; from *B. muscorum*, *Homalota ignobilis* and *Metabletus truncatellus* in numbers.

I only explored *three* Ants' nests, with, however, good results. From *Formica fuliginosa*, *Otiorhyncus ovatus*, *Ceuthorhyncus sulcicollis*, *Xantholinus linearis*, *Myrmedonia laticollis*, *Tachyporus obtusus*, *Scaphisoma boleti*, and from *Myrmica levinodis* (in a stump), *Quedius suturalis*, and *Ocypus brunnipes*.

It was a poor season I am told by Mr. Norgate for *Lepidoptera* and their larvæ. *Sesia tipuliformis* (the Currant Clear-wing) swarmed in June.—W. H. TUCK.

---

TRANSACTIONS  
OF THE  
Norfolk and Norwich  
NATURALISTS' SOCIETY;

*Presented to the Members for*

1897—98.

VOL. VI.—PART 4.

Norwich:  
PRINTED BY FLETCHER AND SON, LTD.  
1898.



# Horfolk and Norwich Naturalists' Society.

---

## OFFICERS FOR 1897—98.

### President.

MR. A. W. PRESTON, F. R. Met. Soc.

### Ex-President.

SIR F. G. M. BOILEAU, BART., F.S.A.

### Vice-Presidents.

THE RIGHT HON. THE EARL OF LEICESTER, K.G.

THE RIGHT HON. THE EARL OF KIMBERLEY, K.G.

THE RIGHT HON. THE LORD WALSINGHAM, F.R.S.

THE RIGHT HON. THE LORD AMHERST OF HACKNEY.

SIR FRANCIS G. M. BOILEAU, BART., F.Z.S., F.S.A.

MICHAEL BEVERLEY, M.D.

COL. FEILDEN, C.M.Z.S.

HERBERT D. GELDART.

JOHN HENRY GURNEY, F.L.S.

JOHN B. BRIDGMAN, F.L.S.

F. W. HARMER, F.G.S.

T. SOUTHWELL, F.Z.S.

### Treasurer.

MR. W. H. BIDWELL.

### Hon. Secretary.

MR. W. A. NICHOLSON.

### Committee.

MR. F. C. HINDE.

MR. G. C. EATON.

REV. J. A. LAURENCE.

MR. A. MAYFIELD.

MR. E. CORDER.

MR. G. H. HARRIS.

MR. J. REEVE.

MR. H. J. THOULESS.

MR. F. SUTTON.

### Journal Committee.

PROFESSOR NEWTON.

MR. A. W. PRESTON.

MR. W. H. BIDWELL.

MR. T. SOUTHWELL.

MR. JAMES REEVE.

### Excursion Committee.

MR. C. BUSSEY.

MR. J. T. HOTBLACK.

MR. E. CORDER.

MR. A. PATTERSON.

MR. F. DIX.

MR. A. W. PRESTON.

### Auditor.

MR. S. W. UTTING.

---

### Harmouth Section.

*Ex-officio Members of the General Committee.*

DR. HENRY BLAKE, *Chairman.*

MR. F. DANBY PALMER, *Treasurer.*

MR. G. H. HARRIS, *Hon. Sec.*

## LIST OF MEMBERS, 1897—98.

\* Members who have compounded for their subscriptions are marked with an asterisk.

- A**
- \*Ames Victor  
Bolton Studios, Fulham Road, S.W.  
Amherst Right Hon. Lord, F.Z.S., V.P.  
Didlington Hall  
Andrew W. H. M. Colney  
Aplin Oliver V. Bloxham  
Atmore E. A. Lynn
- B**
- Back Rev. A. J. Carleton Rode  
Backhouse James Dale Side, Harrogate  
Baker W. E. Tilney All Saints  
Balls F. Sprowston  
Balla J. E. Castle Meadow, Norwich  
Barclay Francis H. Leyton, Essex  
Barclay H. G., F.R.G.S. Colney Hall  
\*Barclay E. High Lee, Hoddesdon  
Barlee Rev. W., M.A. Cringleford Hall  
Burnard Miss A.  
Prince of Wales Road, Norwich  
Barrett C. G., Hon. Mem.  
39 Linden Grove, Nunhead, S.E.  
Barwell H. G. Surrey Street, Norwich  
\*Becher Major Edward F., R.A., F.Z.S.  
Genvena, Wadebridge, Cornwall  
\*Becher Rev. William Wellow, Notts  
Bennett Arthur, F.L.S. Croydon  
Beverley M., M.D., V.P.  
Prince of Wales Road, Norwich  
Bidwell E. 1 Trigg Lane, E.C.  
Bidwell W. H., Treasurer,  
Thorpe Road, Norwich  
Bird Rev. M. C. H., M.A., M.B.O.U.  
Brunstead Rectory  
Birkbeck Sir Edward, Bart.  
Horstead Hall  
Birkbeck E. L. Norwich  
Birkbeck H. Stoke Holy Cross  
Blake Dr. H. Great Yarmouth  
Bloomfield Rev. E. N., M.A., F.E.S.  
Guestling Rectory, Hastings  
Boardman E. T. Queen Street, Norwich  
Boileau Sir F. G. M., Bart., F.Z.S., F.S.A.,  
Ex-President Ketteringham Park  
Boileau Lady Ketteringham Park  
Boileau Miss Ketteringham Park  
Boileau M. C. Ketteringham Park  
Boileau R. F. Ketteringham Park  
Bolingbroke L. G. Ferryside, Norwich  
Borrer W., F.Z.S., F.L.S.  
Cowfold, Horsham
- Bridgman J. B., F.L.S., V.P.  
St. Giles Street, N  
Brittain Henry.  
St. Stephen's Street, N  
Broeck Ernest Vanden, Hon. Mem.  
124 Rue de Terre Neuve, B  
Brown Rev. J. L.  
Chapel Field Grove, N  
Bunsen L. de  
Colkirk House, Fak  
Burlingham D. Catlin  
Burn Rev. W. Pelham, M.A.  
The Chantry, N  
Burnard G. B. Wc  
Burrell W. H. Sheri  
Burton James Gt. Yar  
Burton Mrs. J. Gt. Yar  
Burton S. H., M.B.  
St. Giles Street, N  
Bussey C. St. Martin-at-Palace, N  
Butler Colonel  
Brettenham Park, Bildeston, S  
Butterfield W. C. J. R. St. Le  
Buxton A. F. 50 Cornhil  
Buxton C. Louis Bolwick Hall, N  
Buxton E. G. N  
Buxton Geoffrey F., F.Z.S.  
Dunston Hall, N  
Buxton H. E. Great Yar  
Buxton H. G. Catton Hall, N  
Buxton S. G., F.Z.S.  
Catton Hall, N  
\*Buxton Sir T. F., Bart., F.Z.S.  
Warlies, Waltham
- C**
- Candler C. Har  
Candler G. Har  
Candler Henry  
War Office, Pall Mall, London  
Chase R. W.  
Priory Road, Edgbaston, Birmin  
Christy Miller, F.L.S.  
Pryors, Broomfield, Chel  
Clarke W. G. N  
\*Clifton The Right Hon. Lord  
Dumpton Park, Ran  
Clowes J. E., Hall Quay, Great Yar  
\*Cocks A. H., M.A., F.Z.S.  
Thames Bank, Great Marlow,  
Collett Professor Robert, Hon. Mem  
The University, Christiania, N  
Colman J. J. Carrow House, N  
Colman Russell J. Bracondale, N  
Connop E. M. Rollesb



**Cooke M. C.**, Hon. Mem.  
146 Junction Road, Upper Holloway  
**Cox** deaux John Great Cotes, Lincoln  
**Cox** der O. Brundall  
**Cox** der Edward London Street, Norwich  
**Cox** F. E. East Carlton Rectory  
**Cresswell** George Lynn  
**Cresswell** Rev. S. F., D.D., F.R.A.S.,  
F.R.G.S. Northrepps Rectory  
**Crook** Dr. A.  
Prince of Wales Road, Norwich  
**Cross** J. M. Mile End Road, Norwich  
**Crowfoot** W. M., M.B. Beccles  
**Crowley** T., F.L.S., F.L.S.  
Waddon House, Croydon

## D

**Davies** G. C. Town Close, Norwich  
**Day** Rev. A. G., M.A.  
Great Melton Rectory, Wymondham  
**Digby** A. Fakenham  
**Dix** Francis Essex Street, Norwich  
**Dowson** E. T. F. R. Met. Soc. Geldeston  
**Dresser** H. E., F.Z.S., F.L.S.  
Topleyffe Grauge, Farborough  
**Ducket** Dr. C.  
St. George's Terrace, Great Yarmouth  
**Du Port** Rev. J. M., M.A., Denver Rectory

## E

**Eade** Sir Peter, M.D.  
St. Giles Street, Norwich  
**Eaton** George C.  
Cleveland House, Eaton, Norwich  
**Edwards** J., Hon. Mem.  
Colesborne, Gloucestershire  
**Eldred** E. J. H. Castle Meadow, Norwich  
**Emerson** P. H., B.A., M.B. Oulton  
**Evans** Dr. Muir Kirkley, Lowestoft  
**Everitt** H. B.  
Prince of Wales Road, Norwich

## F

**Falcon** Michael Horstead  
**Farm** A. B., Mount Nod, Greenhithe, Kent  
**Fearn** lden Col. H. W., V.P., F.G.S., C.M.Z.S.  
West House, Wells  
**Fitch** Rev. H. C. Beeston Rectory  
**Flet** cher B. E., Marlingford Hall, Norwich  
**Fletcher** W. H. B.  
Chapel Road, Worthing  
**Foster** J. B. Tombland, Norwich  
**Foster** Charles  
Thorpe St. Andrew, Norwich  
**Fowler** W. Wards, Lincoln College, Oxford

## G

**Ga** insborough The Right Hon. the Earl  
**Gawne** Rev. R. M. Exton Park  
**Geldart** H. D., V.P., Reymerstone  
Thorpe Hamlet, Norwich  
**Gerish** W. B. Wormley, Herts  
**Gifford** W. A.  
St. George's Terrace, Great Yarmouth  
**Gooch** A. H.  
Prince of Wales Road, Norwich  
**Gunn** T. E., F.L.S.  
St. Giles Street, Norwich

**Gurdon** R. T. Letton Hall  
**Gurney** Eustace Sprowton Hall  
**Gurney** Gerard H.  
Keswick Hall, Norwich  
**Gurney** J. H., V.P., F.L.S., F.Z.S.  
Keswick Hall, Norwich  
**Gurney** J. Nigel  
Sprowston Hall, Norwich  
**Gurney** E. H. J. Northrepps Hall  
**Gurney** E. Sprowton Hall, Norwich  
**Guyett** W. J. King Street, Norwich

## H

**Hackblock** W. H. Coltishall  
**Hagen** D. M. Mottisfont Abbey, Hants.  
**Haigh** C. H. Caton  
Grainsby Hall, Gt. Grimsby  
**Haldin**stein Alfred  
Unthank's Road, Norwich  
**Hall** H. Woodbridge  
**Hamblen** W. W. Wells  
**Hamond** Charles A.  
Twyford Hall, East Dereham  
**Hamond** Rear-Admiral R.H., R.N.  
Swaffham  
**Harcourt** B. W., St. Giles Street, Norwich  
**Harmer** F. W., V.P., F.G.S.  
Cringleford, Norwich  
**Harmer** S. F., B.A., F.R.S., B.Sc.  
King's College, Cambridge  
**Harris** G. H., Hon. Sec. Great Yarmouth  
Section 8 Camperdown, Gt. Yarmouth  
**Harvey** E. K. Lowestoft  
**Harvie-Brown** J. A., F.R.S.E.  
Dunipace House, Larbert, N.B.  
**Hastings** The Right Hon. Lord  
Melton Constable  
**Hebbert** C. T., F.Z.S. The Rhodron,  
Hook, Kingston-on-Thames  
**Hector** Sir James, M.D., K.C.M.G., F.R.S.  
Hon. Mem.  
New Zealand Institute, Wellington  
**Herring** Capt. H. L.  
Thorpe St. Andrew, Norwich  
**Hill** Alexander, M.D.  
Downing College, Cambridge  
**Hinde** F. C. Thorpe Hamlet, Norwich  
**Hinde** G. J., Ph.D., F.R.S., F.G.S., Hon.  
Mem. Avondale Road, Croydon  
**Hoare** S., M.P. Cromer  
**Hooker** Sir J. D., M.D., K.C.S.I., C.B.,  
F.R.S., Hon. Mem.  
The Camp, Sunningdale, Surrey  
**Hotblack** G. S. Brundall  
**Hotblack** J. T. Newmarket Road, Norwich  
**Howard** R. J., M.B.O.U.  
Hawkhurst, Blackburn

## I

**Irby** Colonel, F.L.S., F.Z.S.  
14 Cornwall Terrace, Regent's Park, N.W.

## J

**Jarrod** W. T. F.  
Thorpe St. Andrew, Norwich  
**Jenkins** Rev. T. L. Worstead  
**Jickling** Rev. F. Smallburgh Hall  
**Jodrell** Sir Alfred, Bart. Bayfield Hall  
**Jones** Sir Laurence, Bart.  
Cranmer Hall, Fakenham

## K

Kerrison Major Burlingtonham  
 Kimberley The Right Hon. the Earl of,  
 K.G., V.P. Kimberley Hall, Wymondham  
 King H. A. Exchange Street, Norwich

## L

Laurence Rev. J. A. Dilham, Norwich  
 Laurence E. Norwich  
 Leathes Colonel H. M. Dovercourt  
 \*Lee Warner Henry Walsingham Abbey  
 Lee Warner Henry Switham  
 Leicester The Right Hon. the Earl of,  
 K.G., V.P. Holkham Hall  
 Le Pelley Rev. J. L., M.A. Ringland  
 le Strange Hamon, F.Z.S. Hunstanton Hall  
 \*Lindley Sir Nathaniel, The Right Hon.  
 the Master of the Rolls East Carlton  
 Long F. Wells  
 Long J. Dunton  
 Lowe John, M.D., Hon. Mem.  
 4 Gloucester Place, Portman Square,  
 London, W.  
 \*Lubbock The Rt. Hon. Sir John, Bart.,  
 M.P., D.C.L., F.R.S. High Elms, Hayes, Kent

## M

Macpherson A. H. 51 Gloucester Place, Hyde Park, W.  
 Manby A. R., M.D. East Rudham  
 Manning Rev. C. E., M.A., F.S.A. Diss Rectory  
 Marsham Major Rippon Hall  
 Mayfield A. Mendelsham, Stowmarket  
 \*Micklethwait Major G. N. Bath  
 Middleton C. Holkham  
 Miller Henry, Jun. Bosmere House,  
 Norwich Road, Ipswich  
 Morley Claude, F.E.S. The Crescent, Ipswich  
 Mottram James Bank House, Norwich

## N

Newcome E. C. Feltwell  
 Newcome F. d'Arcy Feltwell Hall  
 Newton Professor, M.A., F.R.S., Hon.  
 Mem. Magdalene College, Cambridge  
 Newton E. T., F.R.S., Hon. Mem.  
 H.M. Geological Survey Office,  
 28 Jermyn Street, London  
 Nicholson F., F.Z.S. 84 Major Street, Manchester  
 Nicholson W. A., Honorary Secretary  
 St. Helen's Square, Norwich

## O

\*Ogilvie F. M. Sizewell House, Leiston

## P

Page G. W.  
 Paget Sir James, Bart., F.R.S.,  
 5 Park Square West, Regent  
 Lor  
 Palmer F. Danby, M.S.A. Hall Quay, Great  
 \*Parkin Thomas, M.A., F.Z.S. High Wickham  
 Partridge Rev. W. H., M.A. Caston Rectory, Att  
 Pashley H. N.  
 Patterson A. Ibis House, Gt.  
 Pattin Dr. H. Cooper  
 Peake E. 36 Earlham Road  
 Peckover Alexander  
 Figott T. Digby, C.B., F.R.G.S.  
 5 Ovington Gar  
 Plowright C. B., M.D., Hon. Me  
 Power F. D. 299 Cold Harbour La  
 Preston A. W., F.R. Met. Soc.,  
 Purdy R. J. W. Woodgate House  
 Pycraft W. Natural History  
 Cromwell Roa

## R

Reeve J., Clarence Road, Thorp  
 \*Reid Clement, F.L.S., F.G.S.  
 H.M. Geological Survey Office  
 \*Reid Capt. Savile G., R.E.  
 Yalding,  
 \*Ringer Sidney, M.D. Cavendish  
 Ripley Rev. W. N. Earlham Ha  
 Roberts E. T. Castle Meado  
 Robinson H. S. St. Giles Plai  
 \*Rosebery The Right Hon. t  
 K.G. Berkeley  
 \*Rothschild Hon. Walter  
 Royal Microscopical Society,  
 the, Hon. Mem. 20 Hanover

## S

Sapwell A. D. Woodford  
 Saunders Howard, F.L.S., F  
 7 Radnor Place  
 Savill-Onley C. A. O. Boxfields, Galleywoo  
 Scherren H., F.Z.S. Cavendish Road,  
 Shaw Eland, F.E.S.  
 Shipley W., Jun. Southtown, Gr  
 \*Singh Prince Frederick D  
 Old Bu  
 Slater Rev. H. Thornhaugh Rect  
 Smith W. E.  
 \*Southwell C. Gurrey Lodge, Ch  
 Southwell Miss Janet  
 Southwell T., F.Z.S., V.P.  
 10 The Cr  
 Spelman W. W.  
 Sutton Francis, F.C.S. The  
 Sutton W. L.

**T**  
**Thouless H. J.**, 48 Grove Avenue, Norwich  
**Tillett Eric de C.** St. Giles' Street, Norwich

**Tillett Wilfred S.** St. Giles' Street, Norwich

**Todd J. T.** Chapel Field Gardens, Norwich

**True F. W.**, *Hon. Mem.*  
 U.S. National Museum, Washington,  
 U.S.A.

**Tuck Rev. J. G.**  
 Tostock Rectory, Bury St. Edmunds

**Tuck W. H.**  
 Tostock House, Bury St. Edmunds

**U**  
**Usher H. M.**, F.Z.S. Feltwell  
**Utting S. W.** Thorpe, Norwich

**V**  
**Vaughan Matthew** Haileybury College

**W**  
**Walsingham** The Right Hon. Lord,  
 F.R.S., V.P. Merton Hall, Thetford

Walter J. H. Drayton  
 \*Watling E. A. Scratby Hall, Ormesby,  
 Great Yarmouth  
 Thetford

Watson A. Q.  
 Wheeler F. D., M.A., LL.D. Bracondale, Norwich

\*Whitaker Joseph, F.Z.S. Rainworth Lodge, Mansfield

White R. W. St. Giles' Road, Norwich  
 Whitlock F. B. Gregory Boulevard, Nottingham

Whitty C. E., M.D. Haustanton  
 Williams C. Prince of Wales Road, Norwich

Wilson Cecil  
 Heathside, Thorpe Hamlet, Norwich

Wilson H. F. Chiswick Mall  
 Winter J. J. Drayton, Norwich

Woodward H. B., F.R.S., F.G.S., *Hon. Mem.*  
 8 Inglewood Road, West Hampstead,  
 London, N.W.

Wright C. A., Knight of the Crown of  
 Italy, F.L.S., F.Z.S. Kayhough House, Kew

**Y**  
 Young John, F.L.S., F.Z.S.  
 64 Hereford Road, London, W.

## The Treasurer in Account with the Norfolk and Norwich Naturalists' Society,

### Year ending March, 1898.

	Dr.	£	s.	d.	Cr.	£	s.	d.		
To Balance from last year	...	...	2	10	3	By Fletcher and Son, for Printing Transactions, 1896-97	...	82	5	3
To Subscriptions :-	...	£	3	10	0	„ Stationery, Printing Circulars, and Postage	...	9	8	9
14 for 1896-97	...	...	40	0	0	„ Frame for Portrait	...	0	3	6
160 „ 1897-98	...	...	1	15	0	„ Advertisements	...	0	1	6
7 „ 1898-99	...	...				„ Insurance	...	0	3	0
„ Additional payments for monthly notices	...	...	45	5	0	„ Year Book of Scientific Societies	...	0	6	0
„ Sale of Transactions	...	...	0	8	0	„ Gratuity to Doorkeeper	...	1	0	0
„ Grant from Life Membership Fund	...	...	1	15	6	„ Rent of Room	...	1	1	0
			10	0	0	„ Assistant Secretary's Salary	...	5	0	0
						„ Balance at Messrs. Barclay	...	10	9	9
			£59 18 9					£59 18 9		

#### LIFE MEMBERSHIP FUND.

	£	s.	d.	
To Balance from last year	...	95	1	9
„ Three Compositions	...	12	0	0
„ Interest for 1896-7	...	3	3	4
		£110 5 1		
		£110 5 1		

*List of the Publications received by the Society as Donations  
or Exchanges from March, 1897, to March, 1898.*

---

- BARRITT** (Charles G., F.E.S.). The Lepidoptera of the British Islands. Vol. iv. 8vo. Lond., 1897. *From the Author.*
- BATH** Natural History and Antiquarian Field Club. Proceedings, Vol. viii. no. 4. 8vo. Bath, 1897. *From the Club.*
- BENNETT** (Arthur, F.L.S.). Carex aquatilis, Wahlb. in Lake Lancashire. [From the 'Naturalist' for March, 1897.] pp. 4. 8vo. *From the Author.*
- Notes on British Plants. II. Carex. [Reprinted from the 'Journal of Botany' for June and July, 1897.] pp. 14. 8vo. *From the Author.*
- BRISTOL** Naturalists' Society. Proceedings. New series, vol. viii. part 2. 8vo. Bristol, 1897. *From the Society.*
- BRITISH** Association. Toronto Meeting, 1897. Preliminary Programme, with Maps and Illustrations. pp. 70. 8vo. Toronto, 1896. *From the British Association.*
- BRITISH** Ornithologists' Club. Bulletin. Edited by R. Bowdler Sharpe, LL.D. Vol. i. 8vo. Lond. 1893. *From Mr. J. H. Gurney, F.Z.S.*
- CARDIFF** Naturalists' Society. Report and Transactions. Vol. xxviii. part 2, and vol. xxix. 8vo. Cardiff, 1897. *From the Society.*
- CROYDON** Microscopical and Natural History Club. Proceedings and Transactions, 1896—97. 8vo. Croydon, 1897. *From the Club.*
- EALING** Natural Science and Microscopical Society. Report and Transactions for 1896—7. 8vo. Ealing, 1897. *From the Society.*
- EASTBOURNE** Natural History Society. Transactions. Vol. iii. part 2. 8vo. Eastbourne, 1897. *From the Society.*
- EDWARDS** (James, F.E.S.). On a gynandromorphous specimen of Adopæa thaumas, Hufn. [From the 'Entomologist' for March, 1898.] pp. 2. 8vo. *From the Author.*
- Notes on the Genus Chloriona, Fieber; with descriptions of a new species. [From the 'Entomologist's Monthly Magazine,' second series, vol. ix., March, 1898.] pp. 5. 8vo. *From the Author.*
- HARRISON** (W. Jerome, F.G.S.). A Bibliography of Norfolk Glaciology. [Reprinted from the 'Glacialists' Magazine' for March, June, September, 1897.] pp. 92. 8vo. *From the Author.*

- HINDE (George Jennings, Ph.D., F.R.S.). Notes on the Gravels of Croydon and its neighbourhood. [Reprinted from the 'Transactions of the Croydon Microscopical and Natural History Club' for 1896—97.] pp. 15. 8vo. *From the Author.*
- IBIS (The), a Quarterly Journal of Ornithology. Edited by P. L. Selater, Ph.D., F.R.S., and Howard Saunders, F.L.S. Seventh Series, nos. 9—13. 8vo. Lond., 1897—98.  
*From Mr. G. F. Buxton, F.Z.S.*
- Index of Genera and Species referred to, and an index to the plates, in 'The Ibis' (fourth, fifth, and sixth series), 1877—1894. Edited by Osbert Salvin, M.A., F.R.S. 8vo. Lond. 1897.  
*From Mr. J. H. Gurney, F.Z.S.*
- LAPOURGADE (Paul). Outardes, Pluviers et Vanneaux. 8vo. Paris, 1891.  
*From Professor Newton, F.L.S.*
- LINCOLNSHIRE. Notes on the occurrence of Boulders of Shap-granite, etc., in Lincolnshire. Also, Lincolnshire Boulders; by Thos. Sheppard. The Lincolnshire Naturalists' Union Boulder Committee; by the Rev. W. Tuckwell. [Reprinted from the 'Naturalist' for Nov. and Dec. 1896.] pp. 16. 8vo.
- LIVERPOOL Geological Association. Journal. Vol. xvi. 8vo. Liverpool, 1896.  
*From the Association.*
- LONDON. Geological Society. Quarterly Journal, nos. 210, 211. 8vo. 1897.  
*From Col. Feilden, F.G.S.*
- LONDON. Royal Geographical Society. The Geographical Journal, including the Proceedings of the Royal Geographical Society. Jan. 1897 to Feb. 1898. roy. 8vo.  
*From Mr. H. G. Barclay, F.R.G.S.*
- LONDON. Royal Institution of Great Britain. Proceedings. Vol. xv. part 1. 8vo. Lond., 1897.  
*From the Royal Institution.*
- LONDON. Royal Microscopical Society. Journal of the Royal Microscopical Society; containing its Transactions and Proceedings, etc. From April, 1897 to February, 1898. roy. 8vo. Lond., 1897—98.  
*From the Society.*
- LONDON. South London Entomological and Natural History Society. Proceedings, 1897. 8vo. Lond., 1897.  
*From the Society.*
- LOWE (John, M.D.), The Yew-Trees of Great Britain and Ireland. 8vo. Lond., 1897.  
*From the Author.*
- M'INTOSH (W. C.), The Gatty Marine Laboratory, and the steps which led to its foundation in the University of St. Andrew's. 8vo. Dundee, 1896.  
*From Professor Newton, F.R.S.*
- MANCHESTER Geological Society. Transactions. Vol. xxv. parts 4—11. 8vo. Manchester, 1897.  
*From the Society.*
- MANCHESTER Literary and Philosophical Society. Memoirs and Proceedings. Vol. xli. parts 3 and 4; vol. xlii. part 2. 8vo. Manchester, 1897—98.  
*From the Society.*

- MANCHESTER.** Studies in Biology from the Biological Department of the Owens College. Vol. iii. 8vo. Manchester, 1895.  
*From Professor Newton, F.R.S.*
- MARINE** Biological Association of the United Kingdom. Journal. New series. Vol. IV. nos. 2, 3, and vol. v. no. 1. Plymouth, 1897.  
*From Professor Newton, F.R.S.*
- MAWLEY** (Edward). Report on the Phenological Observations for 1896. [From the 'Quarterly Journal of the Royal Meteorological Society for April, 1897.]
- MONTVIDEO.** Anales del Museo Nacional de Montevideo, publicados bajo la direccion de J. Arechavaleta. No. VII. imp. 8vo. Montevideo, 1898.  
*From the Museum.*  
VII. Flora uruguaya, por Prof. J. Arechavaleta.
- MORE** (A. G.). Life and Letters of Alexander Goodman More, F.R.S.E., F.L.S., with Selections from his Zoological and Botanical Writings. Edited by C. B. Moffat. 8vo. Dublin, 1898.  
*From Mr. J. H. Gurney, F.Z.S.*
- MORLEY** (Claude). A list of the Hymenoptera-aculeata of the Ipswich District. [From the 'Entomologist' for Jan. and Feb., 1898.] pp. 10. 8vo.  
*From the Author.*
- NEW ZEALAND.** Transactions and Proceedings of the New Zealand Institute. Vol. xxix. Edited and published under the authority of the Board of Governors of the Institute, by Sir James Hector, K.C.M.G., M.D., F.R.S., Director. 8vo. Wellington, 1897.  
*From the Institute.*
- NORTHAMPTONSHIRE** Natural History Society. Journal, nos. 65—72. 8vo. Northampton, 1896—97.  
*From the Society.*
- NORWAY.** The Norwegian North Atlantic Expedition, 1876—78. [In Norwegian and English.] Part 24. folio. Christiania, 1897.  
*From Professor Newton, F.R.S.*  
Contents:—Botany. Protophyta, by H. H. Gran.
- NORWICH** Science Gossip Club. Report of Proceedings at the Annual Meeting, held on May 26th, 1897. 8vo. Norwich, 1897.  
*From the Club.*
- NOVA SCOTIA.** The Proceedings and Transactions of the Nova Scotian Institute of Science, Halifax, Nova Scotia. Second series, vol. ii. nos. 1—3. Halifax, N.S., 1896—97.  
*From the Institute.*
- RUSSIA.** Bulletin de la Société Impériale des Naturalistes de Moscou. Année 1896, no. 1. Année 1897, nos. 1—3. roy. 8vo. Moscou, 1897—98.  
*From the Society.*
- SCHERREN** (Henry, F.Z.S.). Through a Pocket Lens. sm. 8vo. Lond., 1897.  
*From the Author.*
- STAFFORDSHIRE** (North) Field Club. Annual Report and Transactions. Vol. xxxi. 8vo. Stoke-upon-Trent, 1897.  
*From the Club.*

- UNITED STATES OF AMERICA. Monographs of the United States Geological Survey. Vols. xxv.—xxviii. 4to. Washington 1896—97. *From the U.S. Geological Survey*
- Vol. xxv. The Glacial Lake Agassiz. By Warren Upham. 1895.
- Vol. xxvi. The Flora of the Amboy Clays. By John Strong Newberry. 1895.
- Vol. xxvii. Geology of the Denver Basin in Colorado. By S. F. Emmons, W. Cross, and G. H. Eldridge. 1896.
- Vol. xxviii. The Marquette Iron-bearing District of Michigan. By C. R. Van Hise and W. S. Bayley. 1897.
- Bulletins of the United States Geological Survey. Nos 87, 127, 130, 135—148. 8vo. Washington, 1896—7. *From the Geological Survey*
- United States National Museum. Special Bulletin. Oceanic Ichthyology, a treatise on the Deep-Sea and Pelagic Fishes of the World. By G. B. Goode, Ph.D., and T. H. Bean, M.D. In two parts. 4to. Washington, 1895. *From Professor Newton, F.R.S.*
- Bulletin of the United States National Museum. No. 4—8vo. Washington. 1896. *From Professor Newton, F.R.S.*
- No. 47. The Fishes of North and Middle America. By D. Jordan, Ph.D., and B. W. Evermann, Ph.D. Part 1896.
- Bulletin of the American Museum of Natural History. Vol. viii. 1896. 8vo. New York, 1896. *From the American Museum*
- Missouri Botanical Garden. Eighth Annual Report. 8vo. St. Louis, 1897. *From the Missouri Board of Trustees*
- Chicago Academy of Sciences. Thirty-ninth Annual Report for the year 1896. 8vo. Chicago, 1897. *From the Academy*
- The Lichen-Flora of Chicago and Vicinity, by William Wirt Calkins. 8vo. Chicago, 1897. *From the Academy*
- YORKSHIRE Naturalists' Union. Transactions. Part 21. 8vo. Leeds, 1898. *From the Union*
- ZOOLOGIST (The): a Monthly Journal of Natural History. April 1897, to March, 1898. 8vo. Lond., 1897—98. *From Mr. G. F. Buxton, F.Z.*



## ADDRESS.

*Read by the President, MR. ARTHUR W. PRESTON, F. R. MET. SOC.,  
to the Members of the Norfolk and Norwich Naturalists'  
Society, at their Twenty-ninth Annual Meeting, held at the  
Norwich Castle-Museum, March 29th, 1898.*

**LADIES AND GENTLEMEN**—Twelve months having elapsed since you did me the honour of electing me to fill this chair, it now falls upon me to address to you a few remarks before vacating it.

Speaking first of the financial position of the Society, it will be seen from the balance sheet that it continues to be satisfactory. The income and expenditure of the year have been nearly equal, while the Life Membership Fund shows a substantial reserve of nearly £100 in the Post Office Savings Bank, after paying £10 to the current account for working expenses.

The number of members remains nearly the same as at the commencement of the year. Five have died, two have resigned, and six new members have been elected; one of the latter, the Hon. W. Rothschild, being a life member. Of those removed by death, the first was Sir Edward Newton, of whom, I understand, Mr. Southwell has prepared a special memoir which will be published in our 'Transactions.'

Mr. T. J. Mann died at his residence, Hyde Hall, Sawbridgeworth, Herts, on 25th August, 1897. He was the head of the brewery firm of Mann, Crossman, and Paulin, and the eldest son of the late Mr. Thomas Mann of Thelveton Hall, Norfolk. An ardent lover of hawking, he established a falconry at Hyde Hall, the seat of the Earls of Roden, on his acquiring a lease of that property. His valuable paper, delivered to the Society in 1889, on "Hawks: how obtained and trained" (Trans. Norfolk and Norwich Nat. Soc. vol. iv. p. 650), will long be remembered.

The other members whose loss we have to deplore are Mr. William Birkbeck, Mr. R. Blake, and the Rev. H. T. Griffith, the two former of whom had been members of our Society for a great number of years.

We have to thank Dr. Lowe, Mr. J. H. Gurney, Mr. G. F. Buxton, Mr. H. G. Barclay, and others for donations of books, periodicals, &c., received from them during the past year, forming valuable additions to the Society's Library.

Sir Francis Boileau in his address from this chair last year alluded to the fact that the excursions of the Society, which at one time formed so pleasurable a feature in the year's programme, had almost fallen into abeyance. I therefore felt it my duty to do what little I could during my year of office to attempt to revive these enjoyable meetings, and being of opinion that one good excursion only should be attempted instead of two or three small ones, and on the principle that "union is strength," knowing that our kindred Society, the Norwich Science Gossip Club, had also experienced a similar falling off at its field meetings, I ventured to suggest that the Society and Club should combine and make an excursion to a place of interest during the summer.

This suggestion proved a great success, and on June 17th, a party of over thirty members from the joint societies met at Thorpe Railway Station, and proceeded to North Walsham, where they took conveyances to Mundesley, now a rising watering-place. A very enjoyable walk was there taken, in the best of weather, along the beach to Trimingham, under the escort of that distinguished geologist, Mr. F. W. Harmer, F.G.S., who was good enough to undertake to point out to the members the various objects of interest to be found along the coast section exposed in this interesting locality. At the outset, Mr. Harmer drew our attention to the well-known post-glacial deposit, which was examined somewhat minutely, as was also the pre-glacial Fresh-water bed, from which Mr. Clement Reid obtained specimens of the Arctic plants *Salix polaris* and *Betula nana*. Mr. Harmer pointed out that the fossil bed in this neighbourhood contained a great quantity of mammalian remains; none, however, were

observed on the occasion of our visit. Our conductor also explained that the deposit in which these remains occur is usually covered by talus, and fossils are, as a rule, met with only when it has been cleared away by a storm. On arriving at Trimmingham a bountiful tea awaited us, and my friend, Dr. H. Cooper Pattin, president of the Science Gossip Club, presided over one end of a tea-table, while I did similar duty at the other end. A pleasant drive through Sidestrand and Overstrand brought us to Cromer station, and I think I express the feelings of all present, when I say that we returned home highly satisfied with a most successful excursion, favoured by the finest weather we could have wished for. The result will, I hope, be a stimulus for future field outings equally agreeable, and there is no reason to fear, in my opinion, that if conducted on similar lines, such should not be the case.

The monthly meetings, at all of which, fortunately, I was able to preside, have, as a whole, been well attended, and some excellent and instructive papers have been read.

The following subjects have been dealt with, the figures appended showing the numbers of papers or notes given on each head:—

Ornithology .....	15
Zoology .....	3
Entomology .....	2
Botany .....	2
Geology.....	1
Meteorology .....	1
Natural History Notes .....	1

These figures are very striking, no less than sixty per cent. of the papers read having been on ornithological subjects. Does not this fact confirm the view which has sometimes been expressed that our Society is getting a little too exclusively ornithological? That the meetings are held within the same walls as in which is stored one of the finest collections of British Birds in the Kingdom, is in itself a justification of that subject being that it is so freely dealt with; but one cannot help wishing that other

branches of natural science had found a more prominent place in the doings of the Society. Botany and geology have been but feebly represented during the evening meetings, and it is disappointing that results obtained from the microscope and telescope seem to have been entirely ignored by our Society. The fact that our brethren from the kindred society, who accompanied us on our summer excursion, now find it necessary to give two whole evenings, instead of one as formerly, to microscopical matters ought not to be without its lesson to us. A good astronomical paper would, in my opinion, also occasionally be both welcome and instructive, and even horticultural notes might come as a pleasing variety, and be not out of place in this "city of gardens." I should also much like to see the "magic lantern" introduced at our meetings, as I am confident this favourite method of illustration would be the means of popularising our monthly assemblies.

I commend these few remarks for the consideration of those in authority. They are made in no spirit of criticism, but merely as suggestions, with a view of increasing the good work done by the Society and enhancing its popularity.

I would now briefly allude, in their order, to the notes and papers given.

At the April meeting, Mr. J. H. Walter gave an account of a visit to an Egyptian Ostrich Farm.

At the May meeting, Mr. Southwell read some interesting notes on a Decoy at Feltwell, and exhibited a fine example of the old race of Norfolk Bustards.

In September, Mr. Eldred described in detail some foreign animals living in British Parks, and gave some entertaining descriptions of the menageries formed by the late Earl of Derby, at Knowsley, and by the Duke of Bedford, at Woburn. Mr. S. F. Harmer sent a note on some bones of a Pelican from the Cambridgeshire Fens. Mr. Mottram gave us an account of a visit to the Swannery at Abbotsbury, near Weymouth, and Colonel Butler communicated the occurrence of an Albatross in Cambridgeshire, and of a Honey Buzzard in Suffolk.

In October, Mr. J. H. Gurney read a paper on the "Economy of the Cuckoo," and Dr. John Lowe sent some notes upon the larva of *Psyche bombycella*, and upon the migration of the Ring Ouzel across the Pyrenees. Mr. Southwell recorded the addition to the Norfolk List of Birds of the Tawny Pipit, which was taken in a clap-net, on October 7th, 1897, on the North Denes at Yarmouth, thus bringing the number of fully recognised Norfolk species up to 308, not including eight doubtful ones. •

At the November meeting, Mr. Southwell exhibited a specimen of the Mediterranean Herring Gull (*Larus cachinnans*), from Mr. Connop's collection, killed on Breydon, in 1886, and at the same time read some interesting notes on the Swan-pit at the Great Hospital. Mr. Thouless brought up specimens of *Pæciloscytus vulneratus* found by himself on *Galium verum* on the South Denes, Great Yarmouth, being, it is believed, the first specimen of this insect found on this side of the Channel. 'The Yew Trees of Great Britain and Ireland,' a book by Dr. Lowe, presented by him to the Society, formed the subject of some instructive remarks by Mr. Nicholson, and will be found a valuable addition to our Library. Mr. Patterson's popular notes, brought up to date, were received, as usual, with acclamation, and concluded one of the best meetings of the session.

In January, after some notes by Mr. W. H. Tuck, on *Aculeate Tymenoptera* in Suffolk, and by Mr. Trueman Tucker, on some human remains found in a gravel-pit, at Hunstanton, in 1897, Mr. Southwell gave a continuation of his valuable papers on the Birds in the Castle-Museum, confining his remarks to the Penguins, illustrated by specimens from the Museum collection. At this meeting a new species of Sparrow Hawk (*Astur butleri*) was exhibited by Mr. J. H. Gurney, and some rare Fruits by Mr. Bidwell.

The last ordinary meeting of the session was held in February, when Mr. J. H. Gurney gave a detailed description of the additions to the raptorial birds in the Norwich Museum during the past year, which was listened to with much interest by the members, and a short note on "Marked Woodcocks" was

contributed by Mr. Wheler of Alnwick. The remainder of the evening was monopolised by myself, in giving a description of the prevailing meteorological conditions of 1897.

It may be added that the Society decided to memorialise the Norfolk County Council as to the extension of close time to shore-birds in this county to the 1st September, and the memorial was subsequently duly signed by the Secretary and myself on behalf of the Society, and forwarded to the proper quarter.

In selecting a subject on which to address you this evening I find considerable difficulty, not being sufficiently learned on those branches of Natural History which usually commend themselves for discussion. It is therefore with some diffidence that I am going to ask you for a few minutes to bear with me on a subject which, although not altogether unfamiliar to the pages of our 'Transactions,' has not often been dealt with in recent years. I allude to the recording of phenological phenomena, and in bringing this subject before you I am following the precedent set by the Royal Meteorological Society, who of late years have brought the matter very prominently before the Fellows with a view of augmenting the staff of observers throughout the kingdom, so as to increase the amount of observations from which to obtain the averages of first flowering of plants, both garden and indigenous, the dates of first leafing of trees, first appearance of birds and insects, as well as other natural phenomena. In past times we have the "Gilbert White" record, as well as that kept for so long a period by the Marsham family, at Stratton Strawless and neighbourhood, the latter forming the subject of a most interesting paper by Mr. T. Southwell (see 'Transactions,' 1874—75). Of late years the number of observers of these phenomena has vastly increased throughout the kingdom, and there is now a complete set of observers organised by the Royal Meteorological Society, ably superintended by the ex-President of that Society, my friend, Mr. Edward Mawley, F. R. Met. Soc., F.R.H.S., of Berkhamsted, Herts, Secretary of the National Rose Society, &c. As an observer of the temperature and rainfall for many years, as well as being interested in Natural History, I have

for some time past directed my observations in the direction mentioned, as the influence of temperature and rainfall upon plant life is at once seen by the most casual observer, and the connection is very marked when the dates of the phenological phenomena are scheduled, and read alongside with the summaries of the meteorological observations.

My annual Meteorological Notes have now formed the subject of papers read before this Society annually for sixteen years past, and I have often thought that some kind of summary of those papers should appear in the 'Transactions' of the Society for reference. The earlier "notes," however, were prepared upon less reliable data than the later ones, and as for the ten years, 1888—1897, the observations have been taken on precisely the same principle, at Blofield and Brundall, in this county, the two stations being within a mile of, and in sight of each other (five years observations at each), and the phenological observations having been taken in the same neighbourhood, I have thought it best to limit the period of my remarks this evening to those ten years.

The tables, ten in number, which I have now the pleasure to bring to your notice, are, as to seven of them, summaries of my observations on the temperature of the air, the rainfall, and the direction of the wind; and as to the remaining three, the dates noted are (Table VIII.) as to first leafing of deciduous trees, (Table IX.) as to first flowering of garden flowers and shrubs, and (Table X.) first flowering of wild plants and other phenomena. The number of objects selected must necessarily be limited, and those I have chosen are amongst the most frequently observed in the neighbourhood in which my observations have been taken.

To make anything like a thorough analysis of these observations would be too gigantic a task to attempt in a short address like the present. The tables speak for themselves, and a comparison of them will show at a glance the way in which the phenological tables are affected by those relating to the weather observations. I therefore only propose to make a few running comments on these schedules, drawing attention to some of the more prominent features.

Table I. shows the absolute highest monthly and annual shade temperature during the period. These are made (as are all the temperature observations referred to in this paper) from thermometers by Negretti and Zambra, exposed in a Stevenson screen, well situated to obtain a free current of air passing through it, but shaded from the sun's rays, and screened from radiation by night. It will be noticed that the highest reading recorded during the period was  $90^{\circ}$  in August, 1893, and that in no summer during the period did the thermometer fail to reach  $80^{\circ}$ .

Table II. shows the lowest night temperature in the screen, and must not be confounded with the readings obtained from exposed thermometers placed upon the grass where much lower readings on clear nights are sometimes obtained. The minimum of the period was in February, 1895, when the thermometer fell to  $4^{\circ}$ , consequently, taking Tables I. and II. together, a range of temperature of  $86^{\circ}$  was recorded in the ten years. The extreme of cold in the winter is much more marked than the extreme of heat in the summer, for whereas the day readings were from  $80^{\circ}$  to  $90^{\circ}$  or a difference of  $10^{\circ}$  only, in winter the coldest night of the season has differed as much as  $20.2^{\circ}$ , *i.e.*,  $4^{\circ}$  in the winter of 1894—5, and  $24.2^{\circ}$  in the following winter. There is no doubt that some of the winters during the period were unusually severe, in fact  $20^{\circ}$  of frost and upwards were registered in all but two of them, and in five of them the thermometer fell below  $10^{\circ}$ . The last two winters of the period (1896 and 1897) were by far the mildest, and gave comparatively little frost.

Table III. gives the mean temperature of each month and year during the period (*i.e.*, the means of maximum and minimum). The most noteworthy feature of this table is the excess in temperature of the summer months of the last five years over the first five years, and, if we except 1895, the same remark applies to the spring months. The yearly temperature also shows a similar tendency, the mean of the first five years being  $47.5^{\circ}$ , and that of the last five being  $49.2^{\circ}$  or a difference of  $1.7^{\circ}$ .

Table IV. shows the monthly and annual rainfall of the ten years, as collected in a five inch "Symons" rain-gauge, whose



receiving surface is one foot above the level of the ground. Here again we have a marked difference between the first five and last five years, the total of the first five being 140.83 inches, and of the last five 117.24 inches, or a difference for the period of 23.59 inches. In other words, the first five years gave an average of 28.16 per annum, and the last five only 23.45 per annum, or 4.71 inches per annum less than the first five. The wettest year was 1892, with 31.05 inches, and the driest 1893, with 19.66 inches. The wettest month was October, 1892, with 7.62 inches, and the driest February, 1891, with 0.07 inch only, which latter was nearly equalled in April, 1893, when 0.10 inch only fell. On the average of the period, July and October were the wettest months, each yielding a mean of over 3 inches, and February was the driest, the average being 1.36 inches only. Comparing this table with Table III. (mean temperatures), it will be readily seen that the five cool summers I have alluded to were wet, the rainfall of July exceeding 4 inches in four instances out of the five, whereas, with one exception, all the five warmer summers were dry, and the exception referred to (1894) was the coolest of the five warm summers.

Tables V., VI., and VII. deal exclusively with the direction of the wind, and my reason for compiling these tables is, that I think they may be useful for reference by our ornithological members, some of whom occasionally consult me as to prevailing wind directions over particular periods connected with the migration of birds. Time will not permit me to refer to them at length; they speak for themselves, and will, I think, supply such information as may be necessary for ornithological purposes. I would only say in passing that the results at the foot of the columns in Table V., have been obtained by extracting from my journals, the general direction of the wind for every day during the ten years. These results show in a most marked manner that the winds in this neighbourhood have a very decided maximum for each month, and such maximum extends over a considerable period; *i.e.*, the S.W. is the prevailing wind continuously from June to January, followed by W. in February

and March, and the well-known cutting North-Easters in April and May, extending into June.

We now come to the last three tables (VIII. to X.), dealing with the phenological observations.

The first of these (Table VIII.) relates exclusively to the first leafing of trees, and may accordingly be compared with the long period of the "Marsham" records before referred to. For the purposes of condensation the number of the various kinds of trees from which observations have been taken has been limited to ten, with the addition of a note of the date on which the foliage is generally complete, or, in other words, when the woodland scenery of the county has assumed its full summer verdure, and bare boughs are seen no more.

Table IX. comprises a selection, from many, of ten garden plants or flowering shrubs found in nearly every garden, from which it is easy to take down the dates of first flowering, and commences with the earliest of our spring flowers, the Winter Aconite, and concludes with one of the latest of our horticultural productions, the *Colchicum autumnale* or Saffron Crocus. (Where the dates of the first flowering of the Winter Aconite occur in December, it refers to the December of the previous year.)

The first part of Table X. contains the names of twenty common wild flowers selected principally from the list published by the Royal Meteorological Society, to which the attention of observers is specially drawn. These plants have been arranged in the sequence of their natural orders, and not according to their dates. Nearly all of these plants are met with in daily walks in this neighbourhood, and the casual observer would hardly think that there was such a difference between the dates of the first flowering of some of them, and how little, apparently, others are affected by the weather, and reappear each year with marked punctuality. Of the former I would especially draw attention to *Caltha palustris* (earliest flowering, February 14th, 1896; latest, April 25th, 1888), a period of seventy-one days; and *Lamium purpureum* whose dates extend from January 5th, 1896, to March 15th, in 1888, a period of seventy days. And with regard to the latter, it will be seen that

*Lychnis dioica* ranges from April 21st, 1894, to May 13th, 1888, a period of only twenty-two days, and *Anthriscus sylvestris* from April 12th, 1893 and 1894, to May 6th, 1891, a period of twenty-four days. This table also includes details as to the dates of the commencement of the hay harvest, the appearance of the first ears of wheat, and the commencement and conclusion of the corn harvest. The last two items show the dates of the first notes of the Cuckoo and Nightingale. I regret that I am unable to add the dates of the first arrivals of birds and insects.

Comparing the three last tables with those relating to temperature, it is at once seen what an important part temperature plays in the development of vegetable life. Commencing with the year 1888, when (see Table III.) the mean temperature of every month from January to August inclusive was below the average, we find in Tables VIII., IX., and X. a corresponding retardation in the first leafing and flowering, in fact in nearly every instance the greatest number of latest dates of the series are this year recorded, up to the conclusion of harvest, twenty in all. In 1891, also, when the mean temperature of the spring and summer were much below the average, sixteen of the dates are the latest. On the other hand, in 1893, when every month from February to August was above its mean value (except the month of June which was about average), there are no less than twenty-five of the earliest dates recorded, in fact these three years give the extremes of mean temperature in each case over a considerable period, and the greatest majority of the extremes of the phenological tables. In other years there are exceptionally warm, and exceptionally cold months, but in most cases such months have been counterbalanced by opposite weather speedily ensuing, with the result that the phenological dates have not been affected in so marked a manner as when the abnormal temperature has been continuous.

Many other interesting facts will be brought to light by a closer comparison of the tables, and if only time had allowed me I should have gone into greater detail, but the limits of this paper compel me to bring these remarks to a conclusion, hoping that

what has been said, although very superficial, may be the means of inducing other lovers of nature to commence a series of observations of a similar kind. The Meteorological Society would be glad to receive further notes from observers in this locality, especially in West Norfolk, and it is only by increasing the staff that sufficient data will be received, which will result in better averages being obtained.

It is now my pleasing duty to hand over this chair to my successor, Mr. J. H. Gurney, a gentleman who has previously occupied it with conspicuous ability and with marked success to the Society, a gentleman whose name alone is a sufficient guarantee that nothing will be found wanting during the period we have the honour of his genial presidency. My own year of office has been an exceedingly pleasant one. I have learnt much, have made many friends, and have met with nothing but courtesy and kindness on all sides. My own shortcomings have been apparent to no one more than to myself, but the honour you conferred upon me in electing so humble an individual to so important a post will never be forgotten by me. I can only say, in conclusion, that I hope my successor will have as agreeable a year of office as that which has fallen to my lot.

TABLE I.

Absolute highest monthly and annual shade temperature during the ten years 1888—1897.

YEAR.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR
1888	54.0	49.0	56.4	64.6	74.0	85.0	73.6	82.5	72.2	65.0	60.2	54.0	85.0
1889	53.0	57.7	63.7	60.4	78.8	80.0	77.8	79.2	79.2	59.0	58.8	53.0	80.0
1890	54.8	48.6	64.0	62.8	71.6	77.0	74.4	80.2	76.7	69.2	57.6	43.8	80.2
1891	50.5	64.0	60.7	64.0	72.7	79.0	79.0	77.0	82.0	69.0	54.8	55.4	82.0
1892	53.0	52.2	58.7	75.0	82.2	80.8	77.2	80.8	71.0	59.2	59.0	51.2	82.2
1893	52.2	56.0	67.5	72.0	72.0	83.7	87.8	90.0	78.0	66.2	56.8	56.0	90.0
1894	53.4	57.0	65.0	70.8	70.0	73.4	84.6	75.6	71.0	64.5	61.4	51.2	84.0
1895	45.0	45.8	60.2	65.8	80.0	79.0	81.0	80.4	81.0	75.0	62.8	55.4	81.0
1896	52.0	56.2	65.6	68.4	76.0	81.0	85.0	78.2	72.0	64.4	50.4	52.2	85.0
1897	45.0	57.8	62.0	67.8	74.0	83.0	85.0	84.0	69.0	66.6	60.2	54.2	85.0
Extremes of ten years.	54.8	64.0	67.5	75.0	82.2	85.0	87.8	90.0	82.0	75.0	62.8	56.0	90.0

TABLE II.

Absolute lowest monthly and annual shade temperature during the ten years 1888—1897.

YEAR.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR
1888	14.2	9.6	24.2	26.2	32.0	41.8	36.6	38.5	37.2	28.4	33.2	24.8	9.6
1889	19.0	11.7	20.2	33.0	39.0	45.8	45.0	43.0	32.0	33.8	29.2	25.2	11.7
1890	19.4	28.2	12.0	29.8	32.6	37.8	40.0	41.0	37.6	28.2	14.0	13.0	12.0
1891	7.2	24.2	26.5	25.0	29.8	38.0	45.0	40.4	44.0	31.2	26.2	18.0	7.2
1892	8.0	9.5	14.5	24.0	29.6	36.2	41.5	40.0	35.0	28.4	30.8	19.2	8.0
1893	8.2	24.4	27.8	30.2	38.6	36.0	45.0	44.8	37.2	31.0	28.0	21.4	8.2
1894	11.5	22.6	26.2	32.8	33.8	42.0	48.0	45.0	40.0	31.2	29.6	28.4	11.5
1895	9.5	4.0	23.0	29.0	36.2	37.7	46.0	44.2	38.2	25.0	28.0	26.4	4.0
1896	24.8	25.6	29.2	31.0	34.2	36.8	41.4	41.2	40.0	29.0	24.2	24.8	24.2
1897	22.0	27.4	27.8	27.0	34.6	43.4	42.1	46.0	39.0	32.4	29.6	21.2	21.2
Extremes of ten years.	7.2	4.0	12.0	24.0	29.6	36.0	36.6	38.5	32.0	25.0	14.0	13.0	4.0

TABLE III.

Mean monthly and annual temperature during the ten years 1888—1897.

YEAR.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR
1888	36.8	33.9	37.1	42.5	51.1	57.3	57.6	58.2	56.3	46.0	45.7	40.3	46.9
1889	35.9	36.1	40.2	44.1	55.2	59.9	59.9	59.9	54.9	49.0	43.9	37.3	48.0
1890	41.2	38.2	43.0	44.5	53.0	58.1	58.8	58.9	59.6	49.7	41.4	30.3	48.1
1891	32.5	38.9	40.1	42.9	49.1	58.1	59.7	59.2	59.3	51.6	41.9	39.1	47.7
1892	34.6	37.2	36.6	45.0	53.3	56.5	58.3	60.3	55.7	45.9	44.9	35.2	47.0
1893	34.1	40.2	44.6	48.4	54.3	58.5	61.4	63.9	56.6	51.0	42.4	39.5	49.6
1894	37.3	40.8	44.1	49.6	49.4	57.1	61.4	59.5	54.0	50.3	46.1	41.0	49.2
1895	32.9	30.4	42.1	47.3	53.4	58.1	61.4	61.9	60.8	46.8	46.7	39.2	48.4
1896	39.7	39.9	45.2	47.4	51.4	61.7	62.8	58.9	57.6	46.9	41.0	38.7	49.3
1897	34.7	41.4	45.0	45.3	50.5	60.3	62.0	63.4	55.0	50.6	45.2	39.9	49.5
Mean of ten years.	36.0	37.7	41.8	45.7	52.1	58.6	60.3	60.4	57.1	48.8	43.9	38.1	48.4



TABLE VI.

Number of days on which the wind blew from the eight points in each month from 1888—1897.

MONTH.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
JANUARY .	20	31	32	33	34	55	54	51
FEBRUARY.	24	41	42	25	14	45	49	43
MARCH . .	24	40	24	24	28	52	70	47
APRIL . . .	35	57	41	33	25	32	35	42
MAY . . . .	46	65	27	26	32	37	39	38
JUNE . . . .	36	51	36	20	22	51	35	48
JULY . . . .	38	27	27	19	30	68	44	57
AUGUST . .	24	16	10	20	27	86	66	61
SEPTEMBER	29	32	28	27	24	62	53	45
OCTOBER . .	23	37	18	23	33	82	55	46
NOVEMBER	10	40	36	33	49	62	41	35
DECEMBER	13	14	37	30	60	68	50	39

TABLE VII.

Number of days on which the wind blew from the eight points in each year from 1888—1897.

YEAR.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
1888	42	46	43	25	39	66	56	49
1889	28	48	36	31	42	57	56	67
1890	27	35	46	34	32	75	66	50
1891	31	47	30	18	39	88	62	50
1892	28	56	30	32	32	58	75	55
1893	25	48	34	28	43	70	57	60
1894	26	49	36	34	36	82	50	52
1895	36	40	36	48	33	71	51	50
1896	50	44	25	30	38	56	66	57
1897	29	38	42	33	44	71	56	52
Average days.	32	45	36	31	38	69	60	54

TABLE VIII.

Dates of first leafing of Deciduous Trees, etc., during the ten years 1888—1897.

TREES, ETC., LEAFING.	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	Average of ten years.
Hawthorn . . . . .	Apr. 11	Mar. 23	Feb. 24	Mar. 30	Apr. 4	Feb. 23	Mar. 11	Apr. 6	Mar. 11	Mar. 19	Mar. 20
Sycamore . . . . .	Apr. 19	Apr. 17	Mar. 29	Apr. 9	Apr. 10	Mar. 19	Mar. 15	Apr. 18	Apr. 3	Apr. 1	Apr. 5
Horse Chestnut . . . . .	Apr. 27	Apr. 12	Mar. 30	Apr. 22	Apr. 12	Mar. 23	Mar. 30	Apr. 9	Mar. 27	Mar. 24	Apr. 6
Lime . . . . .	May 1	Apr. 26	Apr. 12	May 2	Apr. 28	Apr. 3	Apr. 10	Apr. 20	Apr. 17	Apr. 11	Apr. 19
Birch . . . . .	May 3	May 2	Apr. 22	May 4	May 11	Apr. 13	Apr. 9	Apr. 27	Apr. 30	Apr. 15	Apr. 26
Beech . . . . .	Apr. 30	Apr. 30	Apr. 24	May 1	May 7	Apr. 19	Apr. 13	Apr. 30	Apr. 25	Apr. 27	Apr. 27
Elm . . . . .	May 12	May 4	Apr. 24	May 11	May 13	Apr. 15	Apr. 12	Apr. 27	Apr. 22	Apr. 24	Apr. 28
Maple . . . . .	May 10	Apr. 28	Apr. 27	May 10	May 13	Apr. 20	Apr. 26	Apr. 28	Apr. 19	Apr. 16	Apr. 29
Oak . . . . .	May 16	May 8	May 1	May 14	May 17	Apr. 19	Apr. 13	May 2	Apr. 29	Apr. 29	May 3
Ash . . . . .	May 14	May 17	May 7	May 16	May 24	Apr. 21	May 1	May 7	May 9	May 17	May 10
Foliage generally complete	June 9	June 2	May 27	June 17	June 5	May 18	June 11	June 7	May 31	June 2	June 3



TABLE IX.

Dates of first flowering of Garden Plants, Shrubs, etc., during the ten years 1888—1897.

PLANTS FLOWERING.	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	Average of ten years.
Winter Aconite . . . . .	Jan. 22	Dec. 23	Dec. 25	Jan. 29	Dec. 31	Dec. 24	Jan. 14	Dec. 14	Jan. 5	Jan. 1	Jan. 4
Snowdrop . . . . .	Jan. 27	Jan. 13	Jan. 7	Feb. 3	Jan. 28	Jan. 24	Jan. 19	Jan. 17	Jan. 26	Jan. 9	Jan. 20
Crocus . . . . .	Feb. 12	Feb. 17	Jan. 19	Feb. 16	Feb. 7	Feb. 8	Feb. 4	Feb. 28	Jan. 30	Jan. 14	Feb. 6
Daffodil . . . . .	Apr. 12	Mar. 25	Mar. 12	Apr. 7	Apr. 3	Mar. 9	Mar. 5	Mar. 31	Mar. 19	Mar. 18	Mar. 23
Ribes sanguineus . . . . .	Mar. 25	Mar. 31	Mar. 11	Mar. 30	Apr. 6	Mar. 7	Mar. 15	Apr. 8	Mar. 20	Mar. 18	Mar. 23
Lilac . . . . .	May 22	May 14	May 11	May 14	May 18	Apr. 21	Apr. 24	May 12	May 8	May 8	May 9
Laburnum . . . . .	May 25	May 17	May 12	June 1	May 25	Apr. 28	May 3	May 12	May 9	May 13	May 15
White Pink . . . . .	June 14	May 27	June 5	June 22	June 9	May 19	May 20	June 6	May 26	May 31	June 2
Lilium candidum . . . . .	July 20	July 7	July 11	July 19	July 12	June 28	July 7	July 7	June 28	July 2	July 8
Colchicum autumnale . . . . .	Sept. 4	Aug. 21	Aug. 20	Sept. 8	Aug. 29	—	Sept. 10	Aug. 21	Aug. 23	Aug. 27	Aug. 27

TABLE X.

Dates of first flowering of Indigenous Plants and other natural phenomena during the ten years 1888—1897.

PLANTS, ETC., FLOWERING.	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	Average of ten years.
<i>Anemone nemorosa</i> (Wood Anemone)	Apr. 19	Apr. 2	—	Apr. 12	Apr. 5	Mar. 19	Mar. 30	Apr. 10	Mar. 22	Mar. 21	Apr. 2
<i>Ranunculus ficaria</i> (Lesser Celandine)	Mar. 7	Mar. 10	Jan. 25	Mar. 15	Mar. 31	Mar. 2	Mar. 11	Apr. 4	Feb. 23	Mar. 7	Mar. 8
<i>Caltha palustris</i> (Marsh Marigold)	Apr. 25	Mar. 30	Mar. 18	Apr. 21	Apr. 19	Mar. 21	Mar. 25	Apr. 5	Feb. 14	Mar. 25	Mar. 30
<i>Cardamine pratensis</i> (Cuckoo Flower)	May 7	May 4	Apr. 28	May 7	Apr. 19	—	Apr. 12	Apr. 30	Apr. 30	May 1	Apr. 26
<i>Sisymbrium alliaria</i> (Hedge Mustard)	May 4	May 2	Apr. 15	May 7	Apr. 26	Apr. 18	Apr. 15	Apr. 21	Apr. 3	Apr. 16	Apr. 22
<i>Lycchnis dioica</i> (Red Campion)	May 13	May 5	May 1	May 7	May 1	Apr. 27	Apr. 21	May 5	Apr. 25	Apr. 27	May 1
<i>Stellaria holostea</i> (Great Stitchwort)	Apr. 28	Apr. 25	Apr. 12	May 2	Apr. 26	Mar. 30	Apr. 7	Apr. 21	Mar. 25	Apr. 1	Apr. 14
<i>Esculus hippocastanum</i> (Horse Chestnut)	May 21	May 10	May 7	May 26	May 18	Apr. 19	Apr. 24	May 4	May 6	May 9	May 8
<i>Trifolium repens</i> (White Clover)	—	May 25	May 18	June 7	June 1	Apr. 30	May 26	May 26	May 24	May 23	May 23
<i>Prunus spinosa</i> (Blackthorn)	Apr. 29	Apr. 28	Apr. 2	May 8	Apr. 10	Mar. 19	Mar. 13	Apr. 28	Apr. 5	Apr. 12	Apr. 12
<i>Rosa canina</i> (Dog Rose)	June 21	June 11	June 8	June 25	June 13	May 21	June 14	June 10	June 4	June 14	June 11

<i>Crataegus oxyacantha</i> (Hawthorn)	May 24	May 21	May 13	May 18	May 12	Apr. 25	Apr. 29	May 17	May 7	May 15	May 12
<i>Anthriscus sylvestris</i> (Wild Parsley)	May 4	Apr. 27	Apr. 18	May 6	Apr. 27	Apr. 12	Apr. 12	Apr. 21	Apr. 18	Apr. 25	Apr. 23
<i>Chorophyllum tenu.</i> (Rough Chervil)	June 7	May 28	May 25	June 18	June 1	May 18	June 8	May 28	May 30	June 10	June 2
<i>Chrysanthemum leuc.</i> (Ox-eye Daisy)	May 22	May 23	May 7	June 3	May 30	May 2	May 9	May 16	May 16	May 24	May 17
<i>Veronica chamaedrys</i> (Germander Speedwell)	May 5	Apr. 29	Apr. 13	May 3	May 5	Apr. 2	Apr. 15	Apr. 28	Apr. 19	Apr. 25	Apr. 23
<i>Nepeta glechoma</i> (Ground Ivy)	Apr. 30	Apr. 11	Mar. 14	Apr. 9	Apr. 7	Mar. 23	Apr. 7	Apr. 21	Apr. 5	Apr. 12	Apr. 7
<i>Lamium purpureum</i> (Red Dead Nettle)	Mar. 15	Jan. 19	Feb. 15	Feb. 13	Feb. 7	Jan. 29	Feb. 18	Mar. 10	Jan. 5	Jan. 10	Feb. 8
<i>Iris pseud'acorus</i> (Yellow Iris)	June 9	—	June 5	June 18	June 6	May 19	June 8	May 30	June 3	June 7	June 5
<i>Scilla nutans</i> (Bluebell)	May 13	May 7	Apr. 13	May 11	May 12	Apr. 16	Apr. 21	May 5	Apr. 25	Apr. 29	Apr. 30
Hay cut . . . . .	June 14	June 3	June 8	June 22	June 17	May 26	June 19	June 11	June 8	June 15	June 11
Wheat ear . . . . .	June 19	—	June 10	June 25	June 17	—	June 21	June 16	June 6	June 18	June 16
Wheat cut . . . . .	Aug. 24	Aug. 6	Aug. 9	Aug. 22	Aug. 13	July 22	Aug. 10	Aug. 3	July 27	Aug. 3	Aug. 8
Harvest finished . . . . .	Sept. 22	—	Sept. 12	Sept. 19	Sept. 15	Aug. 22	Sept. 20	—	Aug. 21	Aug. 27	Sept. 8
Cuckoo heard . . . . .	Apr. 19	Apr. 24	May 6	May 5	Apr. 27	Apr. 19	Apr. 15	Apr. 18	Apr. 17	Apr. 25	Apr. 23
Nightingale heard . . . . .	Apr. 26	Apr. 21	Apr. 24	Apr. 22	Apr. 22	Apr. 27	Apr. 23	May 9	Apr. 21	Apr. 19	Apr. 24

E E U

I.

A VISIT TO AN EGYPTIAN OSTRICH FARM.

BY J. H. WALTER.

*Read 27th April, 1897.*

ON Wednesday, March 17th, 1897, I went by train from Cairo to Matarieh, a short and hot half-hour's journey, past the Khedive's Summer Palace, to visit the large Ostrich farm belonging to a French limited company.

The farm is enclosed by high mud walls, and the 650 pens into which the square is subdivided are also made of the same material. In each of the few first pens into which I was taken there were from twenty to twenty-four birds of the same age, beginning at two years old up to seven and eight.

In one pen there was an old cock by himself, twenty years old, who, on being spoken to by the keeper, imitated in a most ludicrous manner the dancing Dervishes.

In the next pen were a cock and hen, each twenty-two years old, and the hen had just laid an egg. I was informed that there were about 150 laying hens, and that generally they laid an egg every other day, and that a four-year-old bird will, on an average, produce about thirty eggs yearly.

The cock and hen sit alternately on from eight up to twenty eggs, for a period of six weeks, when the first chick appears; but some time elapses before all the eggs are hatched out.

I was much surprised at the very great difference in size of the chicks in one pen, which contained a cock and hen and ten young ones, some of which were more than twice the size of the others, and yet they were all out of the same nest.

In the last pen I visited, the cock was sitting on four chicks which had only been hatched out that morning, and eight eggs;

but the hen very quickly showed us how objectionable our presence was, and the keeper had to close the door in a hurry. The eggs are also hatched out in incubators; twenty-four being placed in each incubator, the water being kept at a temperature of 39° C., and changed every third day. After about forty-five days the chicks begin to hatch out, but, as far as I could gather, very rarely more than half the eggs are productive.

As the land on which the farm stands is practically desert, and consequently nearly all sand, chalk is put into the pens where there are laying hens. When they have fresh eggs to spare, they charge 4s. each for them, and 3s. for a shell. The feathers are plucked in May, and it takes five or six men to throw an Ostrich and bind it with ropes before the process begins. Small feathers are taken from birds of two years old, and at four years a black and white bird will produce feathers to the value of £8, while those of a grey bird are not usually worth more than £6. The food provided consists chiefly of chopped clover, beans, and bran. All the birds at this farm originally came from the Sudan.

I finished my visit by going up some steps in the main building in the centre of the farm, from the roof of which I was able to see almost at the same time 1450 Ostriches, a sight I shall not easily forget.

## II.

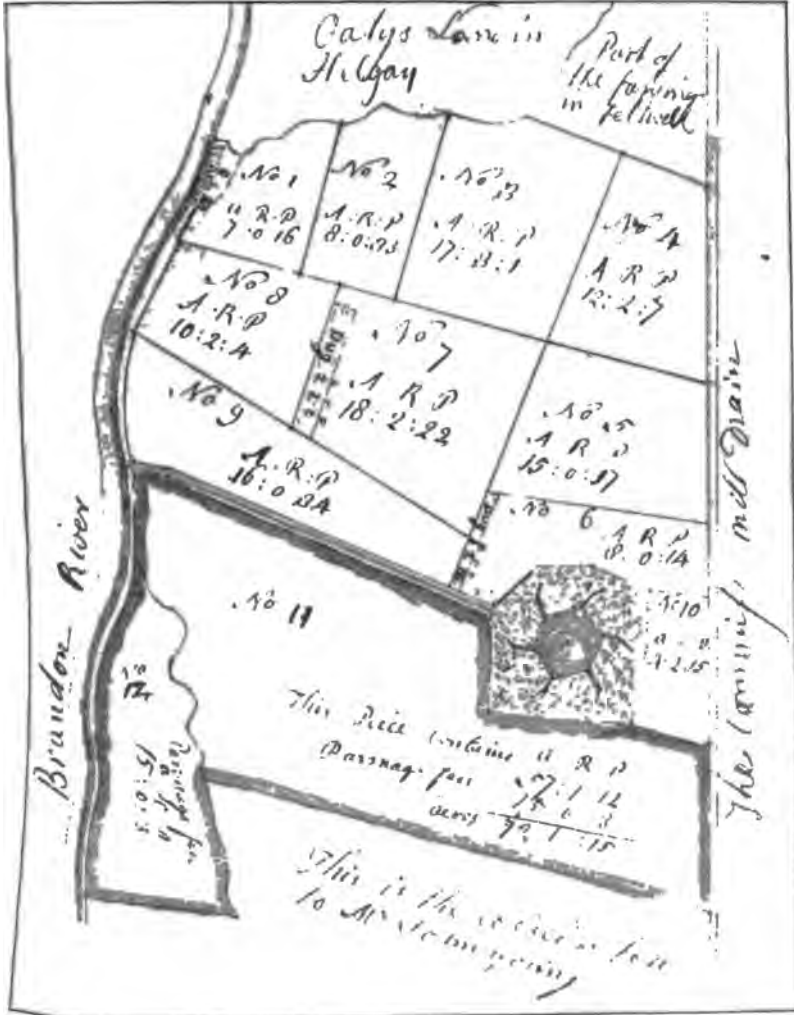
## FELTWELL DECOY.

BY THOMAS SOUTHWELL, F.Z.S., V.-P.

*Read 25th May, 1897.*

IN November, 1878, I read before the Society a paper on "Norfolk Decoys," in which I gave a list, with such particulars of the history as I was then able to glean, of all the decoys, "active and extinct," then known to me, but I was not at that time able to give any account of a decoy marked on Fadiu's map (dated 1790-4) as situated in Feltwell Fen, not far from the Brandon river and rather more than a mile from Brandon Creek Bridge. Mr. Francis d'Arcy Newcome has recently discovered some papers relating to the decoy, which he has been good enough to place in my hands, and of which, as they appear to be of considerable interest, I purpose to give some account. The papers which I now exhibit consist of leases, memorandums of agreement, estate maps of the decoy, statements of the number and value of the birds killed for several years, and many bills for materials supplied, work done at, and food consumed for the use of the decoy. These bear date from the year 1728 to 1786, and are very interesting as throwing light upon the management, cost of keeping in repair, and value to the proprietors, of a decoy some 150 years ago, as well as indicating to some extent the state of the fen country in that district before improved drainage had reclaimed the land.

Mr. Newcome tells me that he thinks the decoy was made by Mr. Robert Clough and Mr. James Nelthorp, whose names I shall frequently have to mention, purely as a speculation apart from the ownership of the land which appears to have been vested in Mr. Clough, and he believes the only connection between them and lessors of the decoy was, that they were neighbours and owners of



FACSIMILE (REDUCED) OF ESTATE PLAN OF FELTWELL OLD DECOY FARM.





the adjoining estates in Feltwell and Lyndford. He has kindly furnished me with the following particulars, as to the connection of the parties mentioned with his family in the present day, which it may be well to give here, as we shall then better understand what is to follow. The Robert Clough mentioned in the first lease was great-great-grandfather to Mr. Newcome; he married in 1726 (?) Miss Mary Wyche, the heiress of Hockwold, and died in 1777: he was succeeded by his son, the Rev. Cyril Clough, also mentioned in the papers, whose youngest daughter and ultimate heiress married the Rev. William Newcome, the father of the late Mr. Edward Clough Newcome, so well known to us as one of the most ardent supporters of Falconry in recent times, and thus the Hockwold and Feltwell estates came into the possession of the Newcomes; but the Decoy Farm, and several other outlying farms in Feltwell and Methwold Fen had been sold previous to the death of the Rev. Cyril Clough, which took place in 1806. The probable cause of the abandonment of the decoy was the drainage of the fen, but at what precise date it took place is unknown. The first Act for the Drainage of the district was obtained in 1751, this was followed by a second Act in 1806. An interesting clause in the lease of 1742, which will be referred to, indicates the condition of the land at that period; but although evidence of the improvement of the land is indicated by the covenants of the lease of 1775, it is probable that many years would elapse, after the passing of the Act, before this "Soak Land" would be sufficiently dry for winter cultivation.

There are two maps of the decoy and the adjoining land, the smaller of which has the appearance of being the older, but they do not differ materially save that the larger one (of which the accompanying plan is a reproduction) contains more detail. The farm consisted of 205 acres, 14 of which were devoted to the "Decoy and Walks," with which went 7 acres 16 perches, on which stood the Decoy House, with yard and gardens; the premises are described as situated on the bank and are shown on the plan; rather over 72 acres were in the occupation of Mr. Dixon, and over 118 acres in that of William Galley. Galley seems to have paid 2s. 6d. an acre for his land, five acres of which are described as "dug land," *i.e.*, I presume, from which the peat had been dug. The plan seems to be on a scale of about  $8\frac{1}{2}$  chains to an inch, this would give an area of about 8640 square yards for the decoy pond,

which is represented as hexagonal in form, and furnished with six pipes, the whole situated in a plantation 14 acres in extent, and communicating by a "dyke" with the Brandon river, from which it was not far distant. The form and extent of the pond appears thus to have been very much on the scale which Skelton advocated in after years.

The earliest document is an agreement signed by Edward Rolfe, and dated "Octob. ye 4th 1728" as follows: "Whereas I formerly Contracted and agreed with Robt. Clough of Hockwold cum Wilton in the County of Norf. Esqe for the Purchase of his 200 acres of Town Land lying in Feltwell in the County of Norf Between the Adventuror Land and the North Banck which has been since conveyed by the sd Mr. Clough to Robt. Clough his Sonne And Whereas the sd Robt. Clough the Sonne and James Nelthorpe Esqe. have entred into Articles to make a Decoy in part of the said 200 acres not having been able to pay the consideration money mentioned & agreed by me to be paid for the Land Do hereby Consent and agree That the sd Robt. Clough the Sonne & James Nelthorpe Esqe shall & may enclose & take in 60 acres in any part of the said 200 acres where they think proper and make and continue the same a Decoy for wild fowls without making any satisfaction or allowance therefore other than what they the sd Mr. Clough & Mr. Nelthorpe shall think fitt to pay & allow. Witness my hand Edward Rolfe [signed by mark] Witness Hen Cocksedge."

The decoy seems to have been constructed at once, for the next document dated 25 June, 1730, is a lease of "a new Decoy," at Feltwell from James Nelthorpe of Lyndford and Robert Clough, Junior, to Thomas Rolfe of Feltwell, Waterman for a yearly rental of £30 for a term of three years—the Lease provides that should Rolfe pay the full rent in the first year and £5—more "if the year prove extraordinary good (one Pound we put into his pocket for to repare ye sd Decoy) & three Pounds we lend him at his going in the which sd sum of three Pounds if he pay it again then we do hereby promise to lend him money to buy three Cows in ye spring." Rolfe is to keep the decoy in repair and to leave it in the same state as when he entered upon it; also "ye sd James Nelthorpe & Robt Clough to have liberty twenty days after Christmas next to draw upon ye sd Thos Rolfe's Poulterer for their half years Rent & so half yearly to ye end of ye lease."

This Thomas Rolfe does not appear to have been a more reliable person as a tenant than was Edward Rolfe previous to 1728 as a purchaser, for there is an Agreement dated 17 July, 1732, only two years subsequent to the Lease just quoted, between Messrs. Nelthorpe and Clough and William Burgis of Magdalen, Norfolk, Yeoman, to lease the decoy for a term of ten years, at an annual rental of £20 for the first five years and £40 for the second five years, and in consideration of Burgis putting the decoy into sufficient repair at his own proper cost he is to have the "profits of ye Decoy from this time to Lady day next [that is for one season] and ye land belonging to ye said Decoy from Michalms. day next to Lady day next after without paying any Rent for ye same."

Burgis seems to have remained tenant of the decoy and land for the term of his lease, for the next document is a formal lease dated 10 March, 1742, to William Harrison of Feltwell, Yeoman, for a term of 21 years from 25th March 1742 (old style) in consideration of his paying the Lessors half the profits arising from the decoy, Harrison to Keep the Reed Hedges, Woods, Netts, Ducks, Ditches, &c in repair towards which he is to be allowed £1 . 4 — out of the profits each summer for repairs. He is to send an account of the sale of the Fowl to the said James Nelthorpe, and Robert Clough, at what price per dozen and to whom sold and if they make no objection the bargain is to be "in full force effect & virtue" There is a provision that should Harrison at any time "Defraud Imbezil or conceal" any of the profits he shall forfeit the sum of £10 for the value of every 5/- so concealed and in proportion for every greater or lesser sum.

On the back of this Deed there is a further agreement in which the name of Robert Clough appears alone, this applies to the house and land; by it Harrison is leased for 21 years, the "House standing on the Bank belonging to the Decoy" and the land about the decoy for £10 per annum when the land is dry, and if wet then £5 a year. Harrison is to keep the fences and ditches in repair and to pay rent yearly at the "Mansion House" of Robert Clough; he is also to be allowed to cut 60,000 Turves to "make good the fences [?] for the conveniency of the Ground yearly." A further addition in the writing of Robert Clough dated 17 March 1763 renews the lease for one year on the same terms for the decoy but for the land the rent is to be £22.

The clause above referred to defining under what circumstances the land is to be considered wet or dry is worth extracting, it is as follows: "the land shall always be deem'd to be Dry when any Profits or Advantages in the Summer Season can be made of it with the Greatest Industry and Diligence of the Tenant. (that is to say) if the Cattle may Graze upon any part of the Land to feed upon any Grass or Hassock sward, &c., tho: they must be Lodg'd in the Tenants yard, then the Land shall be Judged to be at the Rent of Ten Pounds a year, but if the Land be so cover'd with Water, as that none of those Particulars above nam'd can be obtained by the Tenant, by any Contrivances whatsoever, then it shall be Deem'd to be Wett, and the rent to be no more than Five Pounds a year for the Said Land."

When Harrison actually gave up possession there is nothing to show, but the decoy evidently passed into the occupation of a certain William Laws, for there is an agreement dated the 4th of April, 1774, made between Robert Clough of Feltwell on the one part and Martin Jarvis of Hockwold, Yeoman, on the other part, to lease the Decoy Farm consisting of about 200 acres, "now in the Occupation of William Laws," to the said Martin Jarvis, also 15 acres of adventurer's land called the parsonage fen for a Term of seven years "at the yearly rental of £20 a year whereof the sd. R Clough Esq is to allow and bear the Miltax and Land Tax" also in addition to doing the usual repairs the Tenant is to "plow and burn no more than twenty acres in any one year, nor keep that under the plow no more than three years before it is laid down with a proper quantity of Rye grass or High Land hayseeds" Martin Jarvis is also to have the decoy at a yearly rental of £20, Keeping the same in proper repair as specified at length, and "is to Give the said Mr. Clough fifteen couple of Ducks & Mallard every year at such times as shall be wanted" &c., this is all set forth at great length in the lease dated 11th June, 1775, which was executed in due course. The noticeable feature in this lease is the alteration in the covenants incident to the drainage and improvement of the land as indicated by the "Miltax" and the laying down of artificial grasses, results doubtless of the Act of Parliament already referred to.

In this lease also, as in others, special reservation is made of "All and all Manner of Timber Trees Bodies Tops & Lops of Trees, and all wood and Under Wood Scotch fir Bushes Thorns

**Sallows Willows and Quicksetts**” and the following severe clause indicates the importance attached to the due preservation of the decoy wood, which possibly owing to the wet nature of the land, it might have been difficult to maintain, and which was absolutely essential to the privacy of the decoy--“ Also the Said Martin Jarvis his Exors. or Adtors. are not to Suffer any Sort of Cattle whatsoever to get Amongst the Wood about the Decoy upon penalty of forfeiting the Lease Immediately AND also to pay for every Tree damaged the Further Sum of five pounds.”

A small paper book marked “The Decoy Book,” contains the catch of fowl from 1747 to 1758, with various notes, the most important of which are as follows :—

“An Account of Ducks Killed in ye Year 1747 by Will Harrison.”

127 Dozen 11 Birds [1535] amounts to att 11/- p dozen	£70	7	6
The half between Mr. Clough & me [see arrangement in Lease] ... ..		35	3
Recd. my share ... ..		17	11
		6	9

This book was evidently kept by Mr. Nelthorp; the produce of the decoy does not seem to have been great at this time compared with what we have been told of the large number of fowl said to have been killed at the neighbouring decoy at Lakenheath; but it is possible the large number of decoys within a short distance of each other may, in some measure, account for this. The other entries in the book are shortly as follows. I cannot, however, always make his calculations correct :

1748—201 doz.	(2412 birds) @ 10/6 per doz.	=	£105	10	6
1749—325 „	(3900 „ ) „ 11/- „		179	1	5
1750—196 „ & 2	(2354 „ ) „ 11/- „		107	17	10
1751—144 „ & 6	(1734 „ ) „ 11/- „		79	9	11½
1752—330 „	(3960 „ ) „ 11/- „		181	14	
1753—185 „	(1620 „ ) „ 12/- „	81	}	83	7
7 doz. & 10 “odd Birds” (94 „ ) „ 7/- „	2.7				
1754—115 doz. & 9 „	(1389 „ ) „ 12/- „		69	9	3
1755	No account (see further on 1758)				
1756	Received on account £9 2/- leaving 15/3 due “Memorandum Thirty Pounds of this Years Profits is in danger of being lost.”				

May 8. 1758 Recd. the Profits of the years 1755 & 1756 Clear of Bills £10 12 6.

“For the year 1757 & 1758 Kill'd 205 doz which amounts to £112 12 of which sum we have recd. £55 and there Remains due on the Bond the sum of £57.

1758-9 "From April 1758 to March 1759 Ducks Killed 184 doz.  
3½ which at 11/- per dozen comes to £101 5 2.

May 1759 Recd. in part of the Profits for 1757 for my share £12 10.  
Recd. at the same Time in part of ye Profitts for 1758 for  
my share £15.

Recd. more by Cash & Bills £20 10.

Sep 15. 1761 Recd. my share of Bridges for Ducks for 1760 £2 6.

Sep 12. 1760 Pd. Mr. Clough towards cleaning out the Decoy £20.

The book contains no further entries, but it is evident the produ-  
of the decoy was falling off, and that William Harrison, who  
lease did not terminate until Lady Day, 1764, was unable to me-  
his engagements; the outlay for repairs also began to be very heav-  
and this, contrary to the arrangement, seems to have been borne  
the owners. The Bridges mentioned above, was the poulterer  
whom the fowl were sold, as appears from memorandums of pa-  
ments made by him to Messrs. Clough & Harrison. The usu-  
practice was to allow half price for Teal and Wigeon (half bird-  
but I cannot clearly distinguish what proportion of "half bird-  
there were. There is a statement by Bridges of the fowl receiv-  
by him in January, February, and March, 1760, by which it appea-  
only 18 dozen and 6 were thus accounted for, producing £9 5s.,  
which Mr. Nelthorp's share was £2 6s. as shown above.

There are 24 bills for work done at the decoy in the year  
1757-1760, and 16 bills relating to repairs done in the year 17  
some of which are interesting. In 1759, Harrison acknowledg-  
the receipt of £4 4s. for "Hemseed" and work (?) for the dec-  
and £1 1s. for delivering fowl at "Lakenheath brig," at 6d. f-  
dozen, whence they seem to have been sent to London and Swaffha-  
The forms of the bills are curious as well as their contents; here-  
one: "A bill of brick layers work done at Willm. Harrison's Dec-  
to the use of Robt. Clough and James Nelthorp, Esqrs., pr. ■  
John Pearson 1758:—

July 3d began and did six days work of two trowels and two labourers at 5/- per day ...	£1 10
„ 10th began and did two days work of the same company finishing the tunnel ...	10
Allowance for beer 6d. per day ...	4
Payd to John Low for fetching of Clutch ...	7

---

2 11

July 20th 1758

Received of Robt. Clough Esqre the full contents of this bill  
by me

his  
JOHN X PEARSON  
mark

In 1786, which is the last year of which there is any account, thorough renovation seems to have been made at the decoy. In March of that year, William Galley sends in an estimate for repairs to the "De Coy," amounting to £174 5s., no charge being included for my own time." Some of the items are as follows: 24 Stone Tar'd Rope, at 6s. per stone; for Thread and Netting, £20; for mending and Cleaning out 8 pipes at £1 4s. each (there are only 8 pipes shown on the plan); for making 194 Rod of Reed Wall, 2s. per Rod; for cutting Hassocks, £2 2s., &c. The bills show that most of this work mentioned in the estimate was carried out; they are generally addressed to Wm. Galley, but some are variously addressed to Sirrell Clough, Esq., Mr. Clough a Sqr. &c., the owner then being the Revd. Cyril Clough. Some of these bills are interesting, for instance, John Forster charges £23 4s. 4d. for Decoy wine, at 10s. per Dos. and "Marten," which I presume is some other kind of Twine, at 6s. per stone; Ann Goat for Netting, 23 Duzen and five pounds of thread," @ 3s. pr Dozen, charges £3 10s. 3d., &c.

Here the records of the Feltwell Decoy end, and I am unable to ascertain at what date and for what reason the working was discontinued, further than that already suggested; but the extensive repairs effected in 1786 would seem to indicate that at that time there was every encouragement to persevere, and that its abandonment was far from contemplated.

As to the present state of the site of the old decoy, Mr. E. Cyril Newcome tells me that on a recent visit to the spot with Mr. J. C. Feltham, the present owner of the soil, that gentleman pointed out to him a bullock yard, as being the actual site of the decoy, and a depression in the ground was the only indication of its former existence.

III.

NOTES ON SOME FOREIGN ANIMALS LIVING  
IN BRITISH PARKS.

BY E. J. H. ELDRED.

*Read 28th September, 1897.*

WHEN we look at the close connexion and vast commerce that so long existed between this country and the great Colonies Dependencies of Africa, North America, and the Empire of India in all of which countries the highest and most varied forms of animals are found it is somewhat remarkable that no large number of economic value has been naturalised or domesticated in the British Islands within modern times, nor, indeed, until quite recent years, does any attempt seem to have been made upon lines likely to lead to success.

More interest and attention has apparently been given lately to the subject, and there seems an increasing desire among owners of property to acquire foreign animals and birds for their estates as well as, let us hope, protecting some of our scarce indigenous species.

We have heard a great deal lately about the progress and advancement that has taken place during the last sixty years, but in the animal world this period has been disastrous in the extreme, many species have become nearly, if not quite, extinct, and others are verging on disappearance.

In offering these remarks, I do not in the least range myself on the side of thoughtless or ill-considered schemes for the introduction of either mammals, birds, or fishes, for there is nothing in the islands of ours we want to see displaced, and in view of the damage wrought in this way, in New Zealand and elsewhere, the greatest care ought to be exercised in introducing new forms into



ntry, especially islands. There are, however, some species of Grand Antelopes that might doubtless be naturalised in England, only for their beauty and elegance of form, apart from any uninary advantage.

Some thirty-five years ago, an Acclimatisation Society was formed, had, I think, but a short existence. A report was published 1861. In the early days of the Zoological Society they had a farm at Kingston, this appears to have been given up after some years. The most notable instance by a private individual, in the introduction of foreign animals, was the famous Knowsley Park, formed by a late Earl of Derby which was dispersed about the year 1851.

Confining these remarks more particularly to animals (birds, especially game and waterfowl offering a far wider field for observation, so much more having been attempted with them), amongst various parks and localities where collections can now be found, I will be enumerated :

At Powerscourt, Co. Wicklow, the seat of Earl Powerscourt, where a herd of the pretty Japanese Deer has been established about thirty-five years or so, and they appear to thrive well. Leonards Lea, Essex; Sir Edmund Loder. Osmaston Manor, Ashbourne, Leicestershire; Peter Walker; where there is a herd of Wapiti Deer. At Ryedale, Northumberland, Mr. Leland, some American Bison; at the Hon. Walter Rothschild, the museum here and its varied contents are now well-known, there is a collection of birds and some animals. The Hon. Walter Rothschild's team of Burchell's Zebra attracted a good deal of attention some little time ago; and here, I believe, some interesting experiments in progress at the present time, as to breeding hybrids with this Zebra and the Horse.\* At Woburn, Bedfordshire, and where probably the finest private collection of living animals and birds is at present to be seen is Woburn, Beds, the seat of the Duke of Bedford. Passing the deer, of which there are many examples of the Sambar, Axis, and some others, also a flock of Wild Sheep, and five Burchell's Zebras, the most interesting animals are three species of African Antelopes, a pair of White-tailed Gnus, now it is believed not found as a wild animal, but introduced on some private farms in the Cape Colony and the Transvaal; four examples of one of the most beautiful of the

\* 'Zoologist,' February, 1898.

Antelopes, the Sable, or Harris Buck, the first instance that I know of, of its being seen in an English Park. The last to be mentioned is the Eland (*Oreus canna*), of which there are eight (six old and two young) animals, all in fine condition; the oldest bull, a splendid creature. Much interest attaches to this Antelope, the largest of the species, as it was at one time thought capable of domestication in England, and it is to be hoped that further attempts may prove successful.

The Eland was first introduced by the thirteenth Earl of Derby, at Knowsley, in 1840. On the death of the Earl the herd passed, by bequest, to the Zoological Society, thus laying the foundation of the present stock which have done well in the gardens; but in the narrow limits of a menagerie it is difficult to breed with success, and fresh blood is required from time to time; there was formerly a herd at Hawkstone Park, Salop, the seat of Lord Hill; but on journeying there a few years ago with the hope of seeing them, I regretted to find they had been given up some time previously; an individual from this herd was exhibited at the London Cattle Show in 1867, the first introduction of the animal in the meat markets of Europe. There was also formerly a herd of the so-called Barbary Deer at Hawkstone, this is now regarded as merely a variety of the Red Deer, noteworthy as the only Deer inhabiting Africa (Algeria and Tunis), introduced probably by the Carthaginians.

In its native country, South and East Africa, the Eland is unfortunately sharing the fate of all the large animals of that continent, and unless stringent measures are taken for its preservation, it will soon become extinct; it has also suffered, in common with other ruminants, from the rinderpest which has lately ravaged Africa from Abyssinia to the Cape.

Happily attention is now being drawn to the need of protection for this and other game animals, and efforts have already been made by the setting apart of reserves and sanctuaries by the governments of the Cape and Natal, and the administrations of British Central and East Africa, so that there is some hope that the era of unlimited and unchecked destruction, even to extermination, has in a measure ceased, and some of these beautiful animals (beyond a few stuffed skins in museums) may be preserved for the benefit and admiration of posterity.

## IV.

ON SOME BONES OF A PELICAN FROM  
THE CAMBRIDGESHIRE FENS.

BY SIDNEY F. HARMER, M.A., B.Sc.

*Read 28th September, 1897.*

IN February, 1897, some bones from the Fens were brought to the University Museum of Zoology at Cambridge. Most of these specimens belonged to the Beaver, Pig, Swan, Goose, and Pike; but three of them proved, on examination, to have belonged to a Pelican, a bird which has been recorded on two previous occasions from the same part of the country.

The first account was given by Professor Newton (Proc. Zool. Soc. 1868, p. 2), and refers to a left humerus, in the Woodwardian Museum at Cambridge. This specimen was described by Professor Alphonse Milne Edwards in the 'Annales des Sciences Naturelles' (5<sup>e</sup> Sér. Zool. vol. viii. 1867, p. 285); and a translation of this paper appeared in 'The Ibis' (N.S. vol. iv. 1868, p. 363). Milne Edwards described in detail the characters by which the humerus of a Pelican can be distinguished, the great size of the bone being alone an almost certain indication of the genus. He further pointed out that the ossification of the specimen submitted to him was incomplete at the articular extremities; and that the bird was therefore a young one, which was probably native to the Fens, and not an accidental immigrant.

A second left humerus from Feltwell Fen, in Norfolk, was presented in 1871 to the University Museum of Zoology, by Mr. J. H. Gurney, jun., to whom it was given by Mr. John Baker, the well-known Cambridge birdstuffer. In exhibiting it to the Zoological Society, Professor Newton called attention (Proc. Zool. Soc. 1871, p. 702) to its correspondence in size with the humerus of a recent specimen believed to belong to *Pelecanus crispus*.

The bones which have recently been acquired by the University Museum of Zoology were found at Littleport, near Ely. They were formerly in the possession of James L. Luddington, Esq., who has been kind enough to inform me that they were found on his farm in Burnt Fen, Littleport, some seven or eight years ago. They consist of the lower end of a humerus and the upper ends of radius and ulna, all of the left side, and appearing to belong to the same individual. The conclusion that these are the associated bones of a single specimen is quite in accordance with previous experience of the way in which the bones of various animals are found in the peat of the Fens.

The humerus of the Littleport specimen agrees closely with the Feltwell bone, and the three Littleport bones have the closest resemblance, in form and size, to the corresponding bones of the recent *P. crispus*, to which reference has already been made. The ulna is, however, abnormal at a distance of 11 or 12 cm. from its upper or proximal end, and it has the appearance of having been broken, although the fracture was repaired during the life of the bird. The part of the ulna which is preserved measures only 15 cm., so that the whole of the injured region of the bone is not visible. The resemblance, in other respects, between the Littleport bones and those of the recent *P. crispus* certainly lends support to the view hinted at by Professor Newton in 1871, and repeated on page 703 of his 'Dictionary of Birds' (part iii. 1894), that the Fen specimens belonged to that species.

It is worthy of remark that a left humerus has been found on each of the three occasions on which the remains of a Pelican have been recorded from the Fens. The evidence thus afforded of the occurrence of three individuals goes far in support of the view that the Pelican was really native to this part of England.

V.

THE ECONOMY OF THE CUCKOO  
(*CUCULUS CANORUS*).

BY J. H. GURNEY, F.Z.S.

*Read 26th October, 1897.*

- Linn : S.N., 1766.  
Newton, Yarrell's B.B. 4th ed. vol. ii. p. 387.  
" Nature, Nov. 18th, 1869.  
" Dictionary, vol. i. p. 118 *et seq.*  
Saunders' Manual, p. 277, and 2nd ed. p. 287.  
Bidwell, Bull: B.O.C. vol. xxxiv.  
" Trans. Norfolk and Norwich Nat. Soc. vol. iii. p. 526.  
Zoologist, 1894, Southwell and others.  
" 1895, pp. 237, 257, 321.  
Walter, J. F., Orn. 1889, p. 33.  
" M.B. Deutsch. v. Schutze, 1890, p. 468.  
Rey Dr. E., 1892 (his conclusions given, 'Ibis,' 1896, p. 395).  
" " Ornith. Monber, vol. iii.  
Capek. Orn. Jahrb. vol. vii.  
See the titles of other treatises on the Cuckoo in B.M. Catalogue,  
vol. xix. p. 245, and in Smith's 'Birds of Wiltshire,' but the  
above are specially important.

There are several points—such as the stoutly denied eating of other birds' eggs—not by any means thrashed out in the economy of the Common Cuckoo (*Cuculus canorus*, L.). Taking the references given above as my text, I should like to say something about the familiar British Cuckoo, the theme of poets since Chaucer, if it is not trespassing on your forbearance to introduce what, at first sight, may seem to every one a well-worn theme. Well worn in the sense of being much written about, but incomplete, and so it is likely to remain, because the law forbids Cuckoos to be killed in the Spring, and properly, yet Cuckoos are guilty of destroying many valuable insect eaters.

One thing which is remarkable about this bird is that it is equally at home in a Scottish mountain glen, by the marshy side of a Norfolk Broad, on the bleak Scilly Islands, in the cultivated Midlands, or among the tool-sheds and greenhouses of a country house. Of no other British bird can this be said, for it is not true of the ubiquitous Sparrow, nor would it be true of the Robin or the Chaffinch. In the choice of a fosterer it is almost equally ubiquitous. This is one reason of its being such a favourite, and because of the general opinion that no other bird utters a note so closely approaching the human voice, but in June the male "changes his tune." There are very few persons who can imitate a Cuckoo so well as to take in a practised ear, but there are some, and the bird itself is not hard to deceive. The third week in April is the time to listen for Cuckoos in Norfolk,—Our President, Mr. Preston, has favoured us with the average of dates from various sources, giving April 23rd, St. George's Day, as an approximate date of arrival. The same day is given by Mr. Southwell, quoting members of the Marsham family, as the mean of 106 years' observation of the Cuckoo at Stratton Strawless, the home of Gilbert White's correspondent.\*

Although so much has been said and written about Cuckoos spring-coming, no one has been at the pains of collecting data of the last appearance of adult Cuckoos, always the first of the summer migrants to leave the British Isles. This seemingly purposeless haste is admissible evidence that, in other birds as well as themselves, the object of migration northwards is to seek a climate suitable for their young, far more than to satisfy their own requirements. The young often stay into October, and there is one recorded occurrence on our east coast as late as November 26th ('Christy's Birds of Essex,' p. 153), but the end of September is the usual time to quit England's shores. You will hardly credit the Cuckoo affirmed to have been heard at Elmham and Snettisham, nearly twenty miles apart, on December 6th, 1888, in spite of some indirect corroboration which the announcement by Mr. G. Cracknell,

\* In Egypt, Cuckoos appear to be mute on the Spring passage northwards, reserving like some other birds, bent only on migration, their burst of song until the goal is reached, unless all seen by us were females incapable of saying "Cuckoo." The absence of the Golden Oriole's flute-like note was noticed in the same way.

received in 'The Times,' of its being heard elsewhere, for a Cuckoo is not very likely to be in song in December.

The chief points in Cuckoo lore to which I should like to invite the further attention of Norfolk naturalists, because there is still some more to be learnt about them, are :—

- The colour of Cuckoo's eggs.
- The removing of eggs.
- The eating of birds' eggs.
- The removing of nestlings.
- The watching of their own eggs.
- The habits of the young Cuckoo.
- The anatomy of the Cuckoo.
- The dimorphism of its hepatic plumage.

#### CUCKOO'S EGGS.

Cuckoo's eggs, and all that appertains to them, is an inexhaustible subject when naturalists meet in conclave, and it is one which has a fascination for every oologist. Even now we do not seem to have fathomed it in spite of the German assistance quoted at the head of this article, but the subject is concisely treated in Harting's 'Our Summer Migrants.' Our Cuckoo lays blue eggs oftener than is thought, and *Coccyzus jacobinus*, a Cuckoo inhabiting Africa and India, always lays them: to say blue Cuckoo's eggs have never been met with in England is quite incorrect, for they have been found on four or five occasions. In one nest we learn the blue egg was very little larger than a Hedge Sparrow's, but it produced a Cuckoo, which only shows how easily they may be passed over. Dr. Rey, considered a great authority, says Cuckoo's eggs vary more in colour than those of any other bird, and that is a fact, and they are comparatively hard and thick, which abnormally large eggs are not. Dr. Rey says that each Cuckoo lays twenty eggs a year, and several writers are of opinion that each individual Cuckoo keeps to its own district. If this be so, probably only about a third of the twenty eggs result in young Cuckoos, considering how scarce, comparatively speaking, they are; and the rest of the eggs must be lost from one cause or another, of which more later on. Cuckoo's eggs often, but by no means always in this country, whatever may be the case on the Continent, bear a curiously protective resemblance to the eggs of the foster-bird. To the late August Baldamus belongs the credit of this discovery, though

Professor Newton has pointed out that in the second century, Cælius had almost arrived at the truth (*De Nat. Anim.* iii. xxx.); but in 1770, the idea of "a nurse in some degree congenerous" was perfectly new to Gilbert White. It is one of the most curious things in ornithology, but Professor Newton adds a caution lest any should consider that the Cuckoo or any other bird can voluntarily influence the colour of the egg about to be laid. Over that she can have no control, and it is too much to suppose that having laid her egg on the ground, a Cuckoo would look at it, and deliberate what species of bird's nest would be the best to put it into. What is argued, by Baldamus and others since him, is that each individual Cuckoo is parasitic to one or two species, and has power to lay only one type of egg, and in this the Guillemot resembles it, but the Guillemot has need to know its own egg which the Cuckoo has not.\* Further it seems reasonable to suppose that any Cuckoo will by preference lay in the nest of the species which brought her up.

An egg at Scoulton, on June 20th, in a Reed Warbler's nest, was of the reddish type. Here at least was no resemblance. The Cuckoo was close at hand, and perhaps it was a consciousness of wrong colour which rendered her anxious, there being no other egg in the nest. My friend, Mr. Frank Norgate, has obtained single Cuckoo's eggs in several odd situations, in Norfolk and Suffolk, such as (1) lying on the bare earth in a garden, (2) the exposed top of a garden wall, (3) from a nest behind wire netting, and (4) from a nest underneath tiles. The latter must have been deposited in the dark, but this, perhaps, is not very infrequent; and the sight of birds is much clearer than human vision (*cf.* *Trans. Norfolk and Norwich Nat. Soc.* vol. ii. p. 148) as is abundantly proved. For instance, at Mr. Buxton's place near Aylsham, a young Cuckoo was reared in a hole in a stump, only  $3\frac{1}{4}$  inches in diameter, and 28 inches deep. No one saw how the Cuckoo crawled down that narrow passage with an egg in her mouth, where the light must have been excluded by her own body blocking the entrance, and having deposited the egg, turned round and got back again. To Mr. Norgate's unusual sites I could add some very

\* A Flamborough cliff climber told me that he had taken fourteen red Guillemots' eggs in seven consecutive, or nearly consecutive, years from the same rock, probably all laid by one bird (*cf.* Kearton's 'Nature and a Camera,' p. 106).



public ones, where Cuckoo's eggs have been deposited in nests, past which people were coming and going all day, but no doubt the intrusion was effected at early sunrise by the old Cuckoo, the future of whose young one is then assured, provided the fosterers do not forsake, but the Cuckoo does not always lay in the morning.

Cuckoo's eggs are hatched the beginning of June, after which Titlarks and Wagtails do not pay much regard to any Cuckoos, except young ones, neither is its full song heard again. Shakespeare knew this when he said :—

“So when he had occasion to be seen  
He was but as the Cuckoo is in June,  
Heard, not regarded.”

HENRY IV.

The latest egg I have found was on June 28th, but Colonel Butler tells me of a fresh egg in a Yellow Hammer's nest on July 3rd, and of a young Cuckoo unable to fly on the 28th of July last. Most of the eggs in his collection were taken during the first week in June, in different years ('Zoologist,' 1895, p. 230), near Bury, or at Fritton Lake, near Yarmouth, a locality which has attractions for Cuckoos, on both sides of the water. If the foster-bird is not quite happy with the splendid usurper's egg which she is deluded into the belief that she has herself laid, she will perhaps move it from one side of the nest to the other, and if there is reason to think it unfertile, ultimately bury it in the lining of the nest, rejected. In June, 1877, Mr. Norgate saw a Cuckoo's egg, in Hockering Wood, on the ground, beside a Tree Pipit's nest, which egg had some hours before been seen to be in the nest; and there is similar evidence by other observers, showing the disposition above-mentioned. I have more than once had Cuckoo's eggs taken as I believe by rats, but it may have been by mice.

It is a little singular that Sir Thomas Browne makes no mention of the Cuckoo, for it would not be hard to name several marshy places in Norfolk where Cuckoos rather abound, and often lay their eggs in Reed Warblers' nests. Mr. Norgate, who has found as many Cuckoo's eggs as most people, has noticed an odd trait, viz., that those Reed Warblers' nests which contain Cuckoo's eggs have sometimes Cuckoo's feathers woven into the outside or bottom of the nests. If this be the work of the Cuckoo, it can only be regarded as an additional inducement to the foster-parents to take charge of the young Cuckoo, by habituating them to the

sight and scent of their parents' feathers. No one but Mr. Norgate has noticed this remarkable habit, but he has sometimes detected these interwoven feathers in other birds' nests also. Several Robins and Pied Wagtails' nests containing Cuckoo's eggs, which have been found by Mr. Norgate in holes, have had as many as six eggs of the foster-parent's; which leads Mr. Norgate to think that the Cuckoos were probably unable to take out an egg of the fosterer, though they could put their own in.

#### REMOVAL OF THE FOSTERER'S EGGS.

That Cuckoos habitually carry away one or more of the fosterer's eggs is now beyond dispute, and they might be expected to continue watching a fosterer's nest which they had not yet robbed, in the hope of yet doing so.

Mr. Norgate continues:—

"June 4th, 1885.—At about 3 p.m., my housemaid told me she had just put her head out of a window and seen a large slate-coloured bird, with a long tail, flying from a Pied Wagtail's nest, two or three feet below her face, on a pear tree on the wall, and that the bird had what looked like an egg in its bill, and two small brown birds were flying at it. Her attention was first called to it by hearing a great noise of fluttering. I at once climbed to the Wagtail's nest, and found one fresh Cuckoo's egg, and one Wagtail's. I am quite certain that Cuckoos usually abstract one or two (perhaps rarely more) of the foster-parent's eggs in exchange for their own. When two Cuckoo's eggs are in one nest I have never seen more than two eggs of foster-parent with them."

A few years ago, Colonel Butler found a Greenfinch's nest in the North of Suffolk, in his garden, with one egg in it, which he marked with a pencil. A day or two afterwards the nest contained a Cuckoo's egg, and the marked Greenfinch's egg was picked up on a path at a considerable distance from the nest, presumably, one might almost say certainly, dropped there by the Cuckoo, which agrees with Mr. Norgate's experience, except that it is not usual for the Cuckoo to remove the only egg in any nest.

Mr. Norgate, who has had many Cuckoo experiences, continues as follows:—

"I now and then obtain a clutch of Hedge Warbler's, Lark's, or other species, with one egg so much larger than the others that I hope it is a Cuckoo's; but I can never satisfy myself by detecting the hoped for extra hardness of shell or difference in colour of yelk, nor the usual bluntness of the small end.\* Some Cuckoo's eggs are however more pointed than others,

\* In a much incubated egg the proof is in the zygodaetyl feet.

some are much larger than others, and probably some are harder than others. . . . I have found Cuckoo's eggs uninjured outside the nest, and on other occasions the foster-parent's eggs outside the nest sometimes uninjured. I have more than once found the Cuckoo's egg uninjured in a nest with the foster-parent's eggs all broken, but in such cases usually find very many feathers of foster-parent, and sometimes the dead foster-parent outside the nest. I always think this is an accidental termination of the usual scuffle, or that the mischief is done by some other animal. One often sees a continued scuffle between a Cuckoo and one or more small birds, in play or in enmity. . . . I think we should more often find two or more Cuckoo's eggs in one nest, but that I fancy the second and succeeding Cuckoo would be likely to take out the biggest egg (*i.e.*, the previous Cuckoo's), rather than a smaller egg of foster-parent."

#### CUCKOOS' FOSTERERS.

Judging from the excellent lists of fosterers by Mr. Edward Bidwell in our 'Transactions' (vol. iii. p. 526), Mr. Dresser and Mr. W. Bladen (published separately, 1896), there is no species of bird in the least degree suitable whose nest the Cuckoo will not occasionally lay in. It would be more indicative of nature's intended limit if a list was written, giving us the species in whose nests Cuckoos had been actually hatched, because the deposition of its eggs in abnormal nests merely indicates that the Cuckoo could find nothing else handy wherein to put them. An egg once laid must be put somewhere, even in an unfinished nest.\* Cuckoo's eggs have been found in the domed nest of the Wren, but I only find one instance of a Wren's Cuckoo being reared, and cannot imagine how the imprisoned Cuckoo ever gets out of such a small hole (.7 x .8) as a Wren's. Yet there must be Cuckoos whose mission in life is to be parasitic on the Wren, for it seems pretty clear that individual Cuckoos, when they can, introduce their eggs into the nest of one species only; but according to Dr. Rey they never lay eggs which resemble Wren's eggs. But in this he may be wrong (*cf.* Zool. 1895, p. 228; 'Birds of Europe,' vol. v. p. 207), as he certainly is about the Hedge Sparrow. The Rev. Maurice Bird found a Cuckoo's egg in a House Sparrow's nest in Kent, which is rare, but the Sparrow's nest was in a clipped Spruce Fir hedge. Mr. J. A. Cole found and brought to my father a Cuckoo's egg in a Redstart's nest at Catton, in a small tin kettle, and here again the question arises, "How would the young Cuckoo have got out of the kettle?"

\* Mr. Bird found one in an unfinished Hedge Sparrow's nest at Somerton.

The reason a Cuckoo chooses such small kinds of birds as Wagtails, Titlarks, etc., to palm its egg upon, is that if its egg were smaller than the fosterer's eggs, it would not always receive enough of the warmth of the sitting bird to hatch. Yet it is a stated "fact" that Cuckoos have laid in Wood Pigeon's nests, and "a fact" too as old as Willoughby (1676). That each individual Cuckoo lays its own type of egg, season after season, and that in nineteen cases out of twenty it lays that egg on the ground (always for that reason preferring a low nest), and taking it in its mouth flies (J. O. Harper) or crawls to a nest already known, is established, and hardly requires any further proof. The introducing of that egg into another bird's nest may, very possibly, not be resented at all, and certainly not nearly so much as the abstraction of one of the fosterer's would be, which act of spoliation often leads to a scuffle and even to the death of the foster-bird. Neither are the two acts generally simultaneous, but they are sometimes so according to first-hand evidence. Our Norwich birdstuffers have on two or three occasions taken perfect eggs out of Cuckoos, which indicates some latent power of retaining them in the ovarium,—a power long ago suspected by Montagu.

#### CUCKOOS WATCHING THEIR OWN EGGS.

Professor Newton thinks that when a Cuckoo has deposited her egg in a nest she takes no further interest in it, but there are many instances of Cuckoos being seen hanging about in the immediate vicinity. But most likely their motive is, as a rule, not to watch their own eggs, but to carry off some of the fosterer's, lest the latter should bestow too much attention on hers, and not the Cuckoo's, and this is generally done; yet the Cuckoo is too crafty to take all the fosterer's eggs, whereby it would defeat its own ends by causing the fosterer to forsake. All evidence confirms the Professor's view. The Cuckoo's burglarious intention (defeated in this case) seems pointed to in the following memorandum of Mr. Norgate's:—

"June 1st, 1884.—I saw a Cuckoo, and heard it uttering the bubbling noise, which I believe is peculiar to the hen, in the act of flying. It alighted on a Willow under which I was sitting, and near which I found a Pied Wagtail sitting on its nest in ivy on a wall. This nest contained one Cuckoo's egg, and six Wagtail's eggs, and was so deeply imbedded in ivy that I doubt if the Cuckoo could put its head in far enough to take an egg out of it."

However, in argument that the Cuckoo does not always forget its young one I may bring forward the late J. J. Briggs' evidence to the effect that one day, when walking with his dog, a Cuckoo came flying about him within a hundred yards, agitated and alarmed, and occasionally struck down at the dog as the Lapwing does. The next day he found a young Cuckoo in a Hedge Sparrow's nest, a very short distance from the spot where the old Cuckoo had attracted his attention (Zool. 1849, p. 2603) to draw him away. This finds corroboration in the statement of Dr. J. E. Gray that he had seen a Cuckoo, day after day, visit the spot where its offspring was being reared ('Analyst,' vol. ix. 1839, p. 67), and is attested by two correspondents of 'The Field' (February 17th, 1877 and July 31st, 1897).

#### EGG-EATING CUCKOOS.

In the Spring of 1897 I rose a Cuckoo from a Skylark's nest in which were two eggs, one sound, the other freshly broken and sucked. That the Cuckoo was the culprit I have no manner of doubt, and if her object was merely to remove the egg and not to taste its contents, why was it broken? for surely it would be easier for her to fly away with a sound egg than a broken one. An exactly parallel case is given in 'The Zoologist' for 1897, p. 515; and the Cow Bird, *Molothrus bonariensis*, which is parasitic, like our Cuckoo, eats eggs (Argentine Orn. vol. i. p. 75), so why not our Cuckoo? The idea has been derided by many, but as long ago as the time of Willoughby (1676), we read that "having found the nest of some little bird, she either devours or destroys the eggs she there finds." The Greater Spotted Cuckoo will also eat them ('Ibis,' 1862, p. 358), as shells have been found in its stomach. That Cuckoos are guilty of eating eggs receives what on the face of it is undeniable proof from the narration of Mr. H. L. Wilson, who, in the Spring of 1880, at Powick, near Worcester, actually took the remains of eggs out of a Cuckoo's crop, judged to be Robins and Hedge Sparrows. The circumstances have been briefly given under the initials H. L. W., in 'The Field' of January 28th, 1882, where Mr. Wilson remarks:—"On skinning it [the Cuckoo] I found its crop was full of a mash of egg shells. I carefully examined this mash and succeeded in separating the broken shells (held together by the inside skin) of at least seven eggs, two of

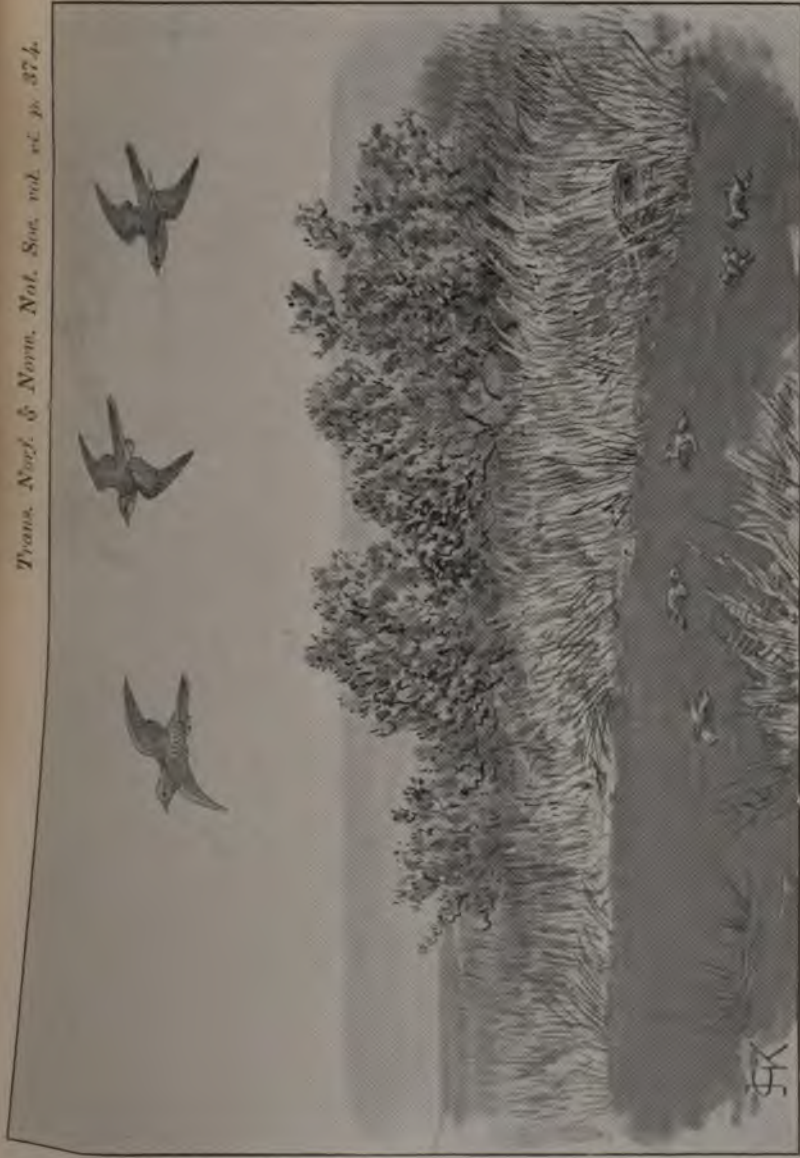
which were Robins, and the rest either Hedge Sparrows or Thrushes, or some bluish eggs."

Mr. P. N. Emerson in writing of the birds of our Norfolk Broads, tells his readers that he has opened Cuckoos, and found in their crops what appeared to be yelk of egg, which is so unmistakable, that one does not see what else there could have been to mislead him. I must confess myself a believer in occasional egg-eating Cuckoos, in spite of the stout denial it has received in high quarters; in confinement they have been even found to eat young birds (Zool. 1896, p. 357). Another strong case of egg-eating where the embryo was nearly ready to be hatched, being perfect in all its parts, is made out in 'Land and Water' of May 30th, 1874, and further evidence is collected in Booth's 'Rough Notes' (vol. i. article "Cuckoo"), and by Mr. Sachse.

#### REMOVING NESTLINGS.

On the 20th of May, 1897, my son and I were in the pursuit of Swallow-tailed Butterflies on Sutton Broad, when three Cuckoos passed me, one behind the other, probably a hen and two cocks. After flying over a small Bog Myrtle or Sweet Gale bush, not more than two feet high and six feet long, standing by itself on the fen, they betook themselves to an adjoining field. In three or four minutes my suspicion was aroused by one Cuckoo returning, which, not heeding me, entered the bush where it remained, but though drawing near very cautiously, I could not see it there, small as it was. When at length the Cuckoo had gone, a minute search revealed nothing, and we were just going away when some ten feet from the bush the marshman nearly trod on a new Yellow Wagtail's nest in the grass. It was empty, but scattered around were five young Wagtails, quite a week old, the farthest one six feet off, the others nearer, no doubt dropped where we now saw them by the Cuckoos. I can only come to the conclusion, that this was a Cuckoo which had a predilection for Yellow Wagtail's nests,\* and as nothing else would suit it, its motive in this instance was by removing the young Wagtails, to incite their bereaved parents to quickly build a new nest, and again lay eggs beside which the crafty Cuckoo might deposit her own. It may be when my binoculars were on the bush was just the time that the Cuckoo happened to

\* Mr. Bird found a Cuckoo's egg in a Yellow Wagtail's nest near Sutton, May 23rd, 1890.



CUCKOOS AND YOUNG WAGTAILS.



22



be searching to see if this had been done. It is true there are Stoats on the marsh, but the dead nestlings showed no marks of teeth. Their relative position, and that of the nest and bush can be best shown by a sketch, and accordingly the accompanying drawing has been made from my recollections of this rural tragedy in bird life by our well-known draughtsman, Mr. Keulemans.

A quarter of a mile further my son found a Reed Bunting's nest, empty, save for one well-fledged young Bunting, dead and bleeding on the edge of the nest. Whether this was Cuckoo's work or Stoat's we could not tell. Bearing on the same subject, another narrative of Cuckoo's destruction may here be appropriately given in the words of the Rev. J. A. Laurence, who, referring to a conversation at a meeting of the Naturalists' Society, about a Robin's nest which contained a Cuckoo's egg, and the unusual number of six Robin's eggs besides, writes under date June 4th, 1889:— "I looked at that Robin's nest on Friday [at Dilham in Norfolk], and all the seven eggs were there. I looked again on Sunday evening, and this was the result: in the nest was a young Cuckoo just born, on the slope of the bank were three young Robins, and three eggs, turned out of the nest. There were two birds in two of the eggs, the third was addled. I replaced two of the young Robins, one of which was certainly alive, and I think both were, in the nest with the young Cuckoo. Next morning, all were gone but the Cuckoo: no trace of the eggs or young Robins was to be found. Now in this case the young Cuckoo can have had nothing to do with turning the other birds and eggs out of the nest as it was itself helpless, and is still."

The above narrative by a careful observer indicates that Cuckoos do take a very active interest, in one sense, in the welfare of their young, unless these Dilham Robins were thrown out by their own parents. On this head there is a good deal to be said (*vide* Montagu's experiment with a Swallow, Orn. Dict. Introduction vi.). For my part, I think it more probable that the Robins were ousted by the old Cuckoo, being chiefly led to this opinion by the narrative of a man, a gardener, who being concealed in a pigsty had a perfect view of what was going on, and saw from his hiding-place an adult Cuckoo take three young Hedge Sparrows, one by one, out of a nest, and fly away with them (Zool. 1889, p. 261). Again, in 'Science Gossip' of May 1st, 1868, will be found an account

of two Hedge Sparrows' eggs and a young Hedge Sparrow being ejected from a Hedge Sparrow's nest in which was a young Cuckoo, on the forenoon of the very day on which that Cuckoo was hatched. Its accomplishment so soon after the Cuckoo was hatched is unusual, and in favour of its being the act of the old Cuckoo, as in three or four hours the Hedge Sparrow could not have conceived much preference for the parasite over her own children one would think.\*

#### NESTLING CUCKOOS.

It is evident that young Cuckoos can thrive and grow big upon anything, for as they have so many foster-parents, it follows they must be nourished on many foods, and those which get the most grow quickest. Many naturalists have marvelled at the amount of food a young Cuckoo can consume, and the fascinated dupes its parents and even other birds are never tired of feeding it. In one, Mr. T. E. Gunn found a piece of cord possibly picked up, but more likely given by the fosterer in mistake for a caterpillar. It is hardly a figure of speech which led one observer to say the little Cuckoo seemed to grow while he watched it, all the more remarkable when we consider the small egg it has come out of, and small wonder if one can eat sixty-five Meadow Brown Butterflies and a hen's egg in a day, and another fifty Caterpillars of *Papilio brassicæ*, and grow fat on the fare; yet they drink nothing. To Aristotle and Pliny the Cuckoo was a puzzle, but Pliny well knew its voracity, and with justice accused it of being a sleek, greedy bird, which monopolised the food intended for its unhappy brethren. Whether a Cuckoo which has been fostered by a Pied Wagtail would, in after life, have exactly

\* I am indebted to Mr. John Paterson, of Glasgow, for a similar experience related by a gentleman in 'The Glasgow Evening Times' of December 12th, 1897. He had found a Titlark's nest with a Cuckoo's egg in it and three Titlark's eggs. On Saturday night, two of the young Titlarks were out of the shell, and another just coming out of the shell, the Cuckoo's egg being then intact. On Sunday morning, at six o'clock, the other Titlark's egg was hatched out, and the Cuckoo's egg split up, and a young Cuckoo in the act of coming out of it. At ten o'clock, the young Cuckoo was alone in the nest, and the three young Titlarks were lying at the root of the whin bush in which the nest was built; he put them back, but on returning to the nest at half past one found them thrown out again. If this nest could only have been watched between the hours of six a.m. and ten a.m., the Cuckoo, or the parent Titlark, would have been convicted.

the same tastes as one reared by a Thrush may well be doubted (*cf.* Gilbert White, letter iv. to Barrington), and there is only one recorded instance of a foster-parent transmitting the intonation of its song to a Cuckoo, however it may transmit its appetite. The song of "Cuck—oo" is always the same, and Colonel Butler tells me the female's bubbling cry is to his ear exactly like the Indian Koel's, but *Eudynamis* is a very aberrant Cuckoo. We have it on the authority of the poets that for 600 years the Cuckoo has told its name to the hills exactly in the strain it does now,—Cuccu, Cuccu,—the noisiest and hence the most noticed of migrants.

Few country sights are more entertaining to any of us, and yet ridiculous, than to see a tiny Titlark standing on the back of a big, uncouth Cuckoo to feed it. The Cuckoo turns back its great head for the expected *larva*, or sometimes a young Cuckoo may be seen to half spread its wings for the clumsier Hedge Sparrow, which uses them as a ladder. Any one seeing a Hedge Sparrow thus feeding a Cuckoo might think with the Fool in 'King Lear,' that it would bite off its head. Long after they have left the nest, Cuckoos keep up infantine manners, vaguely opening and shutting their yellow mouths, impatiently shaking their wings and uttering a querulous cry, always complaining that they are not enough attended to, and if it were not for these artifices they would soon be left to die; it has been said that in confinement a young Cuckoo will never pick up its own food, but I have seen one do so. No matter who its foster-parents are, the lusty toad-like offspring, in many cases a murderer, is their joy and delight, and very soon fills the cradle. From this, if it be a Reed Warbler's nest, it must surely run great risk of ejection in a high wind, though I never knew one thrown out. Although it has originated from such a small egg it receives and requires the food of five birds, and grows so vigorously as to soon outgrow its domicile. If undisturbed, a young Cuckoo remains in, or rather on, its nest, a long time before it is ripe for leaving, and if frightened it will then, the first time of using its wings, have the strength to fly thirty or forty yards. Now capable of supporting itself, it nevertheless prefers to be fed by other birds, perhaps its foster-parents, perhaps others, more or less to the eve of its departure, indolently to us it seems, but in reality only following the dictates of nature.

Two young Cuckoos in one nest is an event very rarely witnessed,

and it has only happened in this county about three times ; on Mousehold Heath (T. E. Gunn, Zool. 1865, p. 9618), at Cringleford, and at Braconash. On one of these occasions I was told they both lived until they were a considerable size, and then one died, instead of being immediately ejected by the other young Cuckoo as might have been anticipated. The two on Mousehold were in a Titlark's nest, and what added very much to the discovery was the circumstance of an addled Cuckoo's egg with the young Cuckoos. There must, therefore, if there was no mistake about it, have been three Cuckoo's eggs at one time in the nest, a portentous prospect indeed for the poor Lark !



The accompanying sketch, by Mrs. Hugh Blackburn, originally published in 1872, shows in an artistic manner the still blind young Cuckoo, standing up to eject a Titlark older than itself, by means of its strong wings and concave back. The resemblance of the wings to a man's hand and arm is very noticeable, and they are evidently of the greatest use in helping the Cuckoo to get underneath the unlucky Titlark, which thus propped up and lodged on the Cuckoo's back, is soon shouldered out of the nest.

## FEEDING ITS OWN YOUNG.

Having now sufficiently discussed eggs, nestlings, and fosterers, there are still a few points about the Cuckoo when it has reached maturity, on which our best authors have dwelt but little,—such are the Cuckoo's anatomy, and its hepatic plumage, and apocryphal pouch, and age. Were a full history of the Cuckoo required there would be many other things, *e.g.*, its food, migrations, and song to consider, about which we need not trouble now, to say nothing of the legends which amount to a mythology of their own. There is still one matter in particular of great significance, the feeding of its own young, which seems really to take place. At the head of this paper are given twelve very important references to histories of the Cuckoo, where nearly all that was known about it up to a few years ago can be learnt, and in particular the feeding of its own young has been asserted and rebutted with no little warmth. The statement of Mr. J. McIntosh that he had distinctly watched an old Cuckoo feeding a young one with caterpillars of *Abraxas grossulariata* ('*Morris' Naturalist*, 1851, p. 11), received with incredulity, because he had made mistakes in *Natural History* elsewhere, was nevertheless curiously confirmatory of what had been previously reported by a naturalist of the British Museum, J. E. Gray (*P.Z.S.*, 1836, p. 104). Both these stories are now further attested by the narrative of Herr A. Müller, of what he personally saw in the German forest of Hohenschied, a narrative which, in this particular, bears the stamp of minute and correct observation ('*Ibis*,' 1889, p. 219, translation). It therefore appears that this departure from the Cuckoo's ordinary habits does take place under very rare circumstances, and we may expect that further verification of it will be obtained in time, special attention being now drawn to the subject by Herr Müller.

## AGE.

Next as regards the age of the bird. Mr. T. Webber tells a singular story of a Cuckoo at Falmouth, a female, brought up by hand, which for three summers returned to the house where it was reared, and allowed itself to be fed and caressed, but

was ultimately killed by a cat ('The Field,' Jan. 23rd, 1888). The German naturalist Johann Naumann recounts how a Cuckoo, undoubtedly a male, with a very peculiar call, returned to the same place, season after season, for twenty-five years. Naumann, who was himself convinced, remarks:—"It would be an almost incredible coincidence if just such another bird with the same soft peculiar cry should have taken possession of the former Cuckoo's old quarters." If a Magpie can live twenty-one years (Zool. 1850, p. 2824), there is nothing improbable in a Cuckoo's living twenty-five, and there are a great many birds which live far longer than that. My father knew of a Cuckoo which returned to the same garden wall, at Easton, for eight years, presumably the same bird, and Booth mentions a pied one two years running at Hickling.

Cuckoos have been often kept in cages, but they are not agreeable pets, and never get through more than two winters, more often only one. The experience of Mr. George Davis of Gloucester, who has brought up no less than forty young Cuckoos, is that they are best fed on meal worms, but when tempted will eat young birds (Zool. 1896, p. 357), a morbid appetite, not indicative of what would happen in their natural surroundings surely.

#### THE SUPPOSED POUCH.

This is hardly the place for a discussion on the anatomy of the Cuckoo, but I cannot refrain from saying something about the supposed pouch. In skinning a Cuckoo it may be noticed that the œsophagus is wide at the orifice, and the skin of the neck sometimes very gelatinous inside, as first pointed out by Thompson which must have given rise to the idea in some people's minds that Cuckoos possess a pouch or internal throat pocket, large enough to carry their eggs in. The small size of the egg, .85 × .75, lends colour to such a theory, but the truth is, the gape is so capacious that no pouch is wanted. Such evidence as there is in the matter is but feeble. The late Mr. G. Swaysland, a well-known Brighton taxidermist, affirmed that he had found, once at least, what amounted to a membranous sac or pocket, and that it was behind the tongue: this seemed explicit, especially as another experimenter, living at Exeter, was also able to speak of an interi-

membrane, with another membrane behind it, the two being united below, with an orifice behind the root of the tongue ('The Field,' January 12th, 1869, and 'Land and Water'), just distinguishable. The bird was examined in a birdstuffer's shop with a knife and a bradawl, but in neither communication does the writer give his name, signing himself "Exoniensis" in 'Land and Water,' and "Quæditor" in 'The Field.' If there be an apparatus, and if it really is deserving the name of a pouch, it would appear to be lower down than that (Kinahan, in 'Birds of Ireland,' vol. iii. p. 42), namely, in the cavity formed by the "merrythought" bone, which is rather long in the Cuckoo but otherwise quite normal. We must remember how emphatically the Great Bustard's sublingual pouch was disbelieved in, until competent investigation established its presence. It may be that the Cuckoo for a short period possesses something analogous, not necessarily as an egg receptacle, but which may be inflated during courtship, and shrivel again, or have to do with its vocal powers, like the tracheal membrane in the male Bittern. It is not always there in June, for a fine male shot on June 2nd, and expressly examined, did not show a trace of it. Macgillivray gives a good plate of the tongue and tapering œsophagus ('British Birds,' vol. iii. plate xi), and but little escaped his acute eye, but he found no "pouch," neither did Herissant or White meet with it.

Any one who has often skinned the Common Cuckoo or the Greater Spotted Cuckoo must have noticed the small size of the sexual organs in the male in Spring, compared with other birds. What this may indicate is a field for speculation; but it is suggestive when taken in connection with its peculiar habits, the abundance of males, and lack of parental affection. In the Greater Spotted Cuckoo there are a number of large hairs underneath, and concealed by the feathers of the body, but whether the same are to be found in the Common Cuckoo I cannot say. They are not indicated in the plates in Nitzsch's 'Pterylography,' so perhaps they do not exist in *C. canorus*.

The hairs which sometimes fill the gizzard of a Cuckoo are, unquestionably, caterpillars' hairs (Tiger Moths, etc.), but they penetrate the coat of the stomach in such a regular way that the

late Mr. Henry Stevenson and others thought the organ naturally had a hairy lining. The matter was set at rest by Mr. Stevenson's sending a Cuckoo's gizzard to Professor Huxley, who decided that they were undoubtedly the hairs of some caterpillar, which, by the action of the gizzard, perforated the lining of the stomach, and somehow became arranged in a zone-like form, wanting root or natural termination. The same arrangement of hairs has been found in the Edolio Cuckoo of South Africa, *Oxylophus serratus* (Sparr), by my late father's correspondent, Mr. Ayres, and in some of the Australian Cuckoos by Gould. Macgillivray figures the stomach twice to show the hairs thrust into its epithelium, but his plate is rather small.

#### PLUMAGE.

The plain plumage of the British Cuckoo would not seem to give much room for variation; but even here this anomalous bird presents a distinct kind of dimorphism when young, for it sometimes has a rufous plumage, and sometimes a very dark plumage. These phases are distinguishable before it leaves the nest, and are still more marked when the Cuckoo is eight or nine weeks old, indeed the extremes of red and brown might be taken for immaturity in two different species. Very early in their life, nine out of ten young Cuckoos begin to show a white occiput, and this white feather sometimes spreads until more than half the crown is white too, amounting in one or two cases to albinism. As in Blackbirds and Ring Ouzels the partial absence of the dark pigment in the feathers shows itself first and most often about the head. We are told that this white spot is rarely, if ever, found in the nearly allied Himalayan Cuckoo (Fauna of B. India, vol. iii. p. 206), and its absence is a good specific character of the Asiatic species I should say. One cannot doubt that it is the rufous, and not the dark nestling Cuckoos, which up to the Spring following their birth, not very infrequently present a bright chestnut-brown colour, accurately compared by Howard Saunders to a rich female Kestrel. They are then called Hepatic Cuckoos, and are more often females than males.

A young Cuckoo obtained at Moscow in September appeared to



be half normal and half hepatic, inasmuch as it had a broad reddish-brown mark over the head and down the back, and two similar reddish marks on the wings. One of the brightest hepatic Cuckoos ever seen was shot in Norfolk fifty-three years ago (*cf.* Gurney, *Zool.* 1846, p. 1315), and the cinnamon colour is hardly faded at all; but another shot in May, 1877, was considered by Mr. Stevenson to be also of an exceptionally vivid red. There must be just a week or two when the new feathers are at their best, and the bird just arrived from Africa's sunny climate has had no time to bleach their brilliancy. Such birds are very beautiful, and are the more appreciated, now that they are protected by the law, by collectors who have already got them. The idea that individual Cuckoos which have acquired the hepatic plumage always retain it is quite inconsistent with what science leads us to expect: as well might we suppose that hepatic Cuckoos are always fostered in some particular kind of nest. None of this variety were met with by my party in Egypt or Algeria, but I saw a good one last year at Vevey in Switzerland, and they are not very uncommon on the Continent according to continental authors, especially Temminck, who met with a great many in Italian markets; and Mr. Meade Waldo saw many on the Ionian Islands exposed for sale dead.

As regards the bird's ordinary plumage, the fourth edition of 'Yarrell' says that there is no outward distinction of sex in Cuckoos, except it be that the female is commonly a little smaller, but she certainly very often shows a rufous tinge on the chest. One shot at Yarmouth, in May, 1882, had this rufous colour so unusually, having perhaps been a late hatched bird the year before, that it extended over the wings, the whole of the nape, and a part of the crown; but its sex was not ascertained. Another got in Egypt on May 10th, 1895, is all in rufous brown plumage, except the lower part of the back, which is slaty blue, but not at all bright. I once skinned a Cuckoo (but not in England) in which the upper side of the wings and most of the back were dull, mealy white, shot on September 20th, and apparently a bird of the year, with the usual white patch on the occiput. The whole subject has been recently treated by Messrs. J. E. Harting and F. Coburn (*Zool.* 1895, pp. 257, 321), the former of whom concludes that

a red or hepatic Cuckoo in England in April, is one which has completed on the Continent its nestling or first year's plumage, but probably it was a reddish bird from the first, or it would not have been hepatic.

#### ALLIED SPECIES.

The nearest allies to our British Cuckoo are the South African *Cuculus gularis* and *C. poliocephalus*, found in Asia and South Africa, and so little do they differ in colour of plumage that neither of them would be recognised if they came to this country; the same may be said of *C. intermedius*, but Colonel Shelley thinks none in Africa but our bird have the true 'Cuckoo' note (B. M. Catalogue, vol. xix. p. 245). My father considered the yellow or yellowish base of the upper mandible in *C. gularis*, the Lineated Cuckoo, the best criterion by which to distinguish it from *C. canorus*. Other more or less allied species may be seen in the Foreign Bird Gallery at Norwich Museum, and a well-mounted skeleton in the British Room there, but we still want a group case showing the process of ejection, or the young Cuckoo being fed by the fosterer.

---

## VI.

## EXHIBITION OF A NORFOLK BUSTARD.

BY THOMAS SOUTHWELL, F.Z.S., V.-P.

*Read 25th May, 1897.*

THE remarkably fine example of the old race of Norfolk bred Bustards which I now exhibit is at present unrecorded, and has only recently come into my possession. Its history is briefly as follows:—

In February last, Professor Newton was informed by Mr. Osbert Salvin that he had heard, through his sister, Miss E. Salvin, who resides at Bournemouth, that a Norfolk Bustard was to be sold at the auction of her friend the late Miss Glasse, a near neighbour, recently deceased. Miss Glasse had told Miss Salvin that her father shot the bird many years ago, when he was living in Norfolk, and Mr. Salvin wished to know whether he should make any further inquiries about it. This led to a correspondence in which Miss Salvin informed Professor Newton that the bird had, at the date of her letter (February 24th, 1897), already been sold at the auction for 26s., but she did not know the purchaser's name; she however mentioned the name of the auctioneer, and added, "Miss Glasse used to tell us that it was shot by her father when they were living in Norfolk;" but she could get no information from her as to "where or when it was shot." At this stage, Professor Newton kindly informed me of the facts expressing a hope that there might be a chance of the specimen returning to its native county, and the result of my further inquiries I give below; but must first mention that Miss Salvin subsequently stated Miss Glasse's old coachman, a Norfolk man, told her "he often heard his master say that he shot the Bustard on Swaffham Heath," before he was in Mr. Glasse's service. In the meantime I had heard of the Bustard through the broker who purchased it,

and obtained the offer of it. I had also written to the coachman, Robert Bear, who replied as follows :—

“March 19th, 1897—“Mr. Glasse told me he shot it [the bird in question] on Swaffham Heath, and by the time he told me I should think it is about sixty years ago. I did not live with him at the time, but he told me while I did live with him.”

Miss Salvin corroborates this, and adds that Mr. Glasse was living at Raynham when he told Bear of the circumstance, and the latter was “*quite* positive that Mr. Glasse shot the Bustard on Swaffham Heath,” also that “He was a young man when he shot it.” Mr. W. B. Glasse was eighty-four years of age when he died in 1890 ; assuming therefore that he was twenty-five years of age at the time of the occurrence, this would fix the event at about the year 1830, a by no means improbable date. Mr. Glasse was an eminent Chancery Barrister, a Q.C., and for many years occupied Vere Lodge, Raynham, near Fakenham, as a shooting box. He lived, after his retirement, at Chittle, near Blandford, for some twelve years, and died there in 1890. After her father’s death Miss Glasse took up her residence at Bournemouth, where she died as above stated.

This superb old bird is even larger than the old male killed in the year 1818, at Beechamwell, in our Museum collection, and if the estimated date of its death be correct, it would probably be the last male of the Swaffham drove ; and it is not unlikely that the selection of the males for destruction, they being the finer birds, was the cause of the rapid extinction of these birds here, none but females having been left for some years previous to 1838, when the Dersingham and Lexham birds, believed to have been the last of their race were killed. These widowed females dropped eggs, of course infertile, in a purposeless way, which were found on the land.

NOTE.—This interesting specimen is now in the fine collection of Mr. E. M. Connop, at Rollesby Hall.

## VII.

## THE ST. HELEN'S SWAN-PIT. .

BY THOMAS SOUTHWELL, F.Z.S., V.-P.

*Read 30th November, 1897.*

At our meeting on the 29th September, 1891, I contributed a short paper on the above ancient and unique institution, in which I stated, that, although doubtless of considerable antiquity, the only direct evidence of such being the case, which I could obtain, was "an entry discovered by Mr. Simpson, the late Governor, in the books of the Hospital [to which it is attached], of a minute to the effect that about May, 1793, the late Mr. Thomas Ivory constructed a *new Swan-yard*, and made other improvements on the premises . . . this entry, therefore, not only marks the date of the present Swan-pit, but establishes the existence of a previous one, near the same spot, probably of monastic origin." The ancient account rolls of the St. Helen's Hospital having been recently transferred to the Muniment Room of the Corporation, where Mr. J. C. Tingey has undertaken their arrangement, I asked him should he discover any early entries with regard to the Swan-pit to be so good as to extract them for me; the result has been that he has most kindly furnished me with the interesting entries from the Hospital Accounts here appended, which carry back the history of the "Cignorum" another three hundred years.

The entries, save the last two, are in Latin; I therefore give the original, and have appended Mr. Tingey's translation.

It will be observed that the customary allowance to the custodian was 3s. 4d. per annum, a sum equal to about eight times that amount in the present money; whether the "delivery" of five Cygnets in the year 1500 was to the cook, as is now generally the case, or to augment the breeding stock at home, or elsewhere, is uncertain; but in 1506 the Hospital, undoubtedly, introduced some

new blood, probably to their stock upon the river, by the purchase of a couple of old Swans and the swanherd marked them with the mark, "anciently determined for marking the Swans belonging to the same Hospital." The mark now in use consists of a chevron, the point of which is directed towards the anterior portion of the mandible.

The last entry but one in 1589 seems to indicate that the old Swan-pit, like the present one, received its water supply direct from the river, as 10s. were paid for "dammyng and fyeng the cryck" through which it doubtless then as now flowed and ebbed.

### ACCOUNT ROLLS OF ST. GILES HOSPITAL.

1487—8.

2 & 3 H. VII.

#### EXPENSÆ MINUTÆ

IIIs IIIId Solutis Willelmo Bylney pro custodia Cignorum Hospitalis sancti Egidii in Norwico ex contractacione pro toto hoc anno

[SMALL EXPENSES.

3s. 4d. Paid to William Bylney for keeping the swans of St. Giles' Hospital in Norwich by contract for this whole year.]

1489—90

4 & 5 H. VII

#### EXPENSÆ MINUTÆ

(Et) solutis Johanni Kerre pro custodia Cignorum hospitalis sancti Egidii in Norwico ex contractacione pro toto hoc anno—  
IIIs IIIId

[SMALL EXPENSES

(And) paid to John Kerre for keeping the swans of St. Giles' Hospital in Norwich by contract for this whole year 3s. 4d.]

1500—1

15 & 16 H. VII

#### MINUTÆ EXPENSÆ

(Et) in denariis solutis Johanni Karre pro Custodia Cignorum hospitalis predicti & deliberacione V cignet per tempus predictum—  
IIIs. IIIId.

[SMALL EXPENSES.

(And) in pence paid to John Karre for keeping the swans of the said hospital, and for delivering 5 cygnets during the aforesaid time (one year) 3s. 4d.]

1506—7 . . . . . 21 &amp; 22 H. VII

CUSTUS MINUTÆ (*sic*) CUM EMPTIONE CIGNORUM

(Et computat) solutis Johanni Ker Swanhierde pro uno le Couple veterum Cignorum vocatorum Eyrers ad signandum cum Signo Hospitalis de antiquo ordinato pro signacione Cignorum eidem Hospitali pertinentium hoc anno emptorum ad incrementum Cignorum suorum IIIs. De aliis presentem Titulum tangentibuz nihil hoc anno

[SMALL CHARGES WITH THE PURCHASE OF SWANS

(And he accounts) paid to John Ker Swanherd for marking with the Hospital mark, anciently determined for marking the Swans belonging to the same Hospital, a couple of old Swans called Eyrers bought this year for increasing his swans. 3s. For other matters touching the present heading, nothing this year.]

1507—8 . . . . . 22 &amp; 23 H. VII.

## CUSTUS MINUTÆ CUM EMPTIONE CIGNORUM

Nullæ hoc anno

[SMALL CHARGES WITH THE PURCHASE OF SWANS.

None this year.]

PAYMENTS. . . . . 1589—90

## THE HOSPITAL

Item to Anthonye Ponyott and Andrew Thyrtle eyther of them V dayes ended the 25 of October 1589 in dammyng and fyeng the cryck next the Swanyard—Xs.

Item to Anthonye Ponyott II dayes endyd the xxiii<sup>th</sup> of June last in pyling and casting the Swanne pond at thospitall—IIs.

## VIII.

SOME ADDITIONS TO  
THE NORWICH CASTLE-MUSEUM IN 1897.

BY THOMAS SOUTHWELL, F.Z.S., V.-P.

*Read 29th March, 1898.*

THE main purpose of these annual notices of the Norwich Castle-Museum is to chronicle the progress of the Natural History Collections; but it is pleasing to note in the Report of the Committee for 1897, just issued, the evident desire of the body of management to popularise and render as useful as possible the excellent institution of which they have the control. Considerable advance has been made during the past year in arranging the collections, especially those devoted to Ethnology, and the systematic arrangement of the collection of British Birds, which, owing to the hasty removal and pressure of other work on the altogether inadequate staff under the direction of the Curator, was not all that could be wished, is now making good progress, whilst by the addition of sketch maps, coloured, to show the distribution of the genera and species, and some beautiful drawings by Keulemans (the gift of Mr. Gurney), illustrating the structure and classification of the Birds of Prey, that important section of the Museum is rendered much more instructive. The Museum is also indebted to Mr. Gurney for a plaster cast of the fossil remains of the Archæopterix, and a drawing showing the restoration of the same, which it is to be hoped is only a commencement of a series of representatives of fossil and extinct forms of animals, so indispensable to a proper study of their existing representatives.

In general Ornithology, Mr. Gurney has given us a specimen of Sabine's Gull, killed at Aberystwyth in 1896, and Mr. Robert Gurney an Icterine Warbler, shot at Cley-next-the-Sea, in September, 1896. Some beautiful specimens of Skua Gulls,



including a so-called Common Skua, killed at Lowestoft, have been given by Mr. Geoffrey Fowell Buxton, making our series of mounted Skuas very complete as to age and sex, and the remarkable phases of plumage conspicuous in the birds of this genus. Mr. Connop has also given a male Gadwall, which was required to complete the case of a pair of these birds with nest and eggs, to illustrate its breeding in the County of Norfolk. A few eggs have been added to the collection, the most noteworthy of which are two eggs of the New Zealand Laughing Owl, a species well represented in our collection, but which there is little doubt will soon become extinct; its eggs, therefore, for which we have to thank Mr. Gurney, are a very valuable acquisition.

With regard to the additions to the collection of Raptorial Birds, Mr. Gurney has kindly furnished me with the following notes:—

“With the increasing difficulty of getting new species, it cannot be expected that every year the Raptorial collection will be enriched by novelties; but 1897 has not passed without five good Hawks and three Owls falling in our way, which shall here be enumerated. A well-mounted *Gennaia gurneyi*, presented by Professor Menzbier, shot February 6th, 1897, is evidently adult from the purity of its chest, and whiteness of head; and has been placed by Mr. Reeve in the first corridor, next to *G. saker* and *G. hendersoni*, with the latter of which Mr. Dresser seeks to unite it (‘Birds of Europe,’ *sup.* part vi.). It has by no means the rufous back that *G. hendersoni* (*milvipes*) has, nor does it resemble it in its barring on the back, and I cannot think it is the same (*cf.* Orn. d. Turkestan, part iii.).

“An adult female of *Urospizias (Astur) sylvestris* (Wallace), from the low country in Flores Island which is south of the Celebes, sent by Mr. Everett, through Mr. E. Gerrard of London, is ticketed ‘irides deep red, bill jet black, cere deep pure chrome, the basal half of bill and eyelids lighter chrome yellow, legs dull wax yellow.’ It agrees well with a pair in the Museum collected many years ago by Mr. A. R. Wallace, except that in Wallace’s the eyes are marked as having been orange. My father’s remarks on *U. sylvestris*, and its ally *U. torquatus*, will be found in the ‘Ibis’ for 1881, p. 266, by any one who may desire to consult them.

“A very good summer pair of *Tinnunculus peninsularis* (Mearns), showing the larger size of the female, procured by Mr. J. F. Abbott, collector to Mr. W. Price, at Sierra Laqura, in Lower California.

Mr. Mearns in describing it ('The Auk,' 1892, p. 267) speaks of 'the dwarfed size of this sub-species' of Kestrel, which in my 'Catalogue' I have placed next to *T. australis*, Rid.

"A female of the little Mexican Owl, *Micropallas graysoni*, Ridg., Nov. 15th, 1895; and a *Glaucidium hoskinsii*, Brewst., taken at a height of 8200 feet at San Pedro, neither of them with any collector's name, but received through Mr. C. K. Worthen, the Natural History agent, and with original tickets, add two more to our list of American sub-species of Owls.

"An adult male Burrowing Owl (*Pholeoptynx (Speotyto) rostrata*) (Townsend) from Clarion Island, Lower California, where it was discovered by the U. S. Scientific Expedition "Albatross," in 1889, is labelled May 25th, 1897, No. 1307, and is acceptable as an insular sub-species, which will stand or fall according to the determination of future naturalists, the more advanced of whom break up *Pholeoptynx cucicularia* into ten geographical sub-species, instead of two as was the case in 1875.

"*Ninox ocellata*, H. & J. (of which we had only one before which came from Sir J. Grey), obtained on Savu Island, between Flores and Timur, in August 1896, by Mr. Everett, is probably a rare bird which may not turn up again for some time. From the same successful collector, whose discoveries do him so much credit, we have a male *Scops albiventris*, Sharpe, shot on the island of Lombok in the Java Sea. It is figured on plate viii. of vol. ii., B. M. Cat. of Striges, and was by mistake omitted from my catalogue, its claims being now also better understood.

"Two eggs of the New Zealand Laughing Owl, *Sceloglaux albifacies*, obtained through Mr. F. Stalchsmith, agree with the cut in the 'Transactions' (vol. vi. p. 158), and are probably to be relied on as genuine, and may one day (if *Sceloglaux* becomes extinct) be looked upon as among our greatest rarities."

One fish which has been added to the collection during the past year is worthy of note from the circumstances connected with its origin. It is many years since the Salmon frequented the river Yare, such few as have at long intervals been met with have evidently been carried up the river by floods, and have been found much out of condition in altogether unnatural localities; but the specimen in question was seen by Mr. G. F. Buxton in the river Tas, above Stoke Holy Cross Mill, and captured by him with a fly

in May, 1897. Specimens of the Sandy Ray and Starry Ray have been contributed by Mr. A. Patterson, gleaned by him from the Yarmouth fishing-boats.

I may conclude by mentioning a charming example of the art of illustrating Natural History in wood, in the form of a beautiful carved panel in high relief, representing a pair of Bullfinches, with nest, young ones and surroundings; the work of Mr. James Minns of this city, which was considered worthy of a place in the last exhibition of the Royal Academy, and which was presented by Mr. Herbert A. Day.

---

IX.

METEOROLOGICAL NOTES, 1897.

(From observations taken at Bradestone House, Brundall, Norfolk.)

BY ARTHUR W. PRESTON, F. R. MET. SOC.

*Read 22nd February, 1898.*

JANUARY.

THIS was a coarse, wintery month, with much snow during the second half. Whilst the days were uniformly cold, on no night did the thermometer fall below 22 degrees, giving a range of temperature for the month of only 23 degrees, which is a smaller range than in any January since 1852. The mean temperature of the month was about 3 degrees below the average. The rough gales and drifting snows of the 22nd and 23rd were the most severe experienced for many years, and in some parts of the county the drifts were greater than since the memorable snowstorm of 18th January, 1881.

## FEBRUARY.

The early part of the month was exceedingly wet, and as the downpour was accompanied by the melting of the January snow-drifts, somewhat serious floods were the consequence, the low lying districts being inundated to a greater extent than for some time past. Nearly the whole month's average rainfall fell during the first week, and the sun hardly shone at all until the 17th. From this date an improvement followed, and some days were singularly warm and summer-like. On the 22nd the day temperature rose to 55.2 degrees, on the 23rd to 56.2 degrees, and on the 26th to 57.8 degrees. The warmth of the nights, also, at this time was remarkable; the lowest reading on the night of the 19th being 46.4 degrees, and on the 25th 47.2 degrees, these minima being more in character with June or July than February. The result of this forcing temperature was to bring the Crocuses and earlier Spring flowers quickly into bloom. The mean temperature of the month (41.3 degrees) was about 3 degrees higher than the average for February.

## MARCH.

This was the fifth warm March in succession, and was about 4 degrees warmer than the average. It entered with boisterous weather, and on the 3rd, with the barometer down to 28.67 in., a gale occurred, although of considerable less violence than was developed further South, where almost as much damage was done as we recorded here in 1895. The rainfall was above the average, but less than in the previous March, and much less than was experienced in other parts of England, particularly in the South. A notable feature of the month was the warmth of the nights between the 17th and 28th, thereby causing a rapid start of vegetation. During this period the thermometer did not once fall below 40.8 degrees, and on some nights the minimum was as high as 47 degrees.

## APRIL.

The month entered with cold, bleak weather. On several mornings there were some rather sharp frosts, and snow fell on the 1st, 2nd, and 5th. There was but little warm weather until the last week, when the temperature rose considerably. The month's

mean was about 1 degree below the average, the warmth of the end of the month somewhat counteracting the cold of the earlier days. As in the seven preceding months, the rainfall was above the average, the total for the first four months of the year being greater than in any year since 1883.

#### MAY.

This was a cold dry month, the mean temperature being about 2 degrees below the average, and the rainfall exactly half the mean. The second week was particularly cold, snow falling on the 12th, and hail on the 11th, 12th, and 13th. The period from the 12th to the 25th was absolutely rainless, and was accompanied by continuous north-easterly winds. The last few days of the month were very warm, with a highly electrical atmosphere. Thunder occurred on the 25th and 30th, and on the evening of the latter date the storms were very severe in some localities, accompanied by heavy rains.

#### JUNE.

The month entered with fine and very warm weather, but on the 4th a northerly current set in with much cloud and a great reduction of temperature. The 7th and 8th were exceedingly wet and cold for the season, the maximum temperature on the 8th (50.6 degrees) being the lowest registered in June for eleven years. The weather improved on the 10th, and considerable heat occurred for a few days, followed by cooler days, with heavy rains in the third week. A gale of unusual violence for June was recorded on the night of the 18th, but was followed by a period of great heat (maximum 80 degrees on 23rd, 83 degrees on 24th, and 80 degrees on 30th), accompanied by a highly electrical state of the atmosphere. Thunderstorms occurred on the 18th, 24th, and 27th, that on the 24th being of great severity, particularly to the north of Norwich, and at Hellesdon loss of life unhappily resulted. The mean temperature of the month was nearly 3 degrees above the average, and the rainfall was also slightly in excess.

#### JULY.

The main feature of this month was its great dryness. The average rainfall for July is about 2.89 in., and in 1886, 1888, 1889, 1890, 1891, and 1894, it exceeded 4 in., but the total recorded

here in July 1897, was but 0.67 in., the least recorded in this month since 1885'. The mean temperature was slightly in excess of the average, and on the 24th it rose to 85 degrees. Thunder occurred on the 20th, 21st, and 25th, and thunderstorms on the afternoons of the 26th and 27th.

#### AUGUST.

This was a warmer, but less settled month than July, and the heat during the first week was very excessive. On each day from the 2nd to the 19th inclusive, the thermometer exceeded 70 degrees, as well as on six other days. The mean temperature of the month (63.4 degrees) was upwards of 3 degrees above the average, and was within half a degree of the hot August of 1893, and it was, with that exception, the warmest summer month since July, 1887. Thunder occurred on eight days, and lightning was seen on one other day. In consequence of these frequent electrical disturbances the weather kept very unsettled, and the rainfall was very unequally distributed. Whilst in some parts of the county almost more rain fell than was wanted, at Brundall the falls, although comparatively frequent, were generally very small, the total being only 1.27 in. ; at Norwich Cemetery, only seven miles distant, the total was 2.15 in.

#### SEPTEMBER.

The month entered with very unsettled weather, and on the 2nd a gale of considerable force blew from the S.W., and an electrical condition prevailed subsequently for some days, with heavy hail showers, accompanied on the 4th and 6th by thunder and lightning. A period of dry weather, with cloud and mist, ensued for some days, but heavy rains occurred from the 17th to 20th, the fall on the 18th (0.92 in.) being the heaviest registered in the twenty-four hours ending 9 a.m. since August, 1895. The third week was very fine, warm and pleasant, with hardly any rain ; but on the evening of the 29th, after a close, oppressive day, a thunderstorm of considerable violence burst over the county, and lasted for several hours, the greatest intensity being developed in the West. A general downpour of rain accompanied and followed the storm, amounting at Brundall to 0.78 in. The total rainfall of the month (3.94 in.) was 1.28 in. in excess of the average.

## OCTOBER.

This was the finest October for many years, for although sometimes it has been drier, and sometimes warmer, rarely has such a delightful prolongation of summer sunshine and warm dry days been recorded. It was the driest October since 1879, but 1886 and 1893 gave a higher mean temperature and some warmer days. The last six days, although very fine, gave 0.01 in. of moisture each morning deposited by wet fogs. The total rainfall of the month was 0.94 in. against an average of 3.05 in., and, looking back over old records in the South-east of England to the commencement of the present century, it appears that October has been drier on only six occasions, namely, in 1803, 1830, 1834, 1861, 1866, and 1879. Except for a slight frost in exposed situations on the morning of the 7th, there was nothing to cut off the more tender flowers, which continued in full bloom to the end of the month.

## NOVEMBER.

To the 27th this was an unusually dry and pleasant month for so late in the season. Although there was a considerable prevalence of cloud and dense fogs at times the barometer remained, as in October, at a very high level with little variation, and the rainfall was trifling. Temperature was high, and on many days very high, the maximum reading for the 14th being 60.2 degrees, and the weather on that day was of the most summer-like description. A great and sudden change occurred on the 27th. The barometer, which at 9 a.m. on the 26th stood at the great height of 30.50 in., had fallen to 30.01 in. at the same hour on the 27th, and fell rapidly during the last-named day, accompanied by an almost continuous downpour of rain, constituting the first wholly rainy day since the middle of September. A rise of the barometer in the evening hardly prepared the way for the great atmospheric disturbance of the two following days. By 9 a.m. on the 28th the barometer had fallen to 29.61 in., and after falling with great rapidity all day, by 9 p.m. stood at 29.02 in. This fall was accompanied by rain, hail, and a violent gale from the S.W. veering to N.W., increasing in intensity during the ensuing night. The greatest violence appeared to be between 7 and 9 a.m. on the 29th, during which time some of the gusts were terrific, inflicting much damage in all directions, and it was not until late in the afternoon

that the wind may be said to have ceased to blow at gale force. It is, happily, but rarely that we experience, in these parts, a gale of such intensity, and, following so soon after the hurricane of 24th March, 1895, and the strong gale of 3rd March, 1897, a comparison may not here be out of place. The 1895 gale, it will be readily recollected, was by far the most violent of the three, but was of much shorter duration, lasting not more than about three hours. Force 11, or about 70 to 80 miles an hour was attained at the height of the gale, whereas, the nearest self-recording anemometer, that on the Sailors' Home at Great Yarmouth, only attained force 9, or about 60 miles an hour during the height of the recent disturbance. In 1895 the chief damage was caused by the uprooting of a vast number of trees; the destruction caused by the recent gale, although serious inland, was chiefly confined to our coasts, where the high tide caused by it wrought almost unprecedented destruction. The March gale of the present year was chiefly felt in the more southern parts of England, where the damage to trees was almost as great as with us in the storm of 1895 which did not extend, with any unusual force, to our southern coasts. Like the 1895 storm the recent gale was accompanied by electric disturbances, lightning being seen on the evenings of the 28th and 29th, and in some places thunderstorms of some severity were experienced. The total rainfall of November was nearly the same as last year, and was 1.25 in. below the average. There was but little frost, and many garden flowers remained in bloom a month later than usual.

#### DECEMBER.

This was, for the fifth year in succession, a mild December, exhibiting but few winter traits. Stormy weather prevailed during the first fortnight, but on the 17th there was a considerable rise of the barometer which continued over Christmas, with some keen frosts and pleasant days, though some of the evening fogs were unusually dense. The minima registered on the mornings of the 23rd (21.2 and 21.8 degrees respectively) were slightly lower than during either of the two previous winters. The weather on Christmas Day was bright, frosty, and seasonable, in fact, a more typical day could hardly be desired. Very mild weather followed, with rough winds and some rain, a heavy gale on the 29th—30th



being of an unusually prolonged character. The rainfall of the month was 0.52 in. below the average, and the mean temperature was about  $2\frac{1}{2}$  in. in excess. The number of days on which rain fell was 17, against 26 the previous December, but with the exception of a few snowflakes on the 2nd, the month may be said to have been a snowless one.

#### THE SEASONS.

The following Tables show the mean temperature and rainfall for the four seasons, together with those of the five previous years, and of a twenty-year approximate average. Winter comprises the three months December to February inclusive; Spring, March to May; Summer, June to August; and Autumn, September to November.

TEMPERATURE.								
Seasons.	1892.	1893.	1894.	1895.	1896.	1897.	20-year average.	Departure of 1897 from average.
Winter ...	degrees. 37.0	degrees. 36.5	degrees. 39.2	degrees. 34.7	degrees. 39.6	degrees. 38.3	degrees. 37.8	degrees. + 0.5
Spring ...	44.9	49.1	47.7	47.6	48.0	46.9	46.2	+ 0.7
Summer ...	58.3	61.2	59.3	60.4	61.1	61.9	60.2	+ 1.7
Autumn ...	48.8	50.0	50.1	51.4	48.5	50.3	49.5	+ 0.8
Year ...	46.9	49.6	49.2	48.4	49.3	49.5	48.4	+ 1.1

RAINFALL.								
Seasons.	1892.	1893.	1894.	1895.	1896.	1897.	20-year average.	Departure of 1897 from average.
Winter ...	in. 6.36	in. 5.80	in. 4.81	in. 7.35	in. 3.28	in. 7.86	in. 6.02	in. + 1.84
Spring ...	5.10	1.61	5.62	4.15	5.18	5.05	5.21	— 0.16
Summer ...	10.20	5.37	8.74	7.51	4.88	4.17	7.17	— 3.00
Autumn ...	11.15	6.10	7.12	7.13	8.49	6.42	8.50	— 2.08
Year ...	31.05	19.66	27.32	24.91	23.28	22.07	26.90	— 4.83

The above Tables show that all the seasons were slightly above their average temperature, especially the Summer, which was the warmest of the series. Rainfall was above the average in the Winter months, the excess being greater than in any of the above years. There was a trifling deficiency in the Spring quarter, and a considerable deficiency in the Summer and Autumn, that of the Summer amounting to as much as three inches.

## THE YEAR.

To sum up, the year may be described as being, on the whole, an exceedingly fine one. Although the snowdrifts in January were greater than for many years past, and were attended with considerable flooding at the thaw in the following month, the frosts during the winter were very slight, and the warmth in the latter part of February was almost phenomenal. Much warm weather ensued until April, when an exceedingly early development of vegetable life received an abrupt check, and the rough North-easterly winds which prevailed for some weeks had, in some localities, a disastrous effect upon the apple crop. The earlier months were somewhat wetter than usual, but May was exceedingly dry, as were also July and August, when, combined with excessive heat, field and garden suffered severely for the third season in succession. Notwithstanding that September was rather rainy, October and November were abnormally dry, although the reverse might have been expected after a summer with so small a rainfall. Much fine weather prevailed during this period, thereby prolonging the summer to an unusual extent, and, but for the density of some of the morning and evening fogs, it was difficult to realise that the approach of Christmas was so near at hand. There was hardly any frost till December 23rd, when four rather sharp nights were again succeeded by mildness. The gale and high tide of November 29th were one of the most notable features of the year, but not less so was the deficiency of the total rainfall, which, with that of the two previous years amounted to 10.44 in., a deficiency which will, no doubt, in due course be fully made up to us.

N.B.—It may be mentioned that this Station has been made a Climatological Station of the Royal Meteorological Society, as from 1st January, 1897, and was visited by the Society's Inspector in September, 1897.

1897.

MONTH.	BAROMETER.					THERMOMETER.					HYGRO-METER. Relative Humidity, 9 a.m.	CLOUD. Estimated proportion	RAINFALL.		WIND.								
	Highest.	Date.	Lowest.	Date.	Mean.	Highest.	Date.	Lowest.	Date.	Mean.			Inches.	No. of days.	N	NE	E	SE	S	SW	W	WNW	Mean est. wind force.
JAN.	30.58	2	29.33	30	29.891	45.0	1	22.0	26	34.7	94	7.5	2.44	26	1	4	8	5	3	0	3	7	2.9
FEB.	30.63	16	29.21	2	30.082	57.8	26	27.4	3	41.4	89	7.8	2.17	18	2	1	4	0	4	9	4	4	3.0
MARCH	30.14	8	28.67	3	29.658	62.9	21	27.8	13	45.0	80	6.6	2.33	17	2	0	1	4	5	8	9	2	4.5
APRIL	30.26	10	29.07	1	29.878	67.8	27	27.0	9	45.3	78	7.4	1.81	17	2	6	3	6	3	5	3	2	3.6
MAY	30.47	15	29.41	28	29.965	74.0	30	34.6	11	50.5	77	5.8	0.91	14	4	7	0	2	2	5	3	8	3.8
JUNE	30.33	12	29.46	18	30.021	83.0	24	43.4	19	60.3	80	6.5	2.23	14	3	1	5	3	5	3	7	3.0	
JULY	30.42	11	29.63	20	30.020	85.0	24	42.1	8	62.0	78	5.1	0.67	7	9	4	5	0	1	5	5	2	2.7
AUG.	30.25	3	29.51	21	29.831	84.0	4	46.0	26	63.4	85	5.3	1.27	15	2	1	2	2	4	8	4	3.3	
SEPT.	30.50	13	29.43	2	29.984	69.0	2	39.0	4	55.0	83	6.7	3.94	16	3	7	0	2	0	6	6	6	2.9
OCT.	30.61	21	29.54	15	30.187	66.6	17	32.4	7	50.6	83	5.0	0.94	15	0	2	4	4	7	6	2	6	2.1
NOV.	30.72	21	29.02	28	30.177	60.2	14	29.6	26	45.2	90	8.1	1.54	16	0	4	6	3	1	8	5	3	2.5
DEC.	30.69	22	28.96	10	29.946	54.2	17	21.2	23	39.9	87	6.8	1.82	17	1	1	4	2	1	6	5	1	3.2
MEANS					29.970					49.4	83.6	6.5											3.1
EXTREMES & TOTALS	30.72	Nov. 21st	28.67	Mar. 3rd		85.0	July 24th	21.2	Dec. 29th				22.07	192	29.38	42.33	44	71.56	52				

## X.

## NOTES ON THE HERRING FISHERY OF 1897.

BY G. H. HARRIS.

*Read 29th March, 1898.*

IN the year 1896 the Herring Fishery in the ports of Yarmouth and Lowestoft had to lament large catches with low prices; there was an abundance both of fish and fine weather, which kept the market, more or less, "glutted." There had been no scarcity during the earlier part of the year, nor was there any unusual demand during the Autumn months, with the result that the worst effect of a "glut" in forcing the price of Herring down below profit-bearing value was felt in all its severity. The year 1897 has also been remarkable for large catches, and, if we except a heavy gale at the end of November, the weather was propitious for the following of the industry. "Gluts" were again, therefore, frequent. And not only were they frequent, but they were enormous, in so far that the catch of 1897 exceeding that of 1896 by 9094 lasts, or by 33 per cent., comes within a trifle of a few hundred lasts of being a record catch. But this result was, as we shall see in the sequel, due not so much to phenomenal shoals of Herring, as it was to an increase in the number of boats fishing from the two ports. And the Autumn fishing has to take all the credit; for the Spring and Midsummer fishings had fallen short by 1288 lasts of the catch of the previous year. This early deficiency is noteworthy as it points the reason why, while the prices of 1896 were not able to stand against the glut of that year, the prices of 1897 did stand.

There was, in fact, a great deficiency of Herring, not only in the comparatively unimportant Spring and Summer fishings of these two East Coast ports, but also in the great North Sea fishing which precedes that of the East Coast. So the Autumn fishing started with a call for fish which was of good omen. But the fish did not come till the second week in October, when some remarkable catches were made. And here it may be more curious than useful to note that old fishermen, remembering that Mackerel had been unusually plentiful during the Summer, shook their heads over the prospect of the Herring fishing, saying that a plenty of Mackerel had always meant a scant of Herring, and that, in their opinion, the fishing would be a poor one—a prediction which, as October wore on, proved a false one; although in these months when supplies were so exceptionally short it did meet with some justification.

The enormous catch landed on the Yarmouth and Lowestoft wharves would have congested business, but for the shortness of the Scotch East Coast catch, which was the salvation of the markets. Prices, although fluctuating, ruled in favour of the catcher. In the height of the season fish caught by Scotch boats fell to £5 10s. and £4 per last, but during the bad weather at the end of November prices ran up to £28 15s. per last. Salt Herring averaged £8 10s.; Scotch, fresh, £6 10s.; Yarmouth, fresh, £10 per last. Besides the deficiency spoken of above, another circumstance affecting prices favourably was the absence of Norwegian Herring from the market. Two notable changes, or developments may be recorded, the one, a change in the class of buyers; the other, a change in the demand.

1897 saw great numbers of foreign buyers in the markets, Germans and Dutchmen, and it also saw a striking rise in the demand for Pickled Herring—Herring which are gutted, placed in brine, packed in barrels and exported. These are eaten simply as Pickled Herring, in their raw state, or the brine having been washed out of them, they may be turned, on arrival at their destination, into "reds." 80,000 barrels of Pickled were asked for by Germany, and sent out by Yarmouth curers alone, and Belgium and Holland were also active buyers in both the Yarmouth and the Lowestoft markets. The extension of the pickling business was much apparent to the eye on the Yarmouth South Denes, where a large area was occupied by men and women employed in packing the millions of fish into the thousands of barrels. Fortunately the Autumn was free from wind or rain: bad weather would have seriously hindered the work, as there was no convenience in the shape of shelter to meet so large a demand of a kind so unexpected. An analysis of the catch, landed on the Yarmouth Wharf, shows a gross total of 23,013 lasts landed by Yarmouth, Lowestoft, and Scotch boats, which at 13,200 fish per last, gives three hundred and three million, seven hundred and seventy-one thousand, six hundred Herrings. At the Lowestoft Wharf, 13,523 lasts were landed, or one hundred and seventy-eight million, five hundred and three thousand, six hundred Herring—being nearly five hundred million Herring in all. The land of fish on the Yarmouth Wharf exceeded that of last year by 3762 lasts, or by 21 per cent; that on the Lowestoft Wharf by 5332 lasts, or by 62 per cent.

The number of Yarmouth, Scotch, and Lowestoft boats fishing from both ports was 856, or 326 from Yarmouth, giving an increase

of 52 on the number of last year, an increase due almost wholly to the Scotch boats, which arrived in great numbers to repair the deficiency of the earlier fishing, and 530 from Lowestoft, giving an increase of 274 boats, made up of 215 Lowestoft and 59 Scotch. It will be noticed that there is a rapid growth of the Herring fishing in Lowestoft, whereas the growth in Yarmouth is not so noticeable; a fact to be accounted for partly by the great convenience of the Lowestoft Dock accommodation, which offers a "restful" and safe place in which boats may lie when they are in port. The superior methods adopted by the Scotch fishermen, which enable them to catch fish better, and to work their boats more economically than is done in Yarmouth, also militate greatly against the success of the Yarmouth fishing, and can hardly fail to affect the Lowestoft fishing as well, unless changes are made.

These 856 boats together caught 36,536 lasts, which gives an average catch of about  $42\frac{1}{2}$  lasts per boat, or  $7\frac{1}{2}$  lasts per boat less than last year; a result which confirms the statement that the largeness of the catch was not due to the Herring shoals being unusually large, but to the increase in the number of boats employed.

I wish to acknowledge my indebtedness for the statistical information in this article to the Great Yarmouth Borough Accountant, and to Mr. Henderson of Lowestoft, and for additional information and revision of proofs to Mr. John R. Nutman and Mr. N. Suffling.

RETURN OF HERRINGS LANDED AT YARMOUTH AND LOWESTOFT  
FISH-WHARVES IN 1897.

	YARMOUTH.			LOWESTOFT.		
	Lasts (18,300)	Thousands (1820)	Hundreds (182)	Lasts (18,300)	Thousands (1820)	Hundreds (182)
Spring Fishing	January	—	—	—	—	—
	February	—	—	—	—	—
	March	—	—	—	95	7
	April	—	—	—	234	3
	May	3	—	—	184	1
Mid- Summer Fishing	June	162	—	—	149	5
	July	347	—	—	476	1
North Sea Fishing	August	322	—	—	12	4
	September	1,645	—	—	93	6
Autumn Home Voyage	October	9,244	—	—	4,528	8
	November	10,276	—	—	7,152	7
	December	1,014	—	—	595	6
Yarmouth	23,013	—	—	13,523	2	1
Lowestoft	13,523	—	—			
Total	36,536	—	—			

XI.

NATURAL HISTORY NOTES FROM YARMOUTH.

By A. PATTERSON.

*Read 29th March, 1898.*

BIRDS.

WOODCOCK.—One taken alive in the street, March 20th, 1897.

BRAMBLINGS.—Unusually numerous in neighbourhood during March, 1897.

SPOONBILL.—A fine one loitering about Breydon, April 27th, 1897, and two or three days previously. Another, May 23rd—29th.

SHELDUCKS.—Three examples of this beautiful Duck, evidently searching for Winkles, on Breydon Flats, May 7th, 1897; four more on May 15th.

TURNSTONES.—Several on Breydon on May 15th, 1897; six on Breydon in the morning, and twenty at night-fall of May 21st.

GREENSHANKS.—Five on Breydon, May 21st.

BLACK TERN.—Only met with one example this year, viz., on June 3rd, 1897.

DUNLINS, ETC.—About sixty Dunlins, Ringed Plovers, and Redshanks in one flock, on Breydon, June 26th, 1897. Curlews were in some numbers by the 29th. Over one hundred Redshanks, mostly birds of the year bred in the neighbourhood, in one flock near my house-boat. Their clamour was incessant.

FAWN-COLOURED SPARROW.—A Sparrow of a decidedly fawn colour was shot at Ormesby, July 23rd.

SPOONBILL.—Saw one on Breydon busily scooping on a flat near the North Wall Drain on July 31st. It was in company with Gulls. The Spoonbill is very sociable in its habits.

COMMON SANDPIPERS.—Saw twelve of these birds in company up the North River, August 4th.

**MIGRANTS.**—Quite a rush of Migrants occurred on September 5th. Several were killed by night-fall. This portended, I thought, a change of wind. The wind had been continuously W.S.W. for some days; in twelve hours after I noticed the birds passing it had shifted to E. On Durrant's stall on the 6th, I noticed the following: 10 Bartailed Godwits, 1 immature Shelduck, 9 Curlew-sandpipers, 1 Reeve, 20 Knots, 1 ♂ Scaup, 1 Greenshank, 2 Kingfishers. This was Durrant's heaviest and most mixed show of birds all the season of 1897—8.

**TEAL.**—Saw hardly any in season 1896—7. Two appeared in the Market on September 11th, 1897. Subsequently others. More plentiful this than for several years past.

**PHALAROPE.**—Grey Phalarope, shot on Breydon, Oct. 7th, 1897.

**WOODCOCK.**—First Woodcock of season, shot October 5th.

**STORM PETREL.**—One shot on Breydon, October 23rd, 1897. Wind E., strong, but not boisterous. One brought in from sea alive on November 3rd, and kept some days in a cage; killed eventually by a dog.

**BEWICK'S SWANS.**—Two in the Market during week ending November 6th, 1897.

**WAXWING.**—One killed on North Denes during first week of November, 1897.

**EIDER DUCK.**—An immature example in the Market, November 20th, 1897. Killed in the breakers at Hemsby by a stone on the 17th. During the great gale and high tide of November 29th, one swam about on Breydon within six yards of me. I saw it killed by a marshman.

**GOLDEN PLOVER.**—Saw about 200 in one flock at Acle, December 22nd, 1897.

**BEWICK'S SWAN.**—A grand specimen, shot on Breydon, February 23rd, 1898. An adult male. The bird hung on a stall day after day until it was spoiled.

**REDSHANKS.**—Eight seen on the Bure Marshes, March 13th, 1898.

**SHAG.**—During the gale of March end, a Shag alighted on board a smack wearied out. It refused to leave, and was eventually made a prisoner. I secured it, and have since kept it alive. It devours, indiscriminately, any kind of fish, and has become remarkably tame and saucy. It ejects undigested fish-bones.

**HOODED CROWS.**—March 31st, 1898: again on April 15th.



Many scores of Hooded Crows on Breydon, many in pairs; undoubtedly gathering together for their departure.

**JACKDAWS AND REDWINGS.**—On the morning of April 2nd, 1898, I saw some Jackdaws bound direct N.E., flying very high. Their notes were unmistakable. At night I several times heard the sharp cry of the Redwing.

**SPOONBILL.**—One on April 8th on Breydon.

### FISHES.

**COD v. SOLE.**—A “shilling sized” *i.e.* a sole worth one shilling was taken out of a Cod's maw on March 21st, 1897.

**CUCKOO RAY (*Raia circularis*).**—A two-foot example (now in Norwich Museum), April 17th, 1897, and two others nearly as large.

**STARRY RAY (*Raia radiata*).**—Length  $22\frac{1}{2}$  inches, came to the Fish Wharf on May 14th, 1897. It is the first example I have met with, and from its freshness I have little hesitation in claiming it as a local specimen. It was the thorniest Ray I ever set eyes upon.

**DORY.**—Smallest locally taken example of Dory, caught in a shrimp-net, May 18th, 1897. Length  $4\frac{1}{2}$  inches. Size of a crown-piece.

**'BULLDOG' GURNARD.**—An example of the Sappharine Gurnard with stunted head, answering to the variety known as 'Bulldog,' brought in May 18th, 1897. Length about 16 inches. Another May 29th.

**ALBINO TURBOT.**—A 15-inch all white Turbot on the Fish Wharf, May 25th, 1897.

**ANGLER-FISH.**—Enormous Sea-Angler or Fishing-frog. Weight 1-cwt. Brought into Yarmouth June 3rd, 1897.

**MACKEREL.**—On June 15th, 1897, a 15-inch Mackerel (*Scomber scomber*) was brought to the Wharf. The deep blue-black back was whole-coloured, and was unrelieved by any markings whatsoever.

**ATHERINE.**—Not usually so common at Yarmouth as at Lowestoft. On or about the 9th July several were taken on Breydon.

**BIB.**—Unusual numbers on Breydon September-end, 1897. Average length 6 inches. A Grey Gurnard, a species not partial to Breydon, taken with number of Bibs, September 29th. Length 14 inches.

**THRASHER.**—A Thrasher Shark (*Squalus vulpes*) landed at Lowestoft, September 29th, 1897, by the Mackerel boat, "Hastings Girl." Length 12 feet. Another Thrasher landed on Yarmouth Fish Wharf, October 8th, 1897. Length 10 feet 2 inches.

**MACKEREL.**—A fine example,  $19\frac{1}{2}$  inches long, on Wharf, October 16th. The latest date for Mackerel occurrence on the Fish Wharf, December 6th, 1897.

**PIKE.**—Mr. Boning of Yarmouth, fishing at Potter Heigham, January 8th, 1898, caught a 29-lb. Pike. Length  $43\frac{1}{2}$  inches, girth  $22\frac{1}{2}$  inches.

**POLE OR CRAIG-FLUKE.**—Two Craig-flukes (*Pleuronectes cynoglossus*) on a fish stall, January 17th, 1898. Saw five others on February 3rd.

**STREAKED GURNARD.**—A fine example of this Gurnard (*Trigla lineata*) brought in January 22nd, 1898.

**LONG ROUGH DAB.**—A  $16\frac{1}{2}$ -inch Long Rough Dab (*Hippoglossoides limandoides*) brought in February 21st, 1898.

**LING.**—A considerable number of Ling being taken on long lines, March, 1898.

**SEA BREEM.**—A fine example of the Sea Bream (*Pagellus centrodontus*) taken in a draw-net off the beach, April 1st, 1898.

**CUCKOO RAY.**—Saw a beautiful specimen of the Cuckoo Ray (*Raja circularis*) on April 5th, 1898. It was taken on a long line just off Yarmouth.

**ABNORMAL PLAICE.**—An 11-inch Plaice on the Fish Wharf, with a fin extending quite across the centre of the under side; it had eight rays, with a connecting membrane. This extra fin must have been an inconvenience.

## XII.

## THE LATE SIR EDWARD NEWTON, M.A., K.C.M.G.

VERY early in the current year of our Society, which is just coming to an end, we had to lament the loss by death of one of our most distinguished Members and a former President, Sir Edward Newton, K.C.M.G., who died at Lowestoft, on the 25th of April, 1897.

Born on the 10th of November, 1832, at Elveden, in Suffolk, close to the Norfolk border, although thoroughly East Anglian, he had always a preference for the county of his birth, and it is probable that it was this preference which induced him to settle at Lowestoft, where the last years of his retirement were spent; but he always took a keen interest in the affairs of the sister county.

A boyhood, of necessity, owing to delicate health, spent much at home, and in a district in which many circumstances combined to create a paradise for the naturalist, added to the happy and congenial companionship of his elder brother, the present Professor Alfred Newton, doubtless tended to develop that intense love for out-door observation to which, through life, he was so devoted. He was a keen bird's nester and collector of eggs, but not a plunderer of nests, and through the warreners learnt the art of finding nests by watching the birds (such as Lapwings, Stone Curlews, Ring Dotterels, &c.), as they rose or ran from them. This art he adapted to other birds, and was especially successful in finding the nests of the Woodlark and heath breeding birds. To do this of course needed an intimate knowledge of the habits of the birds, and the writer has witnessed with pleasure his skill, and the keenness of his delight at finding year after year the nest of a rare and particularly shy little bird which he discovered breeding in an unsuspected locality, and the safety of which he so jealously guarded, that to speak of it in a voice beyond a whisper was treason. His Natural History notes contributed to 'The Zoologist,' commenced in 1845, at the early age of twelve years; he also not long after began a collection of birds' sternums which by means of correspondents in all parts of the kingdom he carried on for ten years or more, at the end of which time he had those of nearly every species on the "British"

list, beside not a few foreign species. A most useful series of papers in 'The Zoologist,' vols. v., vi., and vii., giving the date of arrival and of the first egg laid by seventy-four species of Migrants, contributed by the brothers A. and E. Newton, will show not only how diligently they must have worked in the years 1847, 1848, and 1849, but also how thoroughly they were acquainted with the birds found at Elveden, and their skill in discovering their nests. About this time, too, the idea of forming a much more comprehensive register of Natural History phenomena was first entertained and actually commenced on the 1st of January, 1850, it was continued for ten years, and has been summarised, and a specimen page of the actual form of register given in a paper "On a Method of Registering Natural History Observations," contributed by Professor Newton to our 'Transactions' in 1870. This register far exceeded in completeness anything of the sort which had preceded it, and resulted in some interesting and unexpected disclosures.

It was through his talks with warreners and shepherds that the idea first occurred to Edward Newton, of collecting from them information as to the former abundance and the circumstances attending the extinction of certain former inhabitants of the heaths and fens, and with their accustomed energy the two brothers set to work to interview and commit to writing the recollections of these men who had spent long lives on the spot. The difficulty of obtaining such information (as all know who have attempted it), and the care and time which had to be bestowed upon it were great; but Professor Newton tells me his brother was unequalled in the skill with which he extracted from such witnesses all they knew, and the result was a vast amount of valuable first-hand information with regard to the former abundance of Bitterns and Harriers in the fens, and reliable materials for a history of the extinction of the Bustard in Norfolk and Suffolk, by which the article on that bird in Mr. Stevenson's 'Birds of Norfolk' was greatly enriched. The first of these "conversations" committed to paper was in July, 1851, although this was by no means the first which had taken place, and the great flood in the year 1852—3 turned their attention to the desirability of making similar investigations in the fen district.

These investigations foreshadowed the still more valuable researches which Edward Newton carried on with such marked

success in after years, in relation to the Solitaire, the Dodo, and other extinct birds in the Mascarene Islands. It may be worth mentioning as indicative of their constant alertness, that in 1853, when driving from Elveden to Scoulton, and passing through the parish of Stow Bedon, the two brothers, attracted by their cry, detected a colony of Edible Frogs; nothing came of this at the time, but the fact was imparted to the writer (and perhaps others) that it might not be lost sight of; and in 1859 the details with Mr. Berney's hitherto unpublished notes of their introduction to the county, were printed in 'The Zoologist' (p. 6538). In May, 1876, Professor Newton again came upon some of these amphibians in another locality in the same parish.

But these home studies were to some extent interrupted by his entering at Magdalene College, Cambridge (where he graduated B.A. in 1857), soon however to be directed into a wider sphere, for in 1858 he went to the Island of St. Croix, in the West Indies, where he resided for some months, as a result of which visit he contributed to 'The Ibis' (the Journal of the British Ornithologists' Union, of which he was one of eight founders who collected around them twelve others, making twenty original members) a series of papers (still in conjunction with his brother) on the birds of that Island.

In 1859 he entered the Colonial Service, having been appointed Assistant Colonial Secretary of Mauritius, and was promoted to Auditor General in 1863, and Colonial Secretary in 1868. In 1861 he was sent to Madagascar on an Official Mission, and the next year he again visited that Island on his own account, communicating as usual the ornithological results of his visits to 'The Ibis.'

In 1864 he visited the Island of Rodriguez, the former home of the extinct Solitaire, where his knowledge of the osteology of birds enabled him to recognise, and subsequently have collected, valuable spoils of the extinct birds of that island possessing surpassing interest. He also visited the Seychelles with good results, and at various times contributed largely to the elucidation of the ancient fauna of the Mauritius, a task most congenial to him, as already mentioned with regard to his labours in the same direction in his early home.

In 1875 he was made C.M.G., and in 1877 was transferred to Jamaica, holding the posts of Lieut.-Governor and Colonial Secretary

of that Island till 1883. During this latter period his official work was so heavy that it left him little time to follow out his favourite pursuit, but he never missed an opportunity of helping forward the science of Ornithology, whether by his own researches, or by the assistance which his official position enabled him to render to others. Hard work and the effects of climate broke down his health, and in 1882 he was compelled to return to England; and in 1883, much to his regret, to retire from the service in which he had greatly distinguished himself, and in which his prospects of promotion were so bright. In 1887 he was promoted to K.C.M.G.

It is not my intention to give an extended list of Sir Edward Newton's scientific papers or of his services to ornithological science, but rather to dwell on his connection with ourselves, and to recall his kindly presence when acting in 1887—8 as President of our Society, and the valuable Address on the Birds of the Mascarene Islands with which he enriched its 'Transactions.' So late as 30th of March, 1897, the writer, in the company of the two brothers, whose life-long attachment seemed if possible to increase with the failing health of the younger, visited the spot where they had together seen a Swift, on the remarkably early date of the 26th of that month, and he little thought the keen interest displayed by Sir Edward in every incident of the drive was so soon to end, and that the day so delightfully spent in his genial society would be the last he would be privileged so to pass.

I cannot do better than to conclude with the tribute paid to the memory of Sir Edward Newton by an old and valued friend (Canon Tristram), to which I can add nothing but my heartfelt accord: "For the last five years his health was perceptibly declining. Yet, though always more or less of an invalid, his interest in the pursuits of his more vigorous days never flagged . . . The unselfish modesty which marked all his natural-history work was equally conspicuous in his daily life. His whole nature was the very opposite of self-asserting. There was a delightful charm in the simplicity and genuineness of the man, which won the hearts of all who knew him well; and looking back on a friendship of forty years, the writer can but feel it to have been a high privilege to have known one in whose character were blended all the qualities that go to make the careful, truthful naturalist, and the refined Christian gentleman" ('Ibis,' 1897, p. 479).—T. S.

## XIII.

## WILD BIRDS PROTECTION.

MR. HENRY FREDERICK, Hon. Secretary of the Breydon Wild Birds Protection Society, having brought before our Society the question of the extension of the close-time for shore birds to 31st August, about which his Society had already intended to memorialise the Norfolk County Council, it was decided on 22nd February, 1898, that a separate Memorial on the subject be presented to the County Council from the Norfolk and Norwich Naturalists' Society, as follows :—

TO THE CHAIRMAN, ALDERMEN, AND COUNCILLORS  
OF THE COUNTY COUNCIL FOR THE ADMINISTRATIVE  
COUNTY OF NORFOLK.

THE MEMORIAL of the Norfolk and Norwich Naturalists' Society.

SHEWETH as follows :—

Under and by virtue of the Wild Birds Protection Act, 1880, the killing and taking of Wild Birds is prohibited between the 1st day of March and the 1st day of August in any year; and such Act, as varied by the Local Government Act, 1888, empowers one of Her Majesty's Principal Secretaries of State upon application by the County Council of any Administrative County by Order to extend or vary the time during which the killing or taking of Wild Birds or any of them is so prohibited.

For the County of Norfolk no such Order extending or varying the period aforesaid has yet been obtained, and the close time therefore ends on the last day of July in each year. This date is found to be far too early to give the requisite protection to numerous species of Wild Birds; and your Memorialists, acting under the advice of Naturalists of repute, are desirous that the close time should be extended for the whole month of August, for all species of Wild Birds with the exception only of Wild Duck.

If this Order be obtained, it will assimilate the law in the Administrative County of Norfolk to that prevailing in the Administrative County of East Suffolk; and besides giving the desired protection, it will also facilitate the working of the Wild Birds Protection Act in the parts where the two Counties adjoin, and especially so in the case of Breydon Water, part of which is in each such County.

Your Memorialists are the more emboldened in preferring this Memorial from the fact that they do so with the full approval of the Right Honourable the Earl of Leicester, K.G., the Lord Lieutenant of the County, and owner of the soil on which the chief breeding place of the shore birds in this County is situate.

Your Memorialists therefore pray that you will be pleased to take the matter into your consideration, and thereupon make application to a Secretary of State for an Order extending the time during which the killing and taking of all Wild Birds, except only Wild Duck, is prohibited by the Wild Birds Protection Act, 1880, so as to include the whole month of August in each year.

Dated this 29th day of March, 1898.

(Signed)

A. W. PRESTON, President,  
Norfolk & Norwich Naturalists' Society.

W. A. NICHOLSON, Hon. Secretary.

This having been approved by the County Council, the following Order was made by the Secretary of State, thus extending the operation of the Act, as desired.

IV. "The period during which the killing or taking of Wild Birds is prohibited by the Act of 1880, shall be extended throughout the County of Norfolk, so far as regards all birds mentioned in the Schedule to that Act, except the Snipe, Teal and all species of Wild Duck, so as to be from the 1st March to the 31st August in any year."

#### XIV.

#### MISCELLANEOUS NOTES AND OBSERVATIONS.

ALBATROS IN CAMBRIDGESHIRE.—An Albatros, which has since been identified as *Diomedea melanophrys*, was caught on the Streetley Hall Farm, near Linton in Cambridgeshire, on the 9th July, by a labourer, named Samuel Barker, who killed and took it to



Mr. S. Owen Webb, of Streetley Hall, who forwarded it, under the impression that it was a species of Gull, to Mr. Travis, taxidermist, Bury St. Edmund's, for preservation. The bird, when captured, was uninjured, and in very good condition, bore no marks of captivity, but seemed simply exhausted. On hearing of it through the Rev. Julian Tuck, I asked Mr. J. H. Gurney to go with me to Mr. Travis's shop to examine it, and to make sure of the species, we persuaded him to forward it to Mr. Howard Saunders, who, in conjunction with Mr. Osbert Salvin, pronounced it to belong to the above species. It is, I believe, the first instance of the occurrence of an Albatros in the British Isles, though a bird of the same species was shot in the Færoe Islands ('Ibis,' 1896, p. 136), and others are referred to by Mr. J. A. Harvie-Brown and Mr. H. L. Popham ('Zoologist,' 1894, p. 337), as having been met with in that same portion of the Atlantic Ocean. In the present specimen which appears to be an adult bird, the superciliary mark is scarcely perceptible, consisting of a very indistinct tinge of grey on the feathers over and in front of the eye, in which respect it seems to resemble the one killed in the Færoes, and there is another peculiarity which, strange to say, is not mentioned in the British Museum Catalogue, vol. xxv. p. 447, and that is, that the whole of the outer web of the outside tail feather is white, or whitish, a very conspicuous feature when the tail is spread. The following note was made by Mr. Gurney and myself from the specimen shortly after it was mounted.

	inches.
Length—following outline of mounted specimen	
along the back from tip of beak to end of tail ...	26.3
Wing, closed from bend to tip ... ..	17.0
Bill, along ridge to tip following the curve ...	4.2
Tarsus, in front ... ..	2.4
„ behind ... ..	2.9
Expanse ( <i>teste</i> Mr. Travis) about ... ..	84.0
Number of tail feathers, twelve	

Soft parts as described to us by Mr. Travis, and so far as we could judge ourselves: bill, pale lemon yellow, along the culmen, passing into brownish black at the bend towards the tip for about one inch, the extreme tip for about half an inch pale whitish horn, remainder brownish orange; legs and feet fleshy blue.—E. A. BUTLER, Lt.-Col.

**HONEY BUZZARD IN SUFFOLK.**—A remarkably fine specimen of the Honey Buzzard (*Pernis apivorus*) was shot in Bull's Cross Wood, on the Edwardstone Hall Estate, about  $4\frac{1}{2}$  miles S.E. of Lavenham in Suffolk, on or about the 1st of July, by a gamekeeper, who mistook it in thick covert for a Wood Pigeon. It is in perfect adult plumage, having the lower parts almost entirely white, and has been preserved by Mr. Travis, taxidermist, Bury St. Edmund's, in whose shop Mr. J. H. Gurney and I had the pleasure of examining it shortly after it was mounted.—E. A. BUTLER, Lt.-Col.

**MARKED WOODCOCKS.**—January, 1898. Young Woodcocks have been marked in the Parks at Alnwick, the seat of the Duke of Northumberland, since the year 1891, with a German silver ring on the leg, on which was stamped the letter "N," and the year, (thus, N 91).

The following marked birds have been shot :—

Mark and Date.	Where Killed and by Whom.	Date when Killed.
N. 91.	Harehope, Northumberland (about 7 miles N.W.)	Nov. 1891
N. 91.	Hulne Park, Alnwick, by Earl Percy	... Dec. 1892
N. 92.	" " by Hon. T. Willoughby	Jan. 6, 1896
N. 94.	Broome Park, Northd. (adjoining Estate)	... Nov. 1894
N. 94.	Hepburn Wood, Northd. (about 10 miles N.W.)	Jan. 1895
N. 96.	Hulne Park, by Mr. Paynter	... Nov. 1896
N. 96.	" (Catheugh)	... Dec. 16, 1896
N. 97.*	Rosegarland, Wexford, Ireland	... Dec. 10, 1897
N. 97.	Hulne Park, Alnwick, by Earl Percy	... Jan. 1898
N. 97.	" " by Lord George Campbell	Jan. 1898

(\* See letter in 'Field' Newspaper by F. R. Leigh.)

The above birds were all marked in the months of May or June.

Numbers marked,	1891.	6	Woodcocks.
"	"	1892.	5 "
"	"	1894.	4 "
"	"	1896.	9 "
"	"	1897.	19 "

Woodcocks were also ringed by the keepers in 1893 and 1895, but at present none are known to have been shot belonging to those years. (It was stated that one was shot in Sussex last year, but as the bird was purchased at a poulterer's, there was doubt as to where it was killed : cf. 'The Field,' February 13th, 1897).—E. G. WHEELER.

**MIGRATION OF RING OUZEL** (*Turdus torquatus*, L.).—In April of last year, 1896 (7th and 8th), large numbers were making their

migration across the Pyrenees. As many as a hundred daily were killed and brought into the hotel at Argeles. M. Peyrafitte tells me that they only cross the mountains here and at Bagnères de Bigorre. As the mountains are much lower and more easy to cross near Saint Jean de Luz it would seem as if these two points were old migratory routes. From enquiries I made, the Ouzel is never seen on either side of the migratory track, as *e.g.* between Luz and Gavarnie. Large quantities of Pigeons are said to be caught in nets at Argeles and Bagnères de Bigorre during their migration. I noticed a remarkable degree of variation in the plumage of the Ouzel. Many were evidently birds of the previous year, and had not any trace of the white ring.—JOHN LOWE, M.D.

OCURRENCE OF THE MEDITERRANEAN HERRING GULL (*LARUS CACHINNANS*) IN NORFOLK.—Whilst engaged in making a catalogue of the fine collection of British Birds in the possession of Mr. E. M. Connop of Rollesby Hall, near Great Yarmouth, Mr. Cole, the Norwich bird preserver, pointed out to me a Herring Gull, which he said the late Mr. Stevenson had examined in the flesh, and believed to be *Larus cachinnans*. At his request Mr. Cole had noted the colour of the soft parts on the back of the case, and a careful examination led me to endorse the opinion expressed by Mr. Stevenson. Mr. Howard Saunders has also been good enough to examine the bird, and expresses himself quite satisfied with the correctness of the determination. The bird was shot by the veteran gunner John Thomas, on Breydon Water, near Great Yarmouth, and sent by him in the flesh to Mr. Cole, on the 4th of November, 1886; it proved to be a male by dissection, and differed from the Common Herring Gull in the darkness of the mantle; the legs were a beautiful lemon yellow, and the bare ring round the eye deep orange-red. The mantle and orbital ring still retain their normal colour, but the legs have unfortunately been painted pale yellow, which Mr. Cole assures me he imitated from nature. The late season at which this southern species was killed seems remarkable; but still later in the same year (on December 26th), and in the same locality, a beautiful adult example of the Mediterranean Black-headed Gull was killed. I am not aware of any previous occurrence of *L. cachinnans* in Britain having been recorded.—  
THOMAS SOUTHWELL

**TAWNY PIPIT IN NORFOLK.**—This species was first recorded as British from a specimen killed at Shoreham in August, 1858, since which time it has been met with some thirteen or fourteen times always in autumn, and with one doubtful exception (said to have been killed at Bridlington)—always in the South of England. It is quite possible that others may have been overlooked. The bird now exhibited was taken in a clap-net on the 7th October, 1897, near the Battery on the North Denes, Yarmouth, and proved to be a ♀ by dissection. It breeds in France and Holland, most suitable districts on the European Continent from the Baltic to the Mediterranean, and in North Africa. The addition of the above two birds brings the number of fully recognised Norfolk species up to 308, in addition to which there are 8 others, which for various reasons are considered doubtful—of these 308 species, 103 breed regularly in this county,—6 others nest here occasionally, 11 are suspected to have bred here, and there are 14 others which formerly nested in Norfolk but have now ceased to do so, leaving 169 species occurring here which are not known to breed in Norfolk, and 8 others the claims of which to be reckoned as “Norfolk Birds” are not considered to be fully established.—THOMAS SOUTHWELL.

**LEUCOCHROA CANDIDISSIMA.**—The abundance of this shell in the Riviera is very remarkable. At Mentone and Bordighera it is the most abundant of all shells. They may be seen at a long distance forming white bands at the foot of sloping banks, and suggesting the idea of bits of chalk which had rolled down. This resemblance might be protective, but the abundance of the shell seems to indicate something repulsive in the flavour, rather than such a degree of stupidity on the part of the Thrush family as would prevent their distinguishing them from stones. One would be inclined to think, however, that their numbers are rather due to the paucity of birds than to any other cause. The point is a curious one, and worth more closely working out than I was able to do.—JOHN LOWE, M.D.

**PSYCHE BOMBYCELLA.**—A curious instance of mimicry is shown by the larva of this insect. It resembles a very minute ‘caddis’ and is of a slate blue colour. Some years ago I found it in Switzerland, on the spikes of *Nardus stricta*, to the summit of which it climbs, and fixing itself by one end moves about in a manner closely resembling the anthers of the plant agitated by the wind. The similarity to these is so great that it was with

difficulty that I could distinguish the one from the other, and it was only by some eccentric movement that I discovered the creature at all. It is difficult to say what is the precise object of its climbing up the stems of this grass (I found it on no other species), but that it is protected by its resemblance to the anthers is certain. A similar species which I found on Thistles is probably *Psyche nigricantella*.—JOHN LOWE, M.D.

*PÆCILOSCYTUS VULNERATUS*—I have recently taken a few examples of this insect at Yarmouth on the South Denes. It forms a most interesting addition to the British Fauna, as although it is well known on the Continent, and has occurred in Sweden, Denmark, Germany, France, Switzerland, and all over South Europe, it has not previously been seen on this side of the Channel. All my specimens came from *Galium verum* growing among the short grass.—E. G. WHEELER.

ACULEATE HYMENOPTERA AT TOSTOCK, NEAR BURY ST. EDMUND'S. The splendid season of 1897 was very profitable for my field work. I added the following to my parish list:—

*Leptothorax acervorum*, Fab. A worker upon a post at the wood. August 14th.

*Salius fuscus*, Linn. May 30th, on Wild Parsley.

*Tachytes pectinipes*, Linn. Two, June 7th.

*Andrena decorata*, Sm. Three females, July 28th, on Parsley.

*Halictus prasinus*, Sm. Female, July 7th, on Hawkweed.

*Osmia leucomelana*, Kirb. July 7th, on the flower of the Garden Sage.

*Megachile maritima*, Kirb. July 8th, two females, one male, in the flowers of *Campanula trachelium* (nettle-leaved bell-flower).

*Epeolus productus*, Thoms. Two females, August 10th, on Ragwort.

This brings my list to : Ants 10, Fossores 54, Wasps 13, Bees 112, total 189. And, with about seventy species recorded from other places, chiefly along the coast, Suffolk now takes the first place among the counties for the Aculeate Hymenoptera ; Norfolk following next. I also captured the following uncommon Bees : *Nomada ochrostoma* (3), *Andrena pilipes* (4), *Sphecodes rubicundus* (6 males), *Stelis aterrima* (5), *S. phæoptera* (4), *Prosopis brevicornis* (3), *P. confusus* (1), *Colletes picistigma* (5).

In Coleoptera I had several good Inquilines. I opened up twenty-seven nests of *Vespa vulgaris*, and got from seven of them 17 *Metæcus paradoxus* (1, 3, 4, 1, 4, 2, 2).

From nests of *Bombus latreillellus* and *lapidarius* I took several of the rare Heterothrops, 4-punctula, and a large number of *Epuræa æstiva*. From *Vespa rufa*, *Oxytelus sculpturatus* and *Cryptophagus setulosus*; from *B. sylvarum*, *Anthicus antherinus* and *Carcinops minimus*, the last new to Suffolk. From *V. crabro*, *Oxypoda opaca*; from *B. terrestris*, *Lathrobium boreale*. From Fungi, I took in abundance the pretty *Tetratoma fungorum*; also *Homalota liturata*, a rare insect.

In the general list I had *Microglossa nidicola*, *Tachyporus formosus*, *Silpha tristis*, *Telmatophilus caricis* (on *typha*), *Ptilinus pectinicornis*, *Pogonocherus dentatus*, *Apthona hilaris*, and *Tychius meliloti*.

Among the Diptera, the best thing I had was *Pocota apiformis*, a handsome Fly bred from a larva found in a Bee's nest. Other good Flies were: *Chrysonotus bipunctatus*, *Syrphus cinctellus*, *Actina tibialis*, *Xanthogramma ornatum*, *Eristalis sepulchralis*, *Criorrhina floccosa*, *Chrysotoxum 8-maculatum*, *Nemoræa glabrata*, *Gonia ornata* and *Brachycoma devia*.

Mr. Claude Morley came over on August 4th, and although it was very hot and dry, he took by sweeping a new hemipteron for the Suffolk list, *Macrotylus solitarius*. I also took *Sehirus bicolor* (under bark), *Berytus minor* (in a Bee's nest), *Aradus depressus*, and *Nabis flavomarginatus* (macropterous form). Also *Issus coleoptratus* (homopteron) in a nest of *V. vulgaris*, and *Pediopsis tibialis* by sweeping.—W. H. TUCK, Tostock.

TRANSACTIONS  
OF THE  
Norfolk and Norwich  
NATURALISTS' SOCIETY;

*Presented to the Members for*

1898—99.

VOL. VI.—PART 5.

Norwich:  
PRINTED BY FLETCHER AND SON, LTD.  
1899.





# Norfolk and Norwich Naturalists' Society.

## OFFICERS FOR 1898—99.

### President.

MR. JOHN HENRY GURNEY, F.L.S., F.Z.S.

### Ex-President.

MR. A. W. PRESTON, F. R. Met. Soc.

### Vice-Presidents.

THE RIGHT HON. THE EARL OF LEICESTER, K.G.

THE RIGHT HON. THE EARL OF KIMBERLEY, K.G.

THE RIGHT HON. THE LORD WALSHINGHAM, F.R.S.

THE RIGHT HON. THE LORD AMHERST OF HACKNEY.

SIR FRANCIS G. M. BOILEAU, BART., F.Z.S., F.S.A.

ISAEL BEVERLEY, M.D. COL. FEILDEN, C.M.Z.S.

BERT D. GELDART. JOHN HENRY GURNEY, F.L.S., F.Z.S.

B. BRIDGMAN, F.L.S. F. W. HARMER, F.G.S.

T. SOUTHWELL, F.Z.S.

### Treasurer.

MR. W. H. BIDWELL.

### Hon. Secretary.

MR. W. A. NICHOLSON,

St. Helen's Square, Norwich.

### Committee.

C. EATON.	REV. J. A. LAURENCE.	MR. W. G. CLARKE.
CORDER.	MR. G. H. HARRIS.	MR. E. J. H. ELDRED.
J. THOULESS.	MR. F. SUTTON.	MR. J. T. HOTBLACK.

### Journal Committee.

PROFESSOR NEWTON.	MR. A. W. PRESTON.
MR. W. H. BIDWELL.	MR. T. SOUTHWELL.
MR. JAMES REEVE.	

### Excursion Committee.

MR. C. BUSSEY.	MR. J. T. HOTBLACK.
MR. E. CORDER.	MR. A. PATTERSON.
MR. F. DIX.	MR. A. W. PRESTON.

### Auditor.

MR. S. W. UTTING.

### Yarmouth Section.

*Ex-officio Members of the General Committee.*

HENRY BLAKE, *Chairman.* MR. F. DANBY PALMER, *Treasurer.*

MR. T. J. WIGG, *Hon. Sec.*

## LIST OF MEMBERS, 1898—99.

\* Members who have compounded for their subscriptions are marked with an asterisk.

## A

\* Ames Victor  
Thornham Cottage, King's Lynn  
Amherst Right Hon. Lord, F.Z.S., V.P.  
Didlington Hall  
Andrew W. H. M. Colney  
Aplin Oliver V. Bloxham, Oxon  
Atmore E. A. Lynn

## B

Back Rev. A. J. Carleton Rode  
Backhouse James Dale Side, Harrogate  
Baker W. E. Tilney All Saints  
Balls F. 4 Constitution Hill, Sprowston  
Balls J. E. Castle Meadow, Norwich  
Barclay Francis H. Leyton, Essex  
Barclay H. G., F.R.G.S. Colney Hall  
\* Barclay E. High Lee, Hoddesdon  
Barles Rev. W., M.A. Cringleford Hall  
Barnard Miss A.  
Prince of Wales Road, Norwich  
Barrett C. G., Hon. Mem.  
39 Linden Grove, Nunhead, S.E.  
\* Becher Major Edward F., R.A., F.Z.S.  
Genvena, Wadebridge, Cornwall  
\* Becher Rev. William Wellow, Notts  
Bennett Arthur, F.L.S.  
143 High Street, Croydon  
Beverley M., M.D., V.P.  
Prince of Wales Road, Norwich  
Bidwell E. 1 Trigg Lane, E.C.  
Bidwell W. H., Treasurer,  
Thorpe Road, Norwich  
Bird Rev. M. C. H., M.A., M.B.O.U.  
Brunstead Rectory  
Birkbeck Sir Edward, Bart.  
Horstead Hall  
Birkbeck E. L. Lexham Hall  
Birkbeck H. Westacre Hall  
Blake Dr. H., Regent Road, Gt. Yarmouth  
Bloomfield Rev. E. N., M.A., F.E.S.  
Guestling Rectory, Hastings  
Boardman E. T. Queen Street, Norwich  
Boileau Sir F. G. M., Bart., F.Z.S., F.S.A.,  
Ketteringham Park  
Boileau Lady Ketteringham Park  
Boileau Miss Ketteringham Park  
Boileau M. C. Ketteringham Park  
Boileau E. F. Ketteringham Park  
Bolingbroke L. G. Ferryside, Norwich  
Bridgman J. B., F.L.S., V.P.  
St. Giles Street, Norwich  
Brittain Henry  
St. Stephen's Street, Norwich

Broeck Ernest Vanden, Hon. Mem.  
124 Rue de Terre Neuve, Brussels  
Brown Rev. J. L.  
Chapel Field Grove, Norwich  
Bunsen L. de Colkirk House, Fakenham  
Burlingham D. Catlin Lynn  
Burn Rev. W. Pelham, M.A.  
The Chantry, Norwich  
Burnand G. B. Worstead  
Burrell W. H. Sheringham  
Burton James  
Trafalgar Road, Gt. Yarmouth  
Burton Mrs. J.  
Trafalgar Road, Gt. Yarmouth  
Burton S. H., M.B.  
St. Giles Street, Norwich  
Bussey C. St. Martin-at-Palace, Norwich  
Butler Colonel  
Brettenham Park, Bildeston, Suffolk  
Butterfield W. C. J. Ruskin  
14 Stanhope Place, St. Leonards  
Buxton A. F. 50 Cornhill, E.C.  
Buxton C. Louis Bolwick Hall, Norwich  
Buxton E. G. Thorpe, Norwich  
Buxton Geoffrey F., F.Z.S.  
Dunston Hall, Norwich  
Buxton H. E. Great Yarmouth  
Buxton H. G. Catton Hall, Norwich  
Buxton S. G., F.Z.S.  
Catton Hall, Norwich  
\* Buxton Sir T. F., Bart., F.Z.S.  
Warlies, Waltham Abbey

## C

Candler C. Harleston  
Candler G. Harleston  
Candler Henry  
War Office, Pall Mall, London, S.W.  
Chase R. W.  
Priory Road, Edgbaston, Birmingham  
Christy Miller, F.L.S.  
Pryors, Broomfield, Chelmsford  
Clarke W. G.  
80 Chapel Field Road, Norwich  
\* Cocks A. H., M.A., F.Z.S.  
Thames Bank, Great Marlow, Bucks  
Collett Professor Robert, Hon. Mem.  
The University, Christiania, Norway  
Colman Russell J. Bracondale, Norwich  
Connop E. M. Bollesby Hall  
Cooke M. C., Hon. Mem.  
146 Junction Road, Upper Holloway  
Cordeaux John Great Cotes, Lincoln  
Corder Edward London Street, Norwich

F. E. East Carlton Rectory  
worth The Right Hon. Lord  
Letton Hall  
well George Lynn  
vell Rev. S. F., D.D., F.R.A.S.,  
t.G.S. Northrepps Rectory  
r Dr. A.  
Prince of Wales Road, Norwich  
J. M. Mile End Road, Norwich  
foot W. M., M.B. Beccles  
rley P., F.L.S., F.Z.S.  
Waddon House, Croydon

## D

aley The Right Hon. Earl of  
Dumpton Park, Ramsgate  
s G. C. Town Close, Norwich  
Rev. A. G., M.A.  
Great Melton Rectory, Wymondham  
r A. Fakenham  
Francis Essex Street, Norwich  
on E. T., F.R. Met. Soc. Geldeston  
rser H. E., F.L.S., F.Z.S.  
Topclyffe Grange, Farnborough  
et Dr. C.  
George's Terrace, Great Yarmouth  
W. A. 48 Crown Street, Lowestoft

## E

Sir Peter, M.D.  
St. Giles Street, Norwich  
George C.  
Cleveland House, Eaton, Norwich  
F. R.  
Cleveland House, Eaton, Norwich  
rds J., *Hon. Mem.*  
Colesborne, Gloucestershire  
d E. J. H. Castle Meadow, Norwich  
son P. H., B.A., M.B. Oulton  
r Dr. Muir Kirkley, Lowestoft  
tt H. R.  
Prince of Wales Road, Norwich

## F

n Michael Horstead  
A. B., Mount Nod, Greenhithe, Kent  
len Col. H. W., V.P., F.G.S., C.M.Z.S.  
West House, Wells  
Rev. H. C. Beeston Revis Rectory  
er B. E., Marlingford Hall, Norwich  
her W. H. B.  
Chapel Road, Worthing  
ster J. B. Tombland, Norwich  
Charles  
Thorpe St. Andrew, Norwich  
r W. Warde, Lincoln College, Oxford

## G

orough The Right Hon. the Earl  
Exton Park  
Rev. R. M. Reymerstone  
t H. D., V.P.,  
Thorpe Hamlet, Norwich  
W. B.  
Ivy House, Hoddesdon, Berks.  
ld W. A.  
George's Terrace, Great Yarmouth  
in Rev. James  
29 Newmarket Road, Norwich

Goose A. H.  
Princes of Wales Road, Norwich  
Gunn T. E., F.L.S.  
St. Giles Street, Norwich  
\*Gurney Eustace Sprowston Hall  
\*Gurney Gerard H.  
Keswick Hall, Norwich  
\*Gurney J. H., V.P., F.L.S., F.Z.S.  
Keswick Hall, Norwich  
Gurney J. Nigel  
Sprowston Hall, Norwich  
Gurney R. Sprowston Hall, Norwich  
Guyett W. J. King Street, Norwich

## H

\*Hackblock W. H. Coltishall  
\*Haigh G. H. Caton  
Grainsby Hall, Gt. Grimsby  
Haldinstein Alfred  
Unthank Road, Norwich  
Hall H. Woodbridge  
Hamblen W. W. Wells  
Hamond Charles A.  
Twyford Hall, East Dereham  
\*Hamond Rear-Admiral E. H., E.N.  
Swaffham  
Harcourt B. W., St. Giles Street, Norwich  
Harmer F. W., V.P., F.G.S.  
Cringford, Norwich  
Harmer S. F., M.A., F.R.S., D.Sc.  
King's College, Cambridge  
Harris G. H. Great Yarmouth  
Harvey E. K. Lowestoft  
Harvie-Brown J. A., F.R.S.E.  
Dunipace House, Larbert, N.B.  
Hastings The Right Hon. Lord  
Melton Constable  
Hebbert C. T., F.Z.S. The Rhodron,  
Hook, Kingstou-on-Thames  
Hector Sir James, M.D., K.C.M.G., F.R.S.  
*Hon. Mem.*  
New Zealand Institute, Wellington  
Herring Capt. H. L.  
Thorpe St. Andrew, Norwich  
\*Hill Alexander, M.D.  
Downing College, Cambridge  
Hill B. 5 Tower Street, King's Lynn  
Hinde F. C. Thorpe Hamlet, Norwich  
Hinde G. J., Ph.D., F.R.S., F.G.S., *Hon.*  
*Mem.* Avondale Road, Croydon  
\*Hoare Sir S., Bart., M.P. Cromer  
Hooker Sir J. D., M.D., K.C.S.I., C.B.,  
F.R.S., *Hon. Mem.*  
The Camp, Sunningdale, Surrey  
Hotblack G. S. Brundall  
Hotblack J. T.  
Newmarket Road, Norwich  
Howard R. J., M.B.O.U.  
Hawkhurst, Blackburn

## I

Irby Colonel, F.L.S., F.Z.S.  
14 Cornwall Terrace, Regent's Park, N.W.

## J

Jarrold W. T. F.  
Thorpe St. Andrew, Norwich  
Jenkins Rev. T. L. Worstead  
Jickling Rev. F. Smallburgh Hall  
\*Jodrell Sir Alfred, Bart. Bayfield Hall  
Jones Sir Laurence, Bart.  
Cranmer Hall, Fakenham

## K

Kerrison Major Burlingham  
 Kimberley The Right Hon. the Earl of,  
 K.G., V.P. Kimberley Hall, Wymondham  
 King H. A. Exchange Street, Norwich  
 Knight Edward Keswick Old Hall  
 Knights J. E. 36 Beaconsfield Road, Great Yarmouth

## L

Laurence Rev. J. A. Dilham, Norwich  
 Laurence R. Norfolk Club, Norwich  
 Leathes Colonel H. M. Dovercourt  
 \*Lee Warner Henry Walsingham Abbey  
 Lee Warner Henry Swaffham  
 Leicester The Right Hon. the Earl of,  
 K.G., V.P. Holkham Hall  
 Lennard T. Barrett  
 Horsford Manor, Norwich  
 Le Pelley Rev. J. L., M.A. Ringland  
 le Strange Hamon, F.Z.S. Hunstanton Hall  
 \*Lindley Sir Nathaniel, The Right Hon.  
 the Master of the Rolls East Carlton  
 Long Dr. S. H. Prince of Wales Road, Norwich  
 Long J. Dunton  
 Lowe John, M.D., Hon. Mem.  
 4 Gloucester Place, Portman Square,  
 London, W.  
 \*Lubbock The Rt. Hon. Sir John, Bart.,  
 M.P., D.C.L., F.R.S. High Elms, Hayes, Kent

## M

Macpherson A. H.  
 51 Gloucester Place, Hyde Park, W.  
 Manby A. R., M.D. East Rudham  
 Marsham Major Rippon Hall  
 Mayfield A. Mendelsham, Stowmarket  
 Meade-Waldo Edmund  
 Stonewall Park, Edenbridge, Kent  
 \*Micklethwait Major G. N. Bath  
 Middleton C. Holkham  
 Miller Henry, Jun. Bosmere House,  
 Norwich Road, Ipswich  
 Morley Claude, F.E.S. The Crescent, Ipswich  
 Mottram James Bank House, Norwich

## N

Newcome E. C. Feltwell  
 Newcome F. d'Arcy Feltwell Hall  
 Newton Professor, M.A., F.R.S., Hon.  
 Mem. Magdalene College, Cambridge  
 Newton E. T., F.R.S., Hon. Mem.  
 H.M. Geological Survey Office,  
 28 Jernyn Street, London  
 Nicholson F., F.Z.S. 84 Major Street, Manchester  
 Nicholson W. A., Honorary Secretary  
 St. Helen's Square, Norwich

## O

\*Ogilvie F. M. Sizewell House, Leiston

## P

Page G. W. Fakenham  
 Paget Sir James Bart., F.R.S., Hon. Mem.  
 5 Park Square West, Regent's Park, S.W.  
 Palmer F. Danby, M.S.A. Hall Quay, Great Yarmouth  
 \*Parkin Thomas, M.A., F.Z.S. High Wickham, Hastings  
 Partridge Rev. W. H., M.A. Caston Rectory, Attleborough  
 Pashley H. N. Cley  
 Patterson A. Ibis House, Gt. Yarmouth  
 Patten Dr. H. Cooper King Street, Norwich  
 Peake E. 36 Earlham Road, Norwich  
 Peckover Alexander Wisbech  
 Pigott T. Digby, C.B., F.R.G.S. 5 Ovington Gardens, S.W.  
 Plowright C. B., M.D., Hon. Mem. Lynn  
 Power F. D. 299 Cold Harbour Lane, London  
 Preston A. W., F.R. Met. Soc. Bradestone House, Brundall  
 Purdy R. J. W. Woodgate House, Aylham  
 Pycraft W. Natural History Museum,  
 Cromwell Road, London

## R

Reeve J., Clarence Road, Thorpe, Norwich  
 \*Reid Clement, F.R.S., F.L.S., F.G.S.  
 H.M. Geological Survey Office, London  
 \*Reid Capt. Savile G., R.E. Yalding, Maidstone  
 \*Ringer Sidney, M.D. Cavendish Square, W.  
 Ripley Rev. W. N. Harford House, Norwich  
 Roberts E. T. Castle Meadow, Norwich  
 Robinson H. S. St. Giles Plain, Norwich  
 \*Rosebery The Right Hon. the Earl of,  
 K.G. Berkeley Square, W.  
 \*Rothschild Hon. Walter Tring, Herts  
 Royal Microscopical Society, President of  
 the, Hon. Mem. 20 Hanover Square, W.

## S

Sapsworth A. D. Woodford Green, Essex  
 Saunders Howard, F.L.S., F.Z.S. 7 Radnor Place, London, W.  
 Savill-Onley C. A. O. Boxfields, Galleywood, Chelmsford  
 Scherren H., F.Z.S. 9 Cavendish Road, Harringay, N.  
 Shaw Eland, F.E.S. Fakenham  
 Shipley W., Jun. Southtown, Great Yarmouth  
 \*Singh Prince Frederick Duleep H.H. Old Buckenham Hall  
 Slater Rev. H. Thornhaugh Rectory, Wansford  
 Smith W. R. Harleston  
 \*Southwell C. Gurrey Lodge, Childs Hill, N.W.  
 Southwell Miss Janet Norwich  
 Southwell T., F.Z.S., V.P. 10 The Crescent, Norwich  
 Spelman W. W. Brundall  
 Sutton Francis, F.C.S. The Close, Norwich  
 Sutton W. Lincoln Thorpe Road, Norwich

## T

Thouless H. J., 48 Grove Avenue, Norwich  
 Tillet Eric de C. St. Giles' Street, Norwich  
 Tillet Wilfred S. St. Giles' Street, Norwich  
 Tingey J. C. 31 Surrey Street, Norwich  
 Todd J. T. Chapel Field Gardens, Norwich  
 True F. W., *Hon. Mem.*  
 U.S. National Museum, Washington,  
 U.S.A.  
 Tuck Rev. J. G.  
 Tostock Rectory, Bury St. Edmunds  
 Tuck W. H.  
 Tostock House, Bury St. Edmunds

## U

Upcher H. M., F.Z.S. Feltwell  
 Utting S. W. Thorpe, Norwich

## V

Vaughan Matthew Haileybury College

## W

\*Walsingham The Right Hon. Lord.  
 F.R.S., V.P. Merton Hall, Thetford

Walter J. H. Drayton  
 \*Watling R. A. Dunedin, Merton Road, Southsea  
 Thetford  
 Watson A. Q. Bracondale, Norwich  
 Wheeler F. D., M.A., LL.D.  
 \*Whitaker Joseph, F.Z.S. Rainworth Lodge, Mansfield  
 White R. W. Lymington, Hants.  
 Whitty C. E., M.D. Hustanton  
 Wigg T. J., *Hon. Sec. Great Yarmouth*  
 Section, Holland House, North Quay,  
 Gt. Yarmouth  
 Williams C. Prince of Wales Road, Norwich  
 Wilson Cecil Heathside, Thorpe Hamlet, Norwich  
 Wilson H. F. The Osiers, Chiswick Mall  
 Winter J. J. Drayton, Norwich  
 Woodward H. B., F.R.S., F.G.S., *Hon. Mem.*  
 8 Inglewood Road, West Hampstead, N.W.  
 Wright C. A., Knight of the Crown of  
 Italy, F.L.S., F.Z.S. Kayhough House, Kew

## Y

Young John, F.L.S., F.Z.S.  
 64 Hereford Road, London, W.

**The Treasurer in Account with the Norfolk and Norwich Naturalists' Society,  
Year ending March, 1899.**

	Dr.	£	s.	d.	Cr.	£	s.	d.
To Balance from last year	...	10	9	9				
To Subscriptions:—		£	s.	d.				
1 for 1895-96	...	0	5	0	By Fletcher and Son, Limited, <i>Transactions</i> , 1897-98	28	17	6
3 " 1896-97	...	0	15	0	" Stationery, Circulars, Postage, &c.	9	12	4
20 " 1897-98	...	5	0	0	" Insurance	0	9	0
156 " 1898-99	...	39	0	0	" International Congress of Zoology (donation)	1	1	0
11 " 189-1900	...	2	15	0	" Year Book of Scientific Societies	0	6	0
" Additional payments	...	47	15	0	" Door Keeper	1	0	0
" Sale of <i>Transactions</i>	...	0	8	0	" Rent of Room	1	1	0
" Norwich Union Fire Office in satisfaction of claim	...	38	11	6	" Assistant Secretary	5	0	0
		£99	8	3	" Balance at Bank	52	1	5
		£99 8 3						M

**LIFE MEMBERSHIP FUND.**

	£	s.	d.
To Balance in Post Office Savings Bank transferred to Norfolk and Norwich Savings Bank	100	5	1
" Interest to November	1	7	10
	£101	12	11

*Norwich, 2<sup>nd</sup> March, 1899.*

Examined and found correct,  
**STEPHEN WM. UTTING, Auditor.**

£101-12-11

£ s. d.  
... 101 12 11

*List of the Publications received by the Society as Donations  
or Exchanges from March, 1898.*

- 
- ADAMS (Lionel E., B.A.). A Plea for Owls and Kestrels. June, 1898.  
*From the Author.*
- ALSTON (E. R.). In Memoriam. *From Col. H. W. Feilden.*
- AMERICAN Falconidæ and Ornithology of Guadeloupe Island. R. Ridgway. Washington, 1876. *From Col. H. W. Feilden.*
- ANTARCTIC Exploration; A Plea for a National Expedition, by Sir Clements R. Markham, K.C.B., F.R.S. 1898.  
*From Mr. H. G. Barclay, F.R.G.S.*
- BARRERE. Ornithologiæ Specimen Novum. Perpiniani. 1740.  
*From Professor Newton, F.R.S.*
- BARRETT (Charles G., F.E.S.). The Lepidoptera of the British Islands. Vol. v. 8vo. Lond., 1899. *From the Author.*
- BARROW Naturalists' Field Club, etc. Annual Report. Vol. xii. 1898.  
*From the Club.*
- BENNETT (Arthur, F.L.S.). Records of Scottish Plants for 1898, additional to Watson's "Topographical Botany," 2nd Edition. [1883.] *From the Author.*
- BERWICKSHIRE Naturalists' Club. Proceedings. Vol. xvi., No. 2.
- BOMBAY. Catalogue of Birds of the Southern Portion of the Presidency. Capt. E. A. Butler. Bombay, 1880.  
*From Col. H. W. Feilden.*
- BRITISH Association. Report of the Bristol Meeting, 1898. London, 1899.  
*From the Association.*
- BRUSSELS. Bulletin de la Société Belge de Microscopie. 1897—98.  
*From the Society.*
- CABANIS (J.). Ornithologische Notizen. Berlin, 1847.  
*From Professor Newton, F.R.S.*
- CARDIFF Naturalists' Society. Report and Transactions. Vol. xxx. 1897—98. Cardiff, 1899.  
*From the Society.*
- CHALLENGER Expedition. Deep Sea Explorations. 16 Pamphlets.  
*From Col. H. W. Feilden.*
- List of Observing Stations Printed for the use of the Naturalists engaged in preparing the Account of the Voyage.  
*From Col. H. W. Feilden.*
- CHILIAN Birds, New List of, Compiled by the late Harry Berkeley James, F.L.S., etc. London, 1899. *From Col. H. W. Feilden.*
- EALING Natural Science and Microscopical Society. 1897—98. Ealing, 1898.  
*From the Society.*

- EDINBURGH. Proceedings of Royal Physical Society. 1897—98.  
Edinburgh, 1899. *From the Society.*
- ENTOMOLOGY. F. W. Frohawk. *From Mr. J. H. Gurney, F.Z.S.*
- FARÖE Islands; On the Glaciation of the. Karl Grossmann, M.D.,  
F.R.C.S.E., etc., and Joseph Lomas, A.R.C.S. 1895.  
*From Col. H. W. Feilden.*
- GEOLOGICAL Literature added to the Geological Society's Library.  
4 Parts. From June, 1894, to December, 1897.  
*From Col. H. W. Feilden.*
- GEOLOGICAL Society. General Index to the First Fifty Volumes of  
the Quarterly Journal. Part 1, A—La. Part 2, La—Z, 1897.  
*From Col. H. W. Feilden.*
- GEOLOGICAL Society. Quarterly Journal, 15th December, 1897—1st  
February, 1899. London. *From Col. H. W. Feilden.*
- Anniversary Address. 18th February, 1898. By Dr.  
Henry Hicks, F.R.S. *From Col. H. W. Feilden.*
- GLACIAL Period. Essay on its Origin, etc. By C. A. Lindvall.  
Translated from the Swedish. Stockholm, 1891.  
*From Col. H. W. Feilden.*
- GRAY (J. E.). Zoological Miscellany. London, 1831.  
*From Professor Newton, F.R.S.*
- GUADALUPE Island, Birds of. R. Ridgway. 1877.  
*From Col. H. W. Feilden.*
- HARMER (F. W., F.G.S.). On the Range in Time and Space of *Fusus*  
(*Neptunea antiquus*) and its Allies. Extracted from Proceedings  
of International Congress of Zoology, Cambridge, 1898.  
*From the Author.*
- HART (H. C., B.A.). List of Plants found in the Islands of Aran,  
Galway Bay. Dublin, 1875. *From Col. H. W. Feilden.*
- HERODIONES, Studies of the American. R. Ridgway. Washington,  
1878. *From Col. H. W. Feilden.*
- HULL Scientific and Field Naturalists' Club. Transactions, 1898.  
Vol. i., No. 1. Hull, 1898. *From the Club.*
- IBIS (The), a Quarterly Journal of Ornithology. Edited by P. L.  
Sclater, Ph.D., F.R.S., and Howard Saunders, F.L.S. Seventh  
Series, nos. 14—18. 8vo. Lond., 1898—99.  
*From Mr. G. F. Buxton, F.Z.S.*
- INVESTIGATIONS into Applied Nature. William Wilson, Jr. Aberdeen,  
1896. *From Mr. J. H. Gurney, F.Z.S.*
- IOWA Geological Survey. Vol. viii. Annual Report, 1897. Des  
Morines. 1898. *From Col. H. W. Feilden.*
- JANET (C.). Etudes sur Les Fourmis, les Guêpes et les Abeilles.  
Notes 14, 15, 16. *From the Author.*
- JANET (C.). Notes sur les Travaux Scientifiques présentés par  
M. Chas. Janet a l'Académie des Sciences, au Concours de 1896,  
pour le Prix Thore. *From the Author.*



- KAUP Jakob.** *Entwickelungs-Geschichte der Europäischen Thierwelt.* Erster Theil. Darmstadt, 1829.  
*From Professor Newton, F.R.S.*
- LOMAS (Joseph, A.R.C.S.).** *Fossil Plants from St. Helen's. Geology of Farøe Isles. Theory to account for Hexagonal Form of Basalt columns, etc.* Liverpool, 1895.  
*From Col. H. W. Feilden.*
- MANCHESTER Geological Society.** *Transactions.* Vol. xxv. parts 15—19. Vol. xxvi. parts 1, 2, and 3. *From the Society.*
- MANCHESTER Literary and Philosophical Society.** *Memoirs and Proceedings for 1898—99.* Vol. xliii. part 1. Manchester, 1899.  
*From the Society.*
- MIGRATION of Birds.** Sixth Report, 1884. Seventh Report, 1885.  
*From Col. H. W. Feilden.*
- MÈHRING.** *Avium Genera.* 1752. *From Professor Newton, F.R.S.*
- MÜLLER (J.).** *Verschiedenheiten der Stimm-Organen der Passerinen.* Berlin, 1845. *From Professor Newton, F.R.S.*
- NORTHAMPTONSHIRE Naturalists' Society.** *Journal of, Nos. 73—76.* 1898.  
*From the Society.*
- NOVA Scotian Institute of Science.** *Proceedings, etc.* 1897—98. Vol. ix. Halifax, N.S., 1898. *From the Institute.*
- ORNITHOLOGICAL Bibliography.** *List of Faunal Publications relating to British Birds.* Elliot Cones, M.D., Ph. D. Washington, 1880.  
*From Col. H. W. Feilden.*
- ORNITHOLOGIST,** Report of the, for United States for 1886. Washington, 1887. *From Col. H. W. Feilden.*
- ORNITHOLOGY of Southern Texas.** J. C. Merrill. Washington, 1898.  
*From Col. H. W. Feilden.*
- PALÆONTOGRAPHICAL Society.** *British Pleistocene Mammalia.* Parts 1—6. *From Professor Newton, F.R.S.*
- PATTERSON (A.).** *Rambles in Bird Land.* London.  
*From Mr. J. H. Gurney, F.Z.S.*
- PLYMOUTH Institution and Devon and Cornwall Natural History Society.** *Annual Report.* Vol. xii. part 4. 1897—98.  
*From the Society.*
- ROYAL Geographical Society,** *Journal of,* from March, 1898, to May, 1899. *From Mr. H. G. Barclay, F.R.G.S.*
- ROYAL Geographical Society.** *Year-Book and Record,* 1898.  
*From Mr. H. G. Barclay, F.R.G.S.*
- ROYAL Microscopical Society,** *Journal of.* April, 1899. Part 2. Part 4, August, 1898. London. *From the Society.*
- SESSION** *Booke of Bonckle.* Transcribed and Annotated by the late James Hardy, LL.D. Alnwick, 1899.  
*From the Berwickshire Naturalists' Club.*
- SCOTLAND, Fauna of,** with special reference to Clydesdale and the Western District. E. R. Alston, F.L.S. Glasgow, 1880.  
*From Col. H. W. Feilden.*

- SOUTH London Entomological and Natural History Society. 1898.  
Parts 1 and 2. *From the Society.*
- STAFFORDSHIRE (North) Field Club. Report and Transactions. Vol.  
xxxii. 1897—98. Stafford. *From the Club.*
- SUFFOLK. Coleoptera of, by Claude Morley, F.E.S. Plymouth, 1899.  
*From the Author.*
- UNITED STATES OF AMERICA. Year Books of Department of  
Agriculture. 1896 and 1897. Washington.  
*From Col. H. W. Feilden.*
- Department of Agriculture. North American Fauna  
Reports. No. 3, 1890. No. 7, 1893. No. 11, 1896. Washington.  
*From Mr. W. Ruskin Butterfield.*
- Department of Agriculture. Life Zones and Crop Zones  
of the United States. By C. Hart Merriam. Washington, 1898.  
*From Mr. J. H. Gurney, F.Z.S.*
- Department of Agriculture. North American Fauna.  
Nos. 1, 2, 3, 4, 5, 11, 13. *From Col. H. W. Feilden.*
- Department of Agriculture. Cuckoos and Shrikes in  
their relation to Agriculture. Bulletin No. 9. Washington,  
1898. *From Col. H. W. Feilden.*
- Department of Agriculture. Geographic Distribution of  
Cereals in North America. C. S. Plumb, B.S.  
*From Mr. J. H. Gurney, F.Z.S.*
- Work of the Signal Service in the Arctic Regions.  
Washington, 1883. *From Col. H. W. Feilden.*
- VEILLOT L. P. Analyse d'une Nouvelle Ornithologie Elémentaire.  
Paris, 1816. *From Professor Newton, F.R.S.*
- WISCONSIN Academy. Transactions. Vol. xi. 1896—97. Madison,  
Wisconsin, 1898. *From the Academy.*
- ZOOLOGIST (The): a Monthly Journal of Natural History. April,  
1898, to March, 1899. London. *From Mr. G F. Buxton, F.Z.S.*
- ZOOLOGY. Proceedings of the Fourth International Congress of,  
Cambridge, August, 1898. Edited by Adam Sedgwick, M.A.,  
F.R.S. London, 1899.

## ADDRESS.

*Read by the President, MR. J. H. GURNEY, F.Z.S., to the  
Members of the Norfolk and Norwich Naturalists' Society,*

---

### ERRATA.

---

Page 113. For T. C. Amyot read T. E. Amyot.

„ 419. At end of Note on *Paciloscytus vulneratus* for E. G. Wheeler  
read H. J. Thouless.

from many points of view, and only in some degree compensated  
by the payment of £38 11s. 6d. insurance money.

For additions to our shelves last year the thanks of the Society  
are again due to Professor Newton, Mr. G. F. Buxton, Mr. H. G.  
Barclay, Colonel Feilden, and Mr. Butterfield; but these donations  
are at present retained by the Honorary Secretary, until accommoda-  
tion is found for them.

In rebuilding the Library, it is believed the Library Committee  
will be able to assign the Naturalists' Society a larger room for our  
valuable books, which have been crowded for lack of space, and  
for their scientific value deserve better treatment than to be stowed  
away in a confined space.

SOUTH London Entomological and Natural History Society. 1898.  
Parts 1 and 2. *From the Society.*

STAFFORDSHIRE (North) Field Club. Report and Transactions. Vol.  
xxxii. 1897—98. Stafford. *From the Club.*

• SUFFOLK. Coleoptera of, by Claude Morley, F.E.S. Plymouth, 1899.  
*From the Author.*

UNITED STATES OF AMERICA. Year Books of Department of  
Agriculture. 1896 and 1897. Washington.  
*From Col. H. W. Feilden.*

---

ZOOLOGIST (The): a Monthly Journal of Natural History. April,  
1898, to March, 1899. London. *From Mr. G. F. Buxton, F.Z.S.*

ZOOLOGY. Proceedings of the Fourth International Congress of,  
Cambridge, August, 1898. Edited by Adam Sedgwick, M.A.,  
F.R.S. London, 1899.

## ADDRESS.

*Read by the President, MR. J. H. GURNEY, F.Z.S., to the Members of the Norfolk and Norwich Naturalists' Society, at their Thirtieth Annual Meeting, held at the Norwich Castle-Museum, March 28th, 1899.*

LADIES AND GENTLEMEN—I need not say that I was greatly complimented by being for the third time elected President of the Norfolk and Norwich Naturalists' Society, which in the thirty years of its existence has done so much to foster a taste for Natural History in this county, having incontestably achieved as great things as any local Society of its kind in England.

It is impossible not to congratulate ourselves on the Society's extreme good fortune when the Norfolk and Norwich Library was reduced almost to ashes on August 1st, in not losing any of our scientific books, which were in a room by themselves. The back stock of 'The Transactions' which were elsewhere, unfortunately, were so much damaged that Volume 2 is now out of print, and of Vols. 1, 3 and 4, there are not many left, a loss to be regretted from many points of view, and only in some degree compensated by the payment of £38 11s. 6d. insurance money.

For additions to our shelves last year the thanks of the Society are again due to Professor Newton, Mr. G. F. Buxton, Mr. H. G. Barclay, Colonel Feilden, and Mr. Butterfield; but these donations are at present retained by the Honorary Secretary, until accommodation is found for them.

In rebuilding the Library, it is believed the Library Committee will be able to assign the Naturalists' Society a larger room for our valuable books, which have been crowded for lack of space, and for their scientific value deserve better treatment than to be stowed away in a confined space.

I will now, in accordance with our usual practice, briefly glance at the papers read and the work done during the session, which has been in all ways a prosperous one.

In April, Dr. C. B. Plowright sent a note on *Paraselenæ* or Mock Moons, observed at King's Lynn on the 9th March, and Mr. Geldart exhibited a Grass (*Pleuropogon sabinii*), brought from Novaya Zemlya by Colonel Feilden. Mr. Mottram showed under the microscope specimens of Sponge Spicules, and gave an account of Dr. Hinde's work in connection with these objects, also alluding to the Prince of Monaco's paper on Deep-Sea Dredging. Mr. E. Corder exhibited the circulation of the protoplasm in *Nitella*, and made some remarks on the sudden disappearance of this plant in certain localities.

In May, a portrait of the late Sir Edward Newton, President of the Society in 1887, was presented by Professor Newton, and Mr. Francis Sutton read his "Development of the Protective Instinct in Fishes," a subject of much interest. Mr. W. G. Clarke sent an extract from the 'Norwich Mercury,' of 1777, describing Robert Marsham's experiments in washing the bark of trees (*cf.* vol. ii. pp. 133 to 195).

Mr. Bidwell laid on the table a new fruit from the Cape of Good Hope, known as the Melon Pear, of a pale yellow colour, and in taste resembling a Banana. Mr. Patterson showed drawings of a Plaice with an extra fin, and a Crab with two extra claws, and read his monthly notes on Fishes and Birds. On March 28th a Shag was brought him from the sea, which for three weeks proved an interesting pet, for it soon answered to call and would catch fish when thrown to it as neatly as a Pelican. "When hungry," continues Mr. Patterson, "it uttered a harsh discordant trumpet note, and would peck at my boots, more especially at the shoe strings, when demanding attention. It ate  $2\frac{1}{2}$  lbs. of fish a day. On one occasion it ate three ten-inch Whiting one after the other, and a handful of Dabs' heads. It was no hard task to swallow a fish larger than its own head. Gurnards' heads were particularly liked. All the indigestible bones were vomited in a compact mass, reminding one of the pellets of the Owl."

At the October meeting Mr. Patterson again read his monthly notes, and some account was given of the flight of Crossbills in August, and the Scaup Ducks which appeared at the beginning of October, chiefly near the coast (*vide* 'Zoologist,' pp. 122, 125). Mr. H. E. Harris of Leighton Buzzard also sent us a series of photographs of birds from life, some taken in Norfolk, and others at Ravenglass in Cumberland. Those representing Terns and Ringed Dotterel on their eggs were the most appreciated, as such birds are seldom tame enough to be caught with the camera when in the act of incubating.

In November, Mr. Burrell's paper on Mycetozoa brought a good audience, and the subject was rendered doubly attractive by lantern slides of the Slime Funguses, shown on the screen by Mr. Bidwell. Mr. Nicholson produced some rootlets of *Robinia* and Sweet Pea, which showed tubercles, and gave an account of what is known of the connection between the tubercles and the absorption of nitrogenous compounds by the plant; and I gave a dissertation on the bill of the Great Auk, which is shown to vary considerably in different specimens, exhibiting a model of the specimen in Durham Museum.

Our January meeting was rendered additionally agreeable by the presence of Mr. Caton Haigh, who brought with him the, at present, only known specimen of Radde's Bush Warbler which has occurred in Europe, while Mr. Heard of Norwich exhibited a chestnut-coloured Partridge, a variety which has received the name of *Perdix montana*, and of which some account is given in 'The Zoologist,' and a specimen of which has been presented to the Museum by Mr. d'Arcy.

Mr. Geldart's valuable contribution to our knowledge of the Mistletoe was listened to with particular interest, while Mr. Bidwell had for inspection a section of a Beech tree, felled near Norwich, which some inches beneath its surface showed some initials and other carving executed many years ago and grown over afterwards. Mr. Nicholson read a note on Luminous Wood, samples of which, locally obtained, had been lately brought to notice by Mr. Bidwell.

In February, we had highly valuable papers from Mr. A. Bennett,

Mr. Preston, and Mr. Clarke, which will appear in full, and Mr. Southwell exhibited the Head of a Musk Ox, which he had secured for the Museum, which had been obtained in Greenland, and which is of great rarity, very few specimens existing in any European Museum.

The meetings have been well attended, with an average of about seventeen, and ladies several times. Two summer excursions have taken place, the first on June 23rd, to Castleacre, in conjunction with the Science Gossip Club; and the second on September 1st, to Salhouse and Wroxham, with the Yarmouth section of our Society.

On July 23rd, a scientific conference to promote friendly co-operative action between the Natural History Societies of Essex, Norfolk and Suffolk was held at Witham in Essex, when our Society was ably represented by Mr. Southwell. He expressed himself in favour of any movement which should tend to keep together the records of the three counties, and Mr. W. Cole and Professor Meldola spoke in the same sense, and suggested that an annual congress should take place, when papers could be read and subjects of mutual interest to Naturalists be debated. Mr. Cole also thought that an 'East Anglian' Natural History publication to embody the researches of the three Societies might be set on foot. Mr. Miller Christy and Mr. Whitaker also gave their testimony in favour of a three-county federation, but a fuller account of the congress will be found in 'The Essex Naturalist' (p. 360), for a copy of which I am indebted to Mr. Southwell.

At the Bristol Meeting of the British Association in September, Mr. Clement Reid, F.G.S., acted as our delegate on the "Corresponding Societies" Committee. Mr. Reid reports that "one meeting was taken up with a discussion as to size of publications of local Societies, and the form in which reprints should be issued. Various complaints were made; but it turned out, at the end, that the offending Societies were comparatively few, and that the Norfolk Naturalists were not among the offenders. The second meeting was principally devoted to the subject of coast-erosion and coastal changes, but no working scheme for the co-operation of local observers has yet been formulated."



Financially, as you have heard from the honorary treasurer, Mr. Bidwell, our position remains much the same as it was last year, sufficient for our moderate needs and a balance in hand, but little more is to be had in future from the sale of back 'Transactions.'

Mr. Nicholson finds the number of members at the present time to be 256; eight have died, four have resigned, and nine new members have been elected. Of four of those removed by death, Mr. Colman, Mr. Barwell, the Revs. C. R. Manning and J. M. Du Port, Mr. Southwell has kindly prepared the following obituary notices.

"By the death of Mr. J. J. Colman, which took place on the 18th of September last, the Society has lost one of its original and most valued members; in early life Mr. Colman devoted much time to the study of Natural History, especially to Entomology. He was also an active member of the Norwich Microscopical Society, but after the death of his father, which took place shortly after his marriage in 1856, the chief care of an enormously increasing business left him little leisure for such pursuits, not that his interest in Natural Science diminished in the least, for although unable to give his time, both his sympathy and liberal support were always forthcoming when required, and in the old days when the history of our Museum was one continuous struggle for want of means, he was one of its most liberal supporters, retaining a seat on the Committee of Management till the last, his final act being the bequeathal of a number of Pictures to the value of £5000, part of the unrivalled collection of examples of the Norwich School of Artists, which he had got together at Carrow. Mr. Colman was Mayor of Norwich in 1867, when the British Association visited the City, and won the esteem of all who came in contact with him by his genial manners and unbounded hospitality. He also represented the City in Parliament for twenty-one consecutive years, and took a leading part in agriculture, being most successful as an exhibitor of Red-polled Cattle, both at Smithfield and elsewhere. Many of us, doubtless, remember the princely reception given by Mr. Colman to the members of this Society at Corton, on the 31st July, 1879, when he entertained us with his usual

hospitality, causing a section of the Forest-bed to be uncovered for the geologists, and interesting all whether by the fine collection of animal remains from the Norfolk coast (now by the liberality of his son, Mr. Russell Colman, forming part of the extensive collection in the Castle-Museum) or the treasures in all the branches of art collected in his beautiful sea-side residence. I have already mentioned Mr. Colman's liberality to the Norwich Museum, it is impossible to enumerate all the instances in which the institution is indebted to him, but I may mention that to him we owe the re-stuffing and casing of the beautiful group of Norfolk-killed Bustards in the centre of the British Bird-room."

"Mr. H. G. Barwell died on July 9th. He joined our Society in 1875, but never took an active part in its work, although an ardent lover of nature, the beauties of which, as an artist, he was very successful in delineating. Mr. Barwell was for many years Honorary Secretary of the Norwich Government School of Art, where his valuable services will be much missed. We have also to deplore the death of the Rev. C. R. Manning, for forty-two years Rector of Diss, and an Honorary Canon of Norwich Cathedral. Mr. Manning joined our Society in 1871, but was chiefly distinguished as an accomplished archæologist, having been for forty-three years one of the Secretaries of the Norfolk and Norwich Archæological Society, and one of its most frequent and valued contributors."

"The Rev. J. M. Du Port died at Denver Rectory, on 21st of February, having been for some time in declining health. Mr. Du Port joined the Society in 1877, being at that time Vicar of Mattishall, and was an active member, frequently attending the excursions; his genial manners and extensive knowledge of all connected with natural history rendered him on such occasions a most delightful companion, but it was Fungology which he made his special study, and in this branch of botany he attained considerable eminence; his assistance was readily and cheerfully rendered to all who sought it. In 1884, Mr. Du Port succeeded to the Rectory of Denver, having been made Honorary Canon of Norwich in 1881, and subsequently in 1890 was appointed Rural

Dean of Fincham. Greatly interested in educational matters, he will long be remembered by some of our younger members on the occasions when he acted as examiner in the King Edward VI. and the Girls' High School, where his bright and sympathetic bearing removed half the terrors of the examination, and put all at their ease, thereby obtaining the best results. Mr. Du Port contributed to our Society two papers in 1880, one on "The Fungoid Diseases of Cereals," the other on some "Rare Fungi found near Mattishall," and a third in 1893, on a "Remarkable appearance of Fungi in a Field at Ryston, in West Norfolk," all of which will be found printed in the 'Transactions.'

Mr. William Borrer, who died at Cowfold, Sussex, in October last, at the advanced age of eighty-four, became a member of our Society in 1881. He published 'The Birds of Sussex,' a substantial volume of 385 pages, with illustrations, embodying the observations of a life-time, and the notes of many friends, only a few years before his death. On the few occasions on which he visited Norfolk, he manifested great interest in the Museum, regretting that his own ornithological collection had not been equally well preserved at Cowfold from the ravages of moths.

Possibly it will be in your memory that in a former presidential address I lamented the growing scarcity of the rarer denizens of our Broads, and after seventeen years the subject presents itself still more forcibly to my mind, and there is one bird above all others whose decrease every true ornithologist laments, the Bearded Titmouse. It would make some amends if this were spared to us for all our other losses, though we can ill spare the Bittern, the Marsh Harrier, and the Ruff, which like the Avocet, the Black-tailed Godwit, and the Black Tern are gone, it is feared, never to return. With the extinction of the Ruff (last nest in 1889 or 1890) Norfolk loses fourteen breeding species, or if the Crane, Grey Lag Goose, Eared Grebe, Savi's Warbler and Little Bittern be reckoned, nineteen species which once bred within its limits. To these may, perhaps, be added the Hobby, there being no authenticated nest since those which Mr. Norgate found several years ago in Foxley Wood, where, at different times, there have been several nests. On the other

hand, there is some increase of Shoveller Ducks, which is a slight compensation, as the following extract from a letter from the Rev. M. C. Bird testifies: "I have only seen one pair of Shovellers as yet [up to February 26th, 1899]; there were five or six pairs nesting last year. There is no doubt that the decrease of the Garganey Teal coincides with the increase of the Shoveller, but they both probably began to decrease some twenty odd years ago [*i.e.*, about 1875—8], and since then I doubt whether more than two pairs of Garganey have bred in the district [Hickling and adjoining Broads] in any one year, the Shovellers perhaps for a year or two falling even below that average, then rapidly rising again within the last five years, whereas the Garganeys have never meanwhile shown any increase, and are now reduced to the question whether a single pair will stay to breed or no." On March 15th the Shovellers at Hickling had increased to two pair, and several Wigeon, but no Garganey Teal.

Not much is to be said for any of our other Broad-land species, but the Black-headed Gull is happily still very common, and some successful photographs of their nests at Hoveton have been lately taken by Mr. Corder.

My subject, if I took one this evening, would be Norfolk Broads and the Bearded Titmouse; but I have so much to say about this little beauty, and the subject has so grown on my pen, that I think it will be best treated as a separate article. The last report from Mr. Bird is, I am happy to say favourable, he seeing three pairs as recently as the 15th March, in one of their best known resorts: to him and to Mr. Southwell I am much indebted for their assistance in completing the following account of its habits and distribution.

---

## I

THE BEARDED TITMOUSE  
*PANURUS BIARMICUS* (LIN.).

BY J. H. GURNEY, F.Z.S.

*Read 28th March, 1899.*

THE Bearded Titmouse—*Mesange à moustache* of the French—is one of the twenty species for which the British List is indebted to the productive County of Norfolk. Here it was discovered by Sir Thomas Browne, who, through Ray, brought it to notice in 1674. The learned Norwich physician could not have known of its existence, when about two years earlier he wrote his invaluable 'Birds found in Norfolk,' but subsequently he communicated it to Ray, and I drew attention to this passage in 1869. Neither did Ray know it soon enough to include in the posthumously published 'Ornithology' of Francis Willoughby (1676), so the bird was overlooked until Sir Robert Abdy rediscovered it in Essex.

Practically, the Bearded Titmouse is limited at the present day to the Norfolk Broad district, an area twenty-five miles by thirteen, of which part is marsh. Here it still breeds annually, and is found in little flocks throughout the autumn and winter, but whether all these flocks are the same individuals which summer on the Norfolk Broads may be doubted: reasoning from the analogous case of the Wild Duck, Snipe, and Redshank, they probably are not. It is stated to be a summer visitant to some of its Dutch and German habitats, and migratory; and there is a good deal in common between Dutch Fens and Norfolk Broads. So scarce has the Bearded Tit become that scores of visitors to the Norfolk Broads, on Natural History thoughts intent, go away without seeing one. Self-interested marshmen would have strangers believe that this scarcity is owing to hard winters, but their own cupidity is one cause of the decrease, for the truth is, Bearded Tits are not nearly so delicate as their frail appearance would seem to betoken, indeed,

commenced their nests in March, but something would depend on the weather, for March can be a very boisterous month in the Eastern Counties. The nest in Norfolk is generally placed about 2 feet above the level ground, and never in any way suspended, the tallest and stoutest reeds being selected for its support; but exceptionally a nest is in a cluster of Sweet Gale or Dwarf Alder, which grow abundantly round the broads. The nest is composed of the brown blades of *Arundo phragmitis*, and lined with the same plant's feathery top, 2.8 inches inside diameter, and if a projecting piece of reed sticks through the bottom, as I have known to be the case, the difficulty of sitting on the eggs is not on that account insurmountable, however inconvenient. A nice typical nest is the one here photographed by Mr. R. B. Lodge in Heigham Sounds, always a favourite place, and gives a better idea of what it is like than the figure in Yarrell's 'British Birds.' The nest itself and its surroundings, cut out by Mr. R. Chase, is to be seen in The Natural History Museum, among the separately mounted groups of birds.

The eggs, laid early, are very pretty, and at the same time peculiar. Deposited in April, they are generally six in number, though I have found seven, white with specks and short wavy lines of brown, with a pink tinge when fresh, but showing a zone when incubated. Old Joshua, the marshman before alluded to, found two nests, one on the top of the other; and on another occasion twelve eggs in one nest, but in this case two hens were near the nest. Another nest, sent to Mr. F. Norgate by the same man, I believe, contained ten eggs, but two of them were buried under the lining of the nest. It is a fact that the cock bird occasionally takes part in incubation, though this has been doubted by Mr. J. G. Keulemans who has written a pleasing account of the species. Joshua has known them to lay the first egg before the nest was finished, and then a layer of building material, and then some more eggs. An egg taken from a nest on "Hog Hill," Horsey, May 8th, 1889, was placed in an incubator, by Mr. William Evans, but this attempt to ascertain the duration of the incubation period unfortunately was not successful, but Mr. Evans quotes Tidemand's authority for fourteen days, the same as *Parus arvensis*. Lubbock, on the authority of a marshman, gives us a very curious trait in their habits, that in cold weather they sometimes nestle together in



NEST OF THE BEARDED TIT.

*Photographed in Heigham Sounds by R. B. Lodge.*

there are two paragraphs suggestive of migration:—"A Bearded Reedling was seen at the Landguard Lighthouse [on the coast Suffolk, on February 16th, 1887] at 7.40 a.m."—and again from Yarmouth, on November 13th: "nice lot of Bearded Tits are said to have come in at a great height, and from the east," but the correspondent's name is not given (probably Mr. G. Smith). Further evidence of its migratory nature two have been taken in Cornwall, and it is said to have been seen in Pembrokeshire (Mathew).

In its nest and all that concerns the Bearded Tit, a protective colour may be traced. The old cock's black moustaches (which are not double as erroneously represented in Yarrell B. B.) are like the dark corners in the reeds, and his tawny colouring harmonises with the brown tints of autumn. Nowhere is the harmony of nature better seen than in the blending colours of the birds, insects and flowers of Norfolk Broads, where every thing seems made to suit its surroundings. Push your boat into the reeds and lie still, and then a more beautiful object than a cock Bearded Tit, clinging to the uppermost to a tall reed stem, gently waving in the wind, it is difficult to imagine. Except in the vicinity of their nests, or where curiosity gets the better of them, they are decidedly shy, and are inclined to hide low, but by their nests they are better to be seen, as they flit restlessly across one mown open space after another, and sometimes in their anxiety for their eggs betray their whereabouts. They become more unsuspecting when they have young, their care for whom causes them to defy danger and go straight to the very nest in the presence of spectators,—yet they have instinct enough to creep to it, rather than to fly. If there is the least wind, the 'Reed Pheasants,' as they are called by the natives, are not very likely to show themselves, for strange to say what will wave the tops of the reeds will keep them close to the bottom. I have been surprised when walking with an old marshman, an experienced "egger," to notice how often he hears their note when neither of us could see the bird, long experienced in looking for them having sharpened his ear; but it is not loud any time, though described by some persons as shrill, and by Stevenson as ringing and silvery. Indeed, Lord Lilford, who is very fond of the Norfolk Broads, says its note once heard can never be mistaken for that of any other European bird by a good ear, which



no doubt he had. Several authors have alluded to the clear ringing of their call notes, which one admirer (Crespon) compares to the sounds produced by the cords of a French mandolin.

I have been told by our reed-cutters that it is not unusual to see Bearded Tits searching the freshly severed "rands" of reed, as they float lightly on the water, probably for small mollusks and aquatic flies. The late E. T. Booth, when collecting at Hickling for his museum had Bearded Tits in cages, and fed the young ones on flies, and the skinned body of one shot at Ely (where they used to be found), and sent to Mr. Cordeaux, contained very small seeds and river sand in its muscular gizzard, but no flies. Since 1743, when the Countess of Albemarle brought a cage full from Copenhagen (Edwards), it has been popular with bird-fanciers. It is a bird in every way to be recommended for the cage, and Dutch ones can be bought, without infringing on our native stock.

Mr. Young, who has written one of the best accounts of the habits of this charming species in captivity (Trans. Norfolk and Norwich Nat. Soc. vol. iii. p. 519), and who kept one nearly five years, says they have a way of scratching in the sand like a fowl, and that there is no spring moult. Other particulars are given in J. G. Keulemans' 'Cage Birds,' and directions for bringing up the young on bread moistened with milk, and mealworms cut into pieces, ants' eggs and gentles. Also a woodcut of the leg as compared with the leg of a Great Titmouse and a Red-backed Shrike, the latter of which it more nearly resembles in the curve of the hind claw, indeed it was called by Edwards "*The least Butcher Bird.*"

The flight of the Bearded Tit may be described as somewhat laboured, as it flits rather than flies with its heavy half-spread tail, surely incommoding rapid progress, yet this frail little bird is believed capable of crossing the German Ocean. It is in family parties that it is generally to be seen, and I only once remember a solitary one on Norfolk Broads.

On looking over my entries of dates of nesting I quite agree with Mr. Stevenson, that the Bearded Tit is a very early breeder. On one occasion there were young ones to be seen as big as their parents in the middle of June, and on the same day an incomplete clutch of fresh eggs, which would seem to indicate that they sometimes breed three times in a season, the first clutch of eggs being hatched in April. Stevenson and Booth thought that they generally

commenced their nests in March, but something would depend on the weather, for March can be a very boisterous month in the Eastern Counties. The nest in Norfolk is generally placed about a foot above the level ground, and never in any way suspended, the tallest and stoutest reeds being selected for its support; but exceptionally a nest is in a cluster of Sweet Gale or Dwarf Alder, which grow abundantly round the broads. The nest is composed of the brown blades of *Arundo phragmitis*, and lined with the same plant's feathery top, 2.8 inches inside diameter, and if a projecting piece of reed sticks through the bottom, as I have known to be the case, the difficulty of sitting on the eggs is not on that account insurmountable, however inconvenient. A nice typical nest is the one here photographed by Mr. R. B. Lodge in Heigham Sounds, always a favourite place, and gives a better idea of what it is like than the figure in Yarrell's 'British Birds.' The nest itself and its surroundings, cut out by Mr. R. Chase, is to be seen in The Natural History Museum, among the separately mounted groups of birds.

The eggs, laid early, are very pretty, and at the same time peculiar. Deposited in April, they are generally six in number, though I have found seven, white with specks and short wavy lines of brown, with a pink tinge when fresh, but showing a zone when incubated. Old Joshua, the marshman before alluded to, found two nests, one on the top of the other; and on another occasion twelve eggs in one nest, but in this case two hens were near the nest. Another nest, sent to Mr. F. Norgate by the same man, I believe, contained ten eggs, but two of them were buried under the lining of the nest. It is a fact that the cock bird occasionally takes part in incubation, though this has been doubted by Mr. J. G. Keulemans who has written a pleasing account of the species. Joshua has known them to lay the first egg before the nest was finished, and then a layer of building material, and then some more eggs. An egg taken from a nest on "Hog Hill," Horsey, May 8th, 1889, was placed in an incubator, by Mr. William Evans, but this attempt to ascertain the duration of the incubation period unfortunately was not successful, but Mr. Evans quotes Tidemann's authority for fourteen days, the same as *Parus cæruleus*. Lubbock, on the authority of a marshman, gives us a very curious trait in their habits, that in cold weather they sometimes nestle together in



NEST OF THE BEARDED TIT.

*Photographed in Heigham Sounds by R. B. Lodge.*



a cluster, like the Long-tailed Titmouse, and my father has recorded a similar habit in the South African Colies (Zool. 1872, p. 2993). Having supplied the fenman with some dust shot he presently brought Mr. Lubbock six killed at one discharge just before dark, males and females intermixed, which had made a ball of themselves on the reeds ('Fauna of Norfolk,' Southwell's ed. p. 56).

The hen Bearded Tits, which I have examined at birdstuffers' shops and elsewhere, have had at least some trace of the black markings on the back, but the authors of 'The Birds of Europe' say that it is ultimately lost. Possibly they have had in their hands an abnormal instance of a female assuming male plumage (cf. 'The Field,' September 14th, 1872), a transformation which it may be now and then takes place in all birds: their plate excellently represents a male, female, and young, in two stages.

For a long time after quitting the nest, and when they can fly perfectly, the young Bearded Tits have conspicuous black backs, visible a great way off on the wing. The back is the same dark colour when the young ones are in the nest, and it is quite a mistake to say that they are in any respect like the adult female. After they leave it Booth says the young males can be distinguished by their more lemon-coloured bills. The nestling, when hatched, is blind; and one of the most remarkable things about it is that even when only a day old, it has a brilliantly coloured mouth, for raised on the surface of the palate which is red, are four rows of black and white spots like the contrasted colours of the Buckbean flower. The tongue is also partly black which adds to the contrast. It would have been well to reproduce these colours, but my sketch of the palate, done from memory, is not sufficiently accurate for such bright tints.

I think it is a good thing to summarise what is known about the distribution, past and present, of any rare species as has been done very acceptably by Mr. Aplin, such articles saving much labour to the future compilers of British Ornithology; and I will now briefly sketch what is known about the Bearded Tit in other English counties, beginning with Suffolk.

SUFFOLK.—Local ornithologists think the Bearded Tit has almost died out in Suffolk, though it was common enough once, and that as lately as 1830, according to J. D. Hoy (Mag. of N. H. vol. iii. p. 328). Babington gives 1868 as the date of the last nest

(‘Birds of Suffolk,’ pp. 64, 251), known for certain. In 1886 it was still often seen on Oulton Broad, but in 1891 it was rarer and none bred there, though still regarded as an occasional winter visitant. In March, 1899, Mr. Howard Bunn went to Oulton, and saw several gunners for me, and ascertained that a small flock were seen on the 1st of that month by a man named Baxter who knows them. I once heard of a small flock in a little bay on Fritton Lake, but there are not a great many reeds there, and it is probable they have not bred there for a very long time. Mr. Page, the decoyman, has not seen one in a residence of twenty-eight years, neither has Mr. W. Lowne though often on the Lake.

ESSEX.—Supposed to have nested on the Stour in 1868 (Babington, ‘Birds of Suffolk,’ p. 65). Examples also seen in 1885, 1886, and 1888 (Miller Christy), and Mr. Christy thought it possible some might breed.

KENT.—Mr. Douker, writing in 1889, says the Rev. B. Austen shot one in Monkton Marshes some years ago, and in 1865 three were shot near Maidstone (Prentis), but it probably ceased to breed before that. It was formerly found at Charlton and Deptford, places which are now, practically, a part of London. G. Graves in a work now seldom quoted (Brit. Orn. vol. iii. 1821), says in his time it was to be found “in various places adjacent to London; we have killed it on the side of the Surrey Canal, on Sydenham Common; also on the road-side leading from Bermondsey to Deptford, called Blue Anchor Lane; and have seen it in numbers about Erith.” Mr. W. C. Martin, writing in 1854, says he has seen many from the reed ditches between Erith and the Reculvers (Mudie B. B. vol. i. p. 422); and Keulemans, writing twenty years later, says: “Often shot near London . . . I have several times seen the nests with old and young ones at the London birdstuffers.”

SURREY.—Specimens from Elstead and Hampton Lodge (Waring Kidd), but long ago. In 1864 the Rev. J. C. Atkinson thought that it still bred (‘Ibis,’ 1865, p. 121) in Surrey.

SUSSEX.—Mr. W. Borrer saw a nest which he believed to be a Bearded Tit’s, at Amberly, in 1862, as he informed me, or in 1860, as he informed Mr. Butterfield, but there is no allusion to it in his book. However, as recently as 1892, Mr. Meade Waldo, who could not have been mistaken, saw a small flock near East Grinstead.

**HAMPSHIRE.**—No recent specimens are known to Mr. Hart of Christchurch, but his museum contains a pair shot in 1854 (*cf.* Kelsall's 'List of The Birds of Hampshire'), and he is confident that it used to breed.

**CAMBRIDGESHIRE.**—Mr. John Brown of Cambridge tells Mr. A. H. Evans that no Bearded Tits bred except at Whittlesey, and never after it was finally drained; and there were never any breeding at Wicken fen, nor as far as he knows on the marshes past Littleport. In 1865, Mr. A. G. More (and Prof. Newton) considered it extinct, but perhaps it bred a little longer near Ely, where Mr. J. Titterton met with a good many in 1868, and subsequently. In 1897, Mr. Titterton saw fourteen at Boswell pits, and in the winter of 1898 five came to the same spot, but as reed cutting was going on they did not stay.

**HUNTINGDONSHIRE.**—Mr. Dawson Rowley thinks one killed in November, 1866, was the last (*Orn. Mis.* vol. iii. p. 204), prior to which it was considered to be extinct by Mr. Bond.

**BEDFORDSHIRE.**—Of accidental occurrence prior to 1867 (Steel Elliott).

**DORSETSHIRE.**—Several have been met with in former years on the Fleet' at Abbotsbury (Mansel-Pleydell).

**DEVONSHIRE.**—Considered by the authors of 'The Birds of Devon' to have been a resident up to 1840, and H. Saunders thinks that it may possibly have bred in one instance as late as 1888. The Rev. Murray Mathew met with a flock of ten in the autumn on one occasion.

**CORNWALL.**—Two occurrences.

**LINCOLNSHIRE.**—Not uncommon in 1829 or earlier (Hoy), but no modern occurrence known to Mr. Cordeaux, though doubtless abundant enough on the south of the Wash, in the days of the Ruff, and has been known as a Lincolnshire bird for 150 years (Albin).

**YORKSHIRE.**—Six reputed occurrences are given in 'The Vertebrate Fauna of Yorks,' and Mr. Allis speaks of it as formerly not uncommon near Huddersfield (*Morris B. B.* vol. i. 283).

**NORTHAMPTONSHIRE.**—Once met with by the late Lord Lilford.

**MIDDLESEX.**—One seen May 3rd, 1896 ('The Ornithologist,' p. 73).

**HERTFORDSHIRE.**—Near Tring and Hitchin in 1848 (Morris).

**BUCKINGHAMSHIRE.**—A pair shot at Drayton some years prior to 1868 (Clark Kennedy).

BERKSHIRE.—Mr. Aplin draws attention to Dr. Lamb's statement in 1814, that the Bearded Tit was frequent on the Kennet, and bred at Newbury, where Mr. Aplin considers the river valley a very likely spot ('Birds of Oxfordshire,' p. 73).

OXFORDSHIRE.—One or two occurrences many years ago are mentioned ('Zoologist,' 1849, p. 2597).

GLOUCESTERSHIRE.—Thomas Pennant says he saw it, but this was probably 130 years ago, and there seems no later authority for this county.

LEICESTERSHIRE.—Several in 1876, and as recently as 1883 (Montagu Browne): mentioned in Crab's 'Natural History of Belvoir' (1795), as "The Bearded Manica actually shot near Melton Mowbray."

NOTTINGHAMSHIRE.—One occurrence (Sterland).

STAFFORDSHIRE.—Formerly met with (Mc Aldowie, 'Birds of Staffordshire,' p. 53).

CHESHIRE.—A pair said to have been shot at Hoylake in September, 1893 (W. H. Dobie).

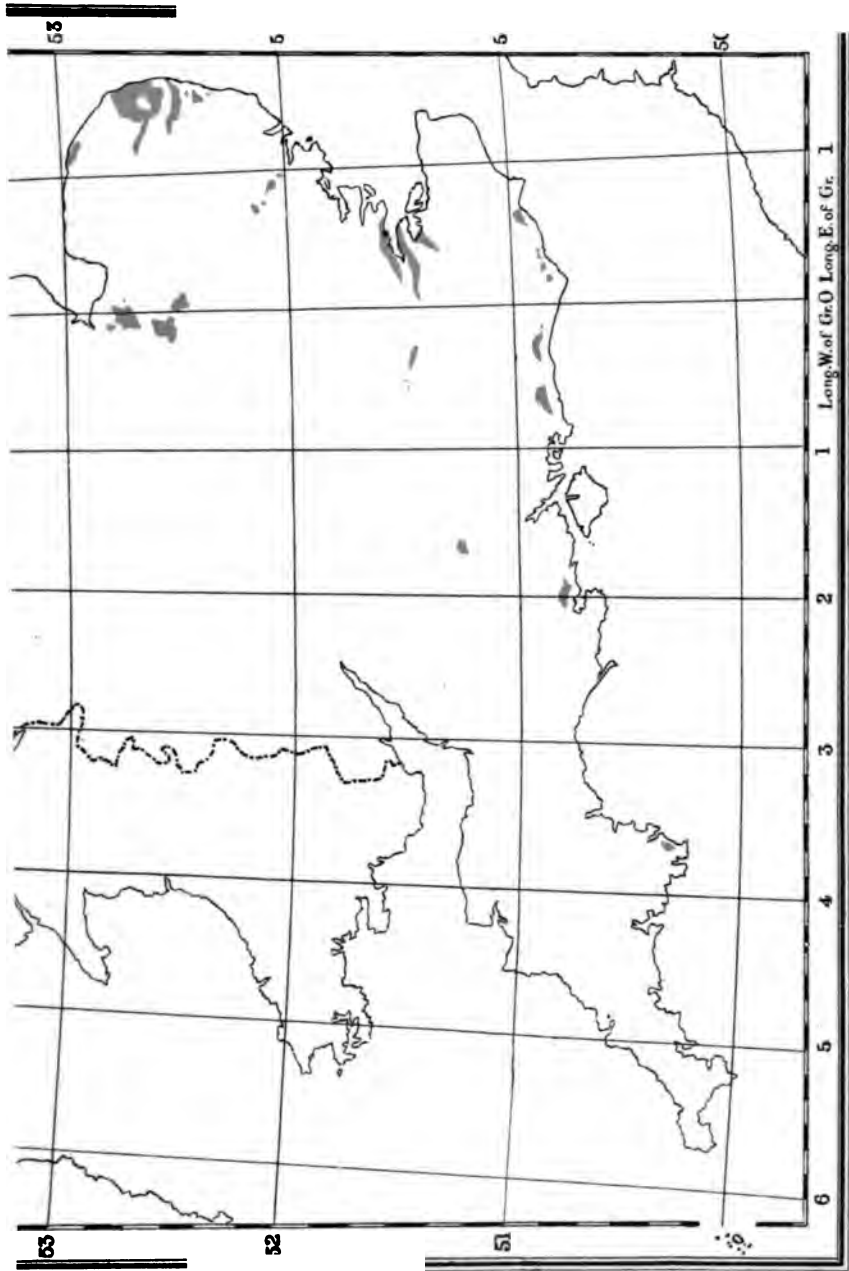
BRECONSHIRE.—Reported occurrence, 'Zoologist,' 1884, p. 486.

In the accompanying map the pink colour is intended to show where this species formerly bred, probably at all times a limited area, for in 1747 Edwards said they were not well enough known in England to have a name; at the same time it is not likely that we recognise all their former haunts. Probably there were no reed beds of sufficient extent in Suffolk and Essex, where they did not breed 150 years ago, as in Norfolk.

It only remains to say that there is only a single species of Bearded Titmouse known, and besides that it is a genus by itself, *Panurus*, Koch, with no nearer allies in the opinion of Dr. Sharpe than the reed birds of the Lower Himalayas and China, *Paradozornis cholornis*, etc. Its range however is extensive, for it reaches to Thibet. It is, undoubtedly, a very isolated and remarkable form, and ought to be considered the representative of a separate family, a view which is confirmed by the way in which it has been bandied about by many authors.

Much that is valuable as to its true position in ornithology, and many further details of its history and habits, which there is not space to dwell on here, will be found in the Fourth Edition of Yarrell's 'British Birds,' and in Stevenson's 'Birds of Norfolk,' and in Dresser's 'Birds of Europe.'





5



## II.

NOTE ON PARASELENÆ, SEEN AT LYNN,  
9TH MARCH, 1898.

BY CHARLES B. FLOWRIGHT, M.D.

*Read 26th April, 1898.*

THE phenomenon of Mock Moons was observed at King's Lynn, on the evening of the 9th March, 1898, by several of the inhabitants. My personal observations were as follows: I left my house at 11.15 p.m.; as soon as I came into the street I noticed that the moon, which was nearly at its full, was surrounded by a large halo ( $45^\circ$  across), within which was the planet Jupiter, towards the West side of the halo, and situated in the luminous part of the circle was a rounded patch of light, looking like a large star in the act of bursting through a bank of cloud; as a matter of fact I thought it was Venus, but a moment's reflection showed that Venus could not occupy this position in the sky. On the Eastern or opposite side of the halo, was a similar but rather fainter, rounded luminous patch. The two Paraselenæ were circular in form but brighter in the centre than they were circumferentially. They were opposite one another, with the moon between them, and were wider than the halo. From the West Paraselene a beam of light extended Westwards, parallel to the horizon, and in the same line as the two Mock Moons, which extended some  $30^\circ$  or  $40^\circ$  below the halo. A little later in the evening this horizontal line of light was supplemented by a second, originating from the Western Mock Moon, also extending Westwards, not exactly parallel to it but inclining slightly downwards towards the horizon. The second beam was never very conspicuous, and soon faded. The Western Mock Moon was, when first seen, much the brighter, but it faded soonest, and at 1.10 a.m. had entirely disappeared. The Eastern Paraselene was however still visible, as a small patch of light.

## III.

THE DEVELOPMENT OF THE PROTECTIVE  
INSTINCT IN FISHES.

BY FRANCIS SUTTON, F.I.C., F.C.S.

*Read 31st May, 1898.*

So far as I am aware very little has ever been written or discussed as to the instincts and emotions of fishes. I suppose that they have generally been considered so much lower than the brutes or birds in this respect that very little can be said about it.

Some naturalists I believe have gone so far as to assert that their existence is destitute of any kind of emotion, and that their nature is more of a vegetative than an animal character. But we know that spiny-rayed fishes, say, like the Perch, are able to manifest what looks like anger or ferocity by the prompt erection of their spines on being handled, or when in the act of seizing their food. Any one who has kept Sticklebacks in an aquarium will have noticed the ferocity of the little male while nesting and hatching is going on, and how he is constantly employed in driving away anything which threatens to molest his offspring. Day, in his book on British Fishes, alludes also to the changes in colour which some fishes undergo, and which appear to be influenced by emotion. For instance, in the case of the common Stickleback, if two of them fight, a strange alteration takes place in the defeated fish, his gallant bearing forsakes him, his gay colours fade away; his defeat appears to have affected his health, and he has the dejected appearance of a conquered slave. The victor, on the other hand, exultant in his victory, becomes more resplendent than ever. This change of colour seems among fishes to be the most prominent evidence of anything like emotion, and is especially evident at the breeding season. Day relates a case observed in an aquarium in America, where a male of the Blenny tribe was kept. On the introduction of a fish of the same kind but of the opposite sex into the vessel, an

almost instant change in the pattern of the colours and their intensity in the male occurred and remained for some weeks.

But my chief object in introducing this question of the protective instinct in fishes is with regard to *inherited instinct*. To put a case plainly, suppose that any given fresh-water fish like the Salmon, Trout, Roach, Bream, or Perch has been caught by a hook furnished with a tempting bait, but has escaped ; or suppose from being too small, or in bad condition, he has been thrown back again ; or say, a fisherman like myself who cares nothing for the fish and only avails himself of them as a means of sport, turns all the fish into the water again, and probably many of these fishes have been caught repeatedly and turned back. Is that any lesson to them as to future caution in searching for food ? I had at one time a good deal of talk with the late Frank Buckland on this subject, and his opinion was that although the means by which such experience in fishes could be communicated to offspring must be very remote, owing to the heterogeneous method of reproduction, yet he believed most firmly that in the case of Salmon or Trout accustomed to live and breed in a certain river, and where they were constantly fished for with the fly, there was an increasing display of caution in taking such baits among the succeeding generations of fish, that in fact there had to be a corresponding degree of adaptation on the part of the fisherman to circumvent this caution by using finer tackle, and by imitating natural baits more closely than was formerly the custom. We know, of course, that the Salmon and Trout which periodically migrate to the sea generally find their way back to the river from which they started.

Buckland assured me that although occasionally mistakes were made, such for instance as sometimes occurs in our own rivers, when a Trout coming from the sea has been caught at Reedham or Cantley, that such occurrences were very rare, and that each fish kept steadily to its own breeding river. My experience, however, has to do with fishes of a lower grade than Salmon or Trout, unfortunately for me, for Norfolk does not furnish much opportunity for this higher class of angling. Pike, Perch, Bream, and Roach are practically the only fish to be met with in our Norfolk rivers, and the sportsman must content himself with these bottom fish in this locality. Pike and Perch, as we all no doubt know, are bold fish, and will often rush at a bright glittering bait, whether it is natural

or artificial, and the fisherman avails himself freely of this tendency on the part of these particular fish. I have myself caught with a spoon as many as a score fish in one day in the Yare, and as an evidence of the fearlessness and the voracity of Pike, I have on one occasion seen a Pike of about seven pounds, rush furiously at a bright spoon hanging over the side of a boat, and dipping a few inches into the water. On one occasion I was using a new bright leaden plummet to fix the depth for Roach fishing, when it was seized by a two-pound Pike on its passage to the bottom, and bolted in a moment.

The voracity and fearlessness of Perch are well illustrated by old Isaac Walton in his pithy comment on this fish: "As you be fishing you may commonly come to a hole where there be Perch, and as you go on fishing you may take them one after the other till they all be gone, for the Perch be like the wicked of this world, he careth not for the destruction of his brother though he perish in his sight."

But the Roach is the most cautious of our local fishes, and next to him the Bream; and it is these two kinds of fish I must use for illustrating what I mean by the title of this short paper. There is, in my personal recollection, a vast difference between the angling of these rivers to-day and that of say sixty years ago. At that time, angling in the Yare was practically limited to the upper river between Surlingham and Norwich. I have some personal recollection as a very small boy of seeing very large hauls of Bream and Roach taken at Surlingham, and I can remember seeing scores of anglers along the riverside, just in front of where the old Thorpe Station was built, and which is now the Goods Station; not only were they angling, but they were catching fish of full size and in large numbers throughout the late summer and early autumn months; the fish were mostly Bream, and I remember to have seen a couple of fishermen fill a bushel basket with these fish in less than a couple of hours. There is now no such sport to be had in that district, except perhaps for a week or two before spawning time when Bream seem to draw up the river to Trowse Eye, but this lasts only for a few days, but at the time I speak of there was no necessity to go down to Coldham Hall, Buckenham, or Cantley. During the whole season any reasonable number of these fish could be caught at or near Norwich. It is not so to-day.

Almost all classes of fish are conspicuous by their absence. There are, occasionally, catches of some size at Whitlingham or Surlingham, but as a rule the fish are found lower down the river at Brundall, Buckenham, or Cantley. Increased traffic and boating no doubt accounts for a great deal of this scarcity in the upper reaches, but the fact is strongly brought out that the catching of fish of this class is by no means so easy as it used to be.

I have in my possession some fishing lines used sixty years or more ago by some of the most successful anglers of that time. These men (one of whom left me as a legacy the whole of his fishing tackle) were the pioneers of angling at Cantley and Buckenham, and they have assured me that, weather being favourable, they had no difficulty in securing not a few pounds of fish but hundredweights, not only Bream (that would be no wonder) but Roach, and the tackle used by them, now in my possession, was so coarse and heavy, that it would be an absolute farce to try and catch a Roach with such tackle in the same place to-day.

Some people think that the fish are far less numerous now than then. I don't believe it, at least so far as Roach are concerned. Bream I believe are curtailed in number, because for some years the large Bream practically disappeared from every part of the River Yare. How or why no one knows, and the mystery has never been cleared up. They are increasing now, and good catches are occasionally made, but nothing like the period of even twenty years ago; moreover the fish are far more cautious, and although a mere tyro may occasionally get a haul of fish, it is practically only the angler who knows the habits and peculiarities of either Roach or Bream (more especially Roach) who can be successful. Nowadays, in order to secure fish, one must use the finest drawn gut for the lower part of the line, and hook almost invisible when in the water, and this applies specially to Roach, but is almost equally advisable for Bream except in very thick water. The state of the water as to colour and turbidity is also, nowadays, an item of greatest importance. One might as well fish in a pail as fish for Bream in clear water; yet at the time I have spoken of, long ago, there was evidently less necessity for this state of things than now. So far as my remembrance goes there was no appearance of the thick water in the neighbourhood of Norwich at that time, and such as is now absolutely necessary for success in Bream fishing.

I suppose it is hardly fair to make any comparison between the intelligence of birds and fishes, but as an instance, I may quote the fact that when telegraph lines were first put up on the Scotch Moors, large numbers of Grouse were killed by striking themselves against the wires, but after a season or two the destruction ceased. The question comes, did the succeeding young birds inherit the habit of flying so as to avoid the wires, or was the habit handed down by animal tradition? We can scarcely imagine that in the case of fishes there can be any kind of tradition as to the danger of hooks, or baits, or that there can be any inherited caution with respect to feeding. The idea of transmission of special intelligence to the progeny of fishes seems to us almost preposterous, and yet if it is a fact (and there seems to be plenty of evidence in favour of it) that fishes in any river do gradually become more cautious, and more difficult of capture, how is it to be accounted for? This is the problem I now put before you, and it is a question very difficult to answer in any satisfactory way, because it opens the question as to whether acquired habits are inherited in fishes, as they no doubt are in the case of some higher forms of life.

---

 IV.

 NOTES ON BIRDS OF THE VALLEY OF THE  
 SOMME.

BY W. WARDE FOWLER.

*Read 27th September, 1898.*

ATTRACTED by a note in a paper by Mr. J. H. Gurney, published in the last issue of the Norfolk and Norwich Naturalists' Society's 'Transactions,' Mr. A. Holte Macpherson and I determined to make a flying visit to Amiens and Abbeville, to see the Great Reed Warbler and other species, if possible. We left London on May 28th, and next morning, thanks to instructions kindly given



us by Mr. Gurney, found the Great Reed Warbler within fifteen minutes' walk from our hotel at Amiens. A boulevard leads from the station to a bridge over the Somme; just beyond the bridge the broad chaussée runs on a high embankment, with large reedy pools on each side of it in deep hollows. From this embankment we at once heard the curious loud croaking of the birds we were in search of, which reminded me of the noise made by the Gulls at the Zoological Gardens when they wish to be fed. No place can be better suited for watching the bird than the pool on the right-hand side of the road; for there is a secluded path between Alders at the very edge of the water where you can see without being seen. The motion of the tall reeds betrays the presence of the bird, which will presently emerge from the undergrowth, climb a stem, and sing or rather declaim vigorously for many minutes without cessation. The song has often been described, and I will only say of it that it is not unlike that of a Sedge Warbler played on a bassoon instead of an oboe; some of the higher and more musical notes are, indeed, to my ear, very like the tones of the upper register of the bassoon. But the general impression left on the ear is that of continual croaking, sometimes Frog-like, sometimes Gull-like.

The Common Reed Warbler was here, the Garden Warbler, and a Nightingale; but on this occasion we did not see any other species. As we could not make any search for the nest of the Great Reed Warbler, owing to the depth of the water, we walked up the Somme for about a mile, and presently reached a large Mere in which was an island with a small restaurant, calling itself "l'île Robinson" (I presume, after Crusoe), where we hired a flat-bottomed boat, and rowed about for an hour in search of likely spots. I landed on one or two reedy islets where the birds were active and noisy, but found no nest; it must have been still too early, and the reeds were not sufficiently grown. Pushing up a narrow stream or ditch which bounded one of the many gardens in this watery region, we saw a Common Sandpiper emerge from under a Gooseberry bush, a singular spot in which to find such a bird.

The afternoon was spent in exploring the picturesque old town, and in strolling on the chalk hills near the citadel, where we hoped to find Crested Larks; but in this we were disappointed.

Next morning we renewed our acquaintance with the Great Reed Warblers, and had excellent views of many of them; the brilliant sunshine lit up the strong rufous colour of their upper parts, which seems to increase in brightness towards the tail. Their attitude when singing on a reed is very like that of the Reed and Sedge Warblers; the white feathers of the throat are puffed out, and the orange gape is shown distinctly, as in the case of the smaller species. Just inside a garden close to the pool on the left-hand side of the road, we found a small Warbler singing a varied, imitative, and most enjoyable song, which reminded us of that of the Marsh Warbler, and puzzled us for some time; this was certainly the Icterine Warbler, as we made out satisfactorily the next day at Abbeville. When we came to know this song better, the difference between it and that of the 'Marsh Warbler became obvious; the general character is not unlike, but it is quieter, less shrill, and does not carry nearly so far. In spite of my deafness, I could detect the Marsh Warbler across the whole breadth of the Somme; but the other I did not hear until close upon it. The Icterine, like the Blackcap and Garden Warbler, remains quietly singing in the same Apple-tree as long as you like to listen; the Marsh Warbler, on the other hand, is seldom in one spot for more than two or three minutes.

While watching these Warblers, a largish brown bird twice rose out of the reeds, flew somewhat heavily a short distance and dropped into them again, giving me a good but very short look through the glass; the bill was unquestionably that of a Bittern, and as I am told that the Little Bittern looks larger in flight than he really is, I imagine my bird was of that species. Macpherson unluckily did not get a good view of it.

We next took train to Abbeville, some thirty miles further down the Somme, and not far from its mouth at St. Valery. Abbeville would make an excellent head-quarters for any one wishing to study the birds of this district; and it may be as well to advise such persons to avoid the slovenly Hotel de la Gare, which is marked with an asterisk in Bädcker, and to patronise the old-fashioned Tête de Bœuf in the middle of the town. All the way from Amiens to Abbeville the Somme flows through a broad valley between cultivated chalk hills, in a maze of streams, ditches, and meres bordered with Reeds, Willows, and Poplars, as

well as in one considerable canal with a towing-path. This is, of course, a comfortable home for the whole tribe of Reed Warblers, and we had the pleasure of hearing our old friend the Marsh Warbler within an hour of our arrival,—the only time I have heard it before the beginning of June. Both Reed Warblers were also here, but it is singular that neither here nor at Amiens did we once hear a Sedge Warbler, though we were so constantly prowling about places in which we might have expected it to abound; nor did we, as we had hoped, come across the Aquatic Warbler (*Acrocephalus aquaticus*). In Reeds by the side of a picturesque Mere, Macpherson found a nest with one egg which puzzled us for a long time, as we did not see the bird; it belonged, however, almost beyond doubt, to a Reed Warbler, but the egg was of that type which approaches nearly to that of the Marsh Warbler. In colouring it was very like the single egg of the Aquatic Warbler which is exhibited at South Kensington, but was somewhat larger and rounder.

We spent the afternoon of a most beautiful and refreshing day in a long ramble to the chalk hills towards the sea, then down through wooded slopes to the valley again, and home across the swampy and reedy flats. As we mounted the hills, we, for the first time, heard some of the familiar birds we had left behind in England, *e.g.*, Chiffchaff, Willow Wren, and Cuckoo. On the cultivated heights were Skylarks, but no Crested Lark. Here the unmistakable Meadow Bunting (*Emberiza cia*), a bird I know well in Switzerland, showed himself to me for a moment, and the rarity of this species in the north of France made the moment a very interesting one. We were not much more than sixty miles from the English coast, and it would seem not impossible that the Meadow Bunting, like other continental members of the group, may make its appearance some day on the south coast of our island. On the way home I found Ray's Wagtail, for the first time since our arrival in France; but these birds are not in their usual numbers this year even in England. Of the Blue-headed species (*M. flava*), I saw a single specimen next morning at Boulogne. Around Abbeville we also found Winchats, Stonechats, Whitethroats, and the Common Redstart, but were surprised to see no Black Redstarts during the three days of our stay.

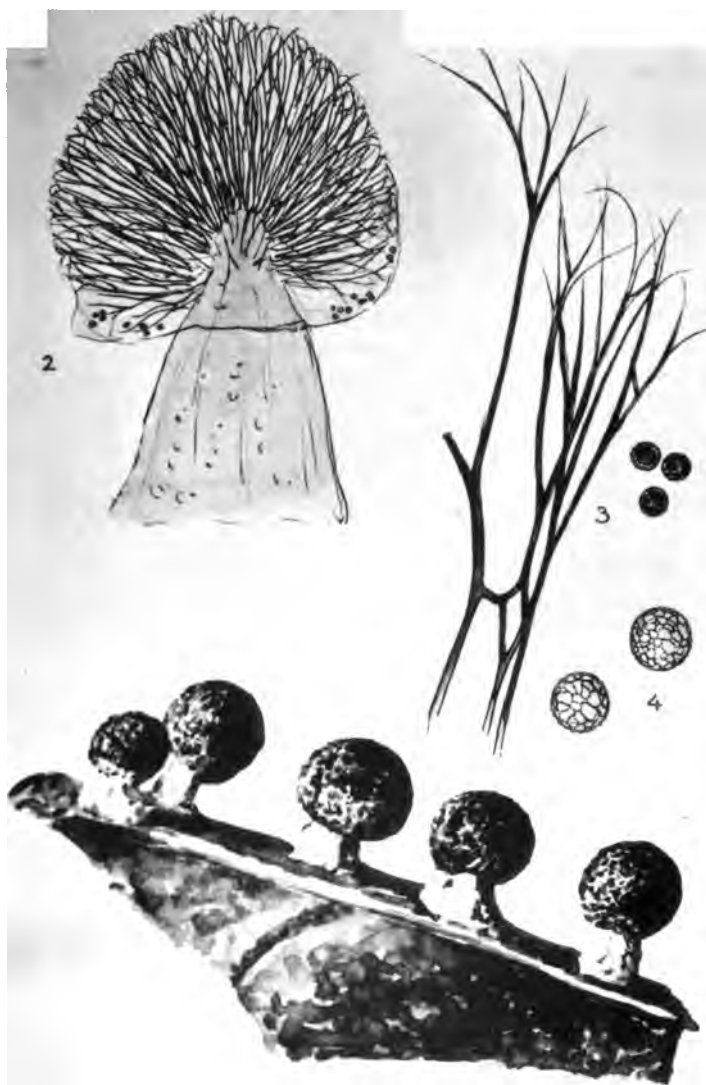
The absence of the Song Thrush was also surprising; but it is probably to be found on the wooded slopes of the hills. The Blackbird was common; the Robin fairly so; and with the exceptions I have mentioned, our common British birds were pretty well represented. But even here the Pied Wagtail was replaced by the White Wagtail, of which species we saw many.

On Whit Monday the weather broke, and I had to be content with listening to an Icterine Warbler near the hotel, while Macpherson went in search of Marsh Warblers where we had heard them the day before. The Icterine has a harsh call-note which is sometimes heard in the song; but the individual to which I listened for a long time here seemed to me to be a remarkably sweet as well as varied singer. It imitated the Song Thrush, Tree Pipit (which was fairly abundant here), Blackcap, Reed Warbler, Whitethroat, Garden Warbler, and Sparrow. That the Hypolais of this district is *H. icterina*, and not *H. polyglotta*, seems to be now proved beyond question; the birds we listened to were too large for the latter, and Macpherson noted the longer wing, which gives the tail the appearance of being comparatively short. Whether the birds recently discovered by Rev. Murray A. Mathew at Lyme Regis, in Dorset,\* belong to the smaller species, may perhaps still be matter of doubt; but the distribution of the two nearly allied species on the western coast of France seems to suggest it strongly, if *H. polyglotta* extends as far north as Brittany, which is opposite to the coast of Dorset.

A more careful examination by British ornithologists of the avi-fauna of the north-west coast of France would probably produce some interesting results. We found our three days' stay most useful and instructive; and a visit of three weeks, or, if possible, of three months, at the right season, would no doubt be found at least as interesting as many journeys which are made to much more distant lands.

\* See 'The Zoologist' for June, 1898, p. 265, and the last edition of H. Saunders' 'Manual,' p. 77.





*PINK. G. Lister, 1870.*

*Yarrow*

**DIACHLÆA SUBSEVILIS (PECK).**

HOLL, NORFOLK, BY J. & E. SAUNDERS, 7-10-97.

1. Sporangium.
2. Sporangium with spores dispersed, showing capitulum.  $\times 75$ .
3. Capitulum threads and spores.  $\times 100$ .
4. Spores.  $\times 1000$ .

## V.

## MYCETOZOA.\*

*Synonyms, MYXOMYCETES, MYXOGASTRES, SLIME FUNGI.*

BY W. H. BURRELL.

*Read 29th November, 1898.*

THE subject of this paper has not been overlooked in the past by the Norfolk and Norwich Naturalists' Society. As far back as 1872 ('Transactions,' vol. i. part iv.) Dr. Plowright published a list of Fungi including several Myxomycetes, and this list was supplemented in 1883 ('Transactions,' vol. iii. part v.); but, learning from the Secretary that it has never been dealt with here apart from the other branches of the great family of Fungi, it occurred to me that a short account of the life history of the class might be of interest.

There are three stages in the life cycle of Mycetozoa :—

- (a) Spore—producing a swarm cell.
- (b) Plasmodium—the vegetative stage produced by the fusion of large numbers of swarm cells.
- (c) Sporangium—the reproductive stage.

The Spores are tiny masses of protoplasm four to fourteen  $\mu$  diameter enclosed in cell walls of congealed protoplasm, which rupture on germination and allow the contents to escape. These swarm cells, each possessing a single nucleus and flagellum, swim freely in water or creep as myxamœbæ; for a few days after germination they increase rapidly in number by bi-partition, the flagellum is then withdrawn, true amœboid movements are adopted,

\* This paper was illustrated with specimens of living plasmodium, sclerotium, and sporangia; lantern slides, photographs, Miss Lister's sketch of *Diachæa subsessilis* (Peck), and some plasmodium which had revived and crept on to glass after remaining dormant as sclerotium for three years.

and the cells fuse together to form masses of protoplasm called plasmodia.

Plasmodium has no cell walls; the contours of the component cells are obliterated and they appear to lose their individuality. Under certain conditions it becomes dormant, drying up to a wax-like consistence (Sclerotium), and it is then observed to divide into more or less regular particles, which Kerner suggests may correspond with the original myxamœbæ. Lister, however, has demonstrated that these particles contain numerous nuclei, and that when the swarm cells coalesce complete fusion of the protoplasm takes place. Plasmodium is generally colourless; in some instances it is coloured, *Badhamia utricularis*, one of the most common species, being a rich golden yellow, and *Trichia fallax* pink. It is saprophytic in habit, rarely parasitic, penetrating the substance of rotten wood, or the damp under layers of decaying leaves in forests, or sodden straw heaps such as are found in farm premises, moving from place to place in search of food by means of a peculiar streaming movement, the more fluid portions setting up currents which flow steadily in one direction for a few seconds and then reverse, with the result that the edge of the mass is steadily pushed forward. This movement from place to place can easily be watched by keeping in a damp dish. I have frequently had specimens under observation, and it is most curious and interesting to notice the changes in situation; sometimes it will be on the upper or lower surface of the food material, at another time wholly transferred to the sides of the dish; at one time having the appearance of a dense mass of slime, and a few hours later covering several square inches with a fine network. Moisture is essential to growth and movement; in dry weather it retires to the interior of the wood, etc., on which it is feeding, but in wet weather, or when mature, it seeks the surface and can readily be found. I was interested to learn from Mr. Upcher's gardener, that he has frequently noticed it on decaying leaves collected for use in his greenhouses, either the heat of fermentation or the desire to assume the fruiting stage driving it to the surface of the heaps; he authenticated this statement by bringing me some, last spring, in the reproductive stage; lack of careful handling had broken up the sporangia, but the fragments and the purple spores were unmistakable.





1000

1000

PLASMODIUM CREEPING ON GLASS.

SHERINGHAM, NORFOLK. W. H. B., 1899.

Magnified 4 diameters.

1000



After a time, varying in different species from weeks to months, a change takes place, the protoplasm concentrates at numerous centres and gives rise to Sporangia; each little heap assumes an outer pellicle, in many cases a stalk is formed that lifts it well above the substratum, and the interior portion undergoes rapid subdivision to form the spores and capillitium.

The Capillitium is a kind of skeleton composed of delicate threads thickened, in many cases, with spiral or transverse bands or with nodules of calcium carbonate; it writhes and twists with every change of atmospheric humidity, and regulates the dispersal of the spores. It may form a more or less complete network supporting the sporangium wall, as in *Arcyria*, *Stemonitis*, etc.; it may be altogether absent, as in *Licea*; or it may be broken up into separate elaters, as in *Trichia*. It affords some of the most reliable generic and specific characters of the class.

According to Kerner, between four and five hundred species have been distinguished; of these about one hundred and thirty are indigenous, and, so far as I have been able to ascertain, fifty-one species and varieties have been found in Norfolk (thirty-nine have been found within a six-mile radius of Sheringham during the past two years). Of the nineteen species given below, not included in Dr. Plowright's lists, three are of special interest.

*Diachæa subsessilis* (Peck) is a rare species which, prior to 1896, had only been found in America, and appears to have been represented by a single type specimen in the New York Museum; in that year, however, it was found in Flitwick Wood, Bedfordshire, by Mr. J. Saunders of Luton ('Journal of Botany,' June, 1897), and in the autumn of 1897 Messrs. J. and E. Saunders found it again at Holt, the second European record. I have had the good fortune to obtain the loan of Miss Lister's coloured drawing of the Hblt specimen; being of local interest, Mr. Saunders has most kindly suggested that it should be published in connection with this paper. I believe it has not been previously figured in any English work.

*Physarum straminipes* (Lister), found on straw in a sheep-fold on the Sheringham Hall estate, October, 1898, is a species recently established on specimens found near Luton ('Journal of Botany,' May, 1898).

*Trichia botrytis* (Pers.) var. *munda* ('Journal of Botany,' June, 1897) has been found on several occasions in Mr. Cremer's woods at Beeston Regis.

I beg to acknowledge my indebtedness to Mr. Bidwell for providing the lantern this evening, and to Mr. James Saunders, not only for the loan of slides, specimens, and coloured sketch, but especially for the generous way in which he has allowed me to make use of his extensive knowledge of the subject.

A list of nineteen species of *Mycetozoa* not previously recorded in the Society's 'Transactions':

- BADHAMIA NITENS. Berk.  
 PHYSARUM NUTANS. Pers. var. VIOLASCENS.  
 „ CALIDRIS. Lister.  
 „ COMPRESSUM. Alb. and Schw.  
 „ STRAMINIPES. Lister.  
 „ CINEREUM. Pers.  
 „ DIDERMA. Rost.  
 „ CONTEXTUM. Pers.  
 CHONDRIODERMA MICHELII. Rost.  
 „ RADIATUM. Rost.  
 DIACHÆA SUBSESSILIS. Peck.  
 DIDYMIUM NIGRIPES. Fries.  
 STEMONITIS SPLENDENS. Rost.  
 ENERTHENEMA ELEGANS. Bowm.  
 LAMPRODERMA IRIDEUM. Mass.  
 LICEA FLEXUOSA. Pers.  
 TRICHIA PERSIMILIS. Karst.  
 „ VARIA. Pers.  
 „ BOTRYTIS. Pers. var. MUNDA.  
 ARCYRIA FERRUGINEA. Sauter.
-

## VI.

THE MISTLETOE: ITS HOSTS AND DISTRIBUTION  
IN GREAT BRITAIN.

BY HERBERT D. GELDART, V.-P.

*Read 31st January, 1899.*

SOME discussion having lately taken place in one of the local papers originating in a question as to whether the Mistletoe ever grows on the Oak in Great Britain, I looked up a little information on the subject, and thought that some of it might interest our members, it being quite understood that all I have to say is drawn from various sources and is not original on my part.

The best account of the Mistletoe and its hosts that I know of is to be found in the 'Flora of Herefordshire,' edited by the Rev. W. H. Purchas and the Rev. Augustin Ley, both of them botanists of high repute, published in 1889, and this is largely based on two papers in the 'Transactions' of the Woolhope Club, one by Dr. Bull in 1864, and the other by the Rev. T. Blight in 1870.

Mistletoe abounds in Herefordshire, and is recorded from every one of the fourteen districts into which that county is divided, for botanical purposes, by the Woolhope Club. It has been found there upon thirty-two different trees, viz., Apple, Common and American Crab, seven different Poplars—Abele, Grey, Aspen, Black, Black Italian, Canadian, and Ontario; Hawthorn, three Maples—Common, Eastern, and Western; Lime, Whiteflowering Acacia, Ash, Mountain Ash, Two Willows—White and Round-leafed Sallow; Hazel, Pear, Oak, Alder, Sycamore, Dog Rose, Medlar, Wych Elm, Yellow Horse Chestnut, White Beam, Laburnum, and Walnut.

The authors also state that out of Herefordshire it has been

recorded in England on eleven more trees, viz., Buckthorn, Red Swamp Maple, Horse Chestnut, Filbert, Catalpa, English Elm, Gooseberry, Plane, Yew, Cedar, and Larch. To this long list I can add one more, from my own observation, having seen it on Weeping Willow at Caversham, in Oxfordshire, thus making a total of forty-four hosts on which Mistletoe has been seen in England.

But there are twelve trees on which it has never been observed spontaneously in England, viz., Beech, Birch, Bird Cherry, Wild Cherry, Blackthorn, Hornbeam, Elder, Holly, Dogwood, Box, Lombardy Poplar, and Sweet Chestnut.

Mistletoe is the only truly parasitic flowering plant of Great Britain, that is to say, the only flowering plant which requires no assistance from the earth, but develops upon the body of its host in the spot where it is to spend its life, and is solely dependent on the juices it absorbs. Dodder, for instance, which is truly parasitic in its flowering stage, for the most part germinates in the earth, and severs its connection with its own root when it has got a firm hold of its victim and can "steal its sustenance" from it. Unlike most other plants, with which the usual rule is that one seed has only one embryo, the Mistletoe has often more than one embryo, sometimes as many as three embryos in a single seed, and each embryo forms a separate plant.

Mr. Blight describes the growth of the Mistletoe. "After the berries have been devoured by birds, the seeds, with most of their viscous matter absorbed by digestion, are ejected in masses of from eight to twelve. Such masses generally fall on the upper surface of the branch, from which the rain mechanically carries the seeds to the under surface—the viscous matter still about them being sufficient to make them still adhere firmly to the bark." After the viscous matter has disappeared, the processes (*i.e.*, radicles) push their way through the dead coverings; they advance parallel to the bark until they attain the length of a quarter to three-eighths of an inch the club-shaped end of the process bends downward and becomes a disc, from the centre of which a radicle descends and penetrates the bark; on reaching the cambial layer it begins to swell into a spherical form, and nutriment is absorbed by not only the advancing root but also by the whole surface of the disc.

Once established on any given tree, the Mistletoe plant soon

begins to increase by another mode of reproduction. This is effected by means of *rhizomes* exactly corresponding to the underground stems of terrestrial plants. To this rhizomatous reproduction is mainly due the abundance of Mistletoe on trees upon which it has once established itself.

“A transverse section of Mistletoe on a branch usually shows a central root and one or more side roots, all of which are generally directed towards the central pith; while the root is thus advancing towards the pith, the Mistletoe expands laterally in the *liber* of the branch. This lateral expansion causes a sort of *corm* or crown of the root to appear which continues to expand in all directions, following the curvature of the branch. This lateral expansion, in some cases, goes on till the branch is almost entirely surrounded by a ring of Mistletoe with its roots converging towards the centre, like so many spokes of a wheel. Thus the Mistletoe carries its own death with it, for by living it deprives itself of the means by which it lives.”

So close and complete is the union between the Mistletoe and its host, the robber and the robbed, that De Candolle found that when he immersed an Apple branch bearing Mistletoe in water coloured with Cochineal, which penetrating the wood and inner bark of the Apple-tree entered into the Mistletoe, its colour was even more intense in the latter than in the former; a fact which will be readily believed by any one who has ever tried to dye a section of Mistletoe, for it sucks up the stain more readily than any other wood I have ever stained, and I have tried not a few.

The peculiar virtues ascribed to the Mistletoe when grown on Oak are, in Pliny's words, that “it would give fruitfulness to all barren animals, and would act as a remedy against all poisons.” Mrs. Lankester quotes a letter from ‘Notes and Queries,’ from the Countess of Danby to her “Cozen;” date between 1663 and 1682, begging for a piece of the “Mistletoe of yo<sup>r</sup> father's Oke.” That it does sometimes grow on the Oak there can be no doubt, as Messrs. Purchas and Ley mention five Oak trees in Herefordshire alone, and give particulars of each locality. The Rev. Kirby Trimmer, in his ‘Flora of Norfolk,’ has three records, the first on Oak at Shottesham (Mr. Bransby Francis); this, knowing the recorder well, I accept with confidence. Of the other two at Aldeby and Woodbastwick, not knowing the recorder,

I can only say that Mr. Trimmer was a very cautious man and difficult to convince, except on good evidence.

As to the suggestion that the plant cut from the Oak by the Druids was *Loranthus* and not Mistletoe, this might be all very well for Austria or Italy, supposing that there were any Druids in those countries, but can hardly apply to Great Britain, where the *Loranthus* does not grow.

According to 'Topographical Botany,' second edition, our present best authority, Mistletoe occurs spontaneously in thirty-one counties of England, from Devonshire (which is queried as planted?), but certainly from Somerset to York, and in one county of Wales, Denbigh; to which must be added one or two more, as Mr. J. E. Griffiths, in his 'Flora,' published in 1895, records it for both the mainland of Carnarvonshire and the Island of Anglesea. It is not recorded with certainty from Cornwall, Huntingdon, Lincoln, Lancaster, Durham, Northumberland, Cumberland, or Westmoreland.

In Scotland it is not native. There is an entry in Sir W. J. Hooker's 'Flora Scotica' which has caused some question; the original record in 1821 stands, "Woods of Mickleour (on Beech?)." We have seen that Mistletoe does not grow on Beech in England; and this same entry dwindled down in the same author's 'British Flora' of 1850, to "Meikleour introduced." In East Anglia it cannot be called abundant. In our own county it has been recorded by Mr. Kirby Trimmer as growing on Apple, Hawthorn, Poplar, Ash, Oak, and Maple. I have seen it myself only on Apple, Ash, and Hawthorn. In Suffolk, Dr. Hind adds Lime and Crab; but in Cambridgeshire, Professor Babington has only two records, and mentions only the Apple as host.

Its European distribution, according to the 'Compendium of Cybele Britannica' is Europe, all except Lapland and Finmark and Northern Russia; it also grows in Siberia.

---



VII.

*SENECIO PALUDOSUS* AND *S. PALUSTRIS* IN  
EAST ANGLIA.

BY ARTHUR BENNETT, F.L.S.

*Read 28th February, 1899.*

FOR some time I have made a point of jotting down any notes I come across on the dying-out or nearly extinct species of the British Flora. In doing this I find I have come across stations, etc., hitherto unpublished; and while I can, it seems best to put on record what I have gathered together, and as these two species are of the greatest interest to East Anglian botanists, I am sending these notes to the Norfolk and Norwich Naturalists' Society. They may be viewed as a contribution to the history of the two species as British plants. I take the counties as they are named in Watson's 'Topographical Botany,' ed. 2, 1883.

*SENECIO PALUDOSUS.* Linn.

*English Names.*

MARSH GOLDEN-ROD.	Petiver. Herb. Britt. t. 16, fig. 8, 1767.
SAW-LEAFED FLEABANE	} Gray, Nat. An. Brit. pl. p. 469, 1820.
MARSH CONSOUND	
MARSH GOLDEN-ROD	} Various authors.
GREAT FEN RAGWORT	
MARSH GROUNDSEL	
BIRD'S-TONGUE	

This is one of our rarest species, and according to Mr. Clarke's 'List of Earliest Notices,' was first recorded by Ray in his Catalogus Plantarum circa Cantabrigensis nascentium 37, 1660.

26. SUFFOLK WEST.—Though variously stated, and leading one to suppose there may have been two stations, I believe it was only one; it was discovered by Mr. F. R. Eagle in 1798, at Lakenheath Fen, near Wangford. I have seen many specimens gathered by Mr. Eagle and others, but I cannot find any of a later date than 1817. This date is, however, open to correction. Within the last ten years the ground has been carefully gone over, but no trace of the species exists; neither do I think it will be refound here judging by the surroundings.

27. NORFOLK EAST.—E. or W. Eng. Bot. ed. 3, 5, p. 88, 1866. For certain reasons I believe this will be Norfolk E. The authority for Norfolk is a specimen in Sir J. E. Smith's herbarium at the Linnean Society; with the note, "Found by myself and J. Sherard in Norfolk." In the 'Phytologist,' pp. 152, 295, 1861, Mr. W. Winter says, "Occasionally found at Ranworth." While the locality in itself is not an unlikely one, no one else seems to have been able to find it. I have searched many likely places for this species, but without success; yet, so difficult of access are some of these places, that I do not despair of its being refound some day.

After this was written I was enabled, by the kindness of Mr. Cross, to examine the copy of the 'Flora of Cambridgeshire' that belonged to the late Mr. W. Marshall of Ely; and in this I found a definite Norfolk station for *Senecio paludosus*, i.e., Redmore Fen, in the south-west corner of the county, bordering on Cambridgeshire; indeed, Mr. Marshall seems to have considered it was Cambridgeshire. In present maps it is called Redmore Fen, but in 1789 all these Fens were spelt "Fenn." In his notes of species "extinct since I began to observe plants in 1834," Mr. Marshall calls it "Redmoors."

Mr. Cross also lent me a map dated 1789, and I find there were three fens at Lakenheath, "Lakinheath Mow Fenn," "Lakingheath Stallard Fenn," and "Lakingheath Common Fenn"; the spellings are as on the map. If we consider "Lakenheath Fen by Wangford," it would apply to the third one named. Another interesting item I culled from this map. What are now called "Wilton Fens" in South-west Norfolk (the owners of this land in 1789 were named Wilton), in that map they are named "Sea Fenn and Cowells in Hockwold and Wilton." Here we have the suppression of an old name, which was a very suggestive one too (read by the light of

Mr. Barrett's Entomological papers\*), for the names of the owners, which mean nothing.

CAMBRIDGESHIRE.—By some error the species is put between inverted commas in 'Topographical Botany.' By some means both Mr. Watson and Mr. W. Marshall must have misunderstood each other. But there is no doubt Mr. Marshall did gather it many times, as he admits in letters to myself. Cambridgeshire has always been its head-quarters in England.

Isle of Ely, two specimens, gathered by Dawson Turner, are in Winch's herbarium at the Linnean Society. Padnal Fen near Ely,† W. Marshall; Barraway Washes, W. Marshall. In 1789 this was called "Barway." Three miles below Ely in 1833, Henslow. Littleport, Burwell Fen, Relhan, quoted in Eng. Botany, p. 650. Chatteris, J. Martyn.

We have found it in many places in the Fens, as by a great ditch side near Stretham Ferry; Ray.

Wicken Fen near Upware. In this Fen, from 1800 to 1825 (and, perhaps, to 1838), many specimens were gathered by the Rev. J. Holme! In 1857 Professor Babington gathered it also in the Fen; but from his journal it would seem only a single specimen, with two stems. This is the year it was reported as being brought into the Botanic Garden at Cambridge. Was the single plant taken?

Since 1857 a few specimens have been found; but I do hope if any one does find it they will let it remain, as the Fen is still undrained, and although, perhaps, not so wet as formerly, it is still not easily gone over in a wet season. It must have been fairly plentiful here in former years, as I have seen a good many specimens, and others are sure to have been lost or destroyed.

LINCOLN SOUTH.—Wet land near Hare Booth, Sir J. Banks. Banks of ditches near Braford Water, half a mile from Lincoln, Rev. Wollaston.

LINCOLN NORTH.—Fen near Revesly Abbey, *i.e.*, the East Fen. Specimen thence in the herbarium of the British Museum. When the species was last gathered in Lincolnshire I have been unable to ascertain; but careful search about 1850-2 by Mr. E. Forster failed to find it. It has been reported from "Chester. By the

\* Cf. Trans. Norfolk and Norwich Nat. Soc. 1870—1, p. 61 and 1871—2, p. 41.

† "Ely Mow Fenn or Padnoll," 1789.

eastern side of the Dee, just above Eaton Boat, sparingly" (Waring in 'Botanists' Guide,' 1805, p. 118). And it was marked for "Ross" by Mr. Gordon in a catalogue for Mr. H. C. Watson, likely in mistake for *S. aquaticus*.

*SENECIO PALUSTRIS.*

First certain record, about March and Chatteris; Ray, Cat. Plant. c. Cantab. nas. 37, 1660, *l.c.*

*English Names.*

MARSH FLEABANE. Petiver. Herb. Britt. t. 16, f. 5, 1767.

JAGGED FLEABANE. Petiver. *l.c.* f. 6, 1767.

HOARY FLEABANE (?). How. Phyt. Britt. 30, 3, 1650.

"TRUMPETS." Note by Mr. J. Crowe in Hudson's *Fl. Anglica*, circa 1790.

GREAT JAGGED-LEAVED FLEABANE.

MARSH FLEAWORT. Withering, An. Brit. Pl. ed. 7, v. 3, p. 939, 1830.

This species was much more abundant than *S. paludosus*, not only as to numbers, but as to counties; but it has now become very scarce. It is uncertain in its appearance, as, notwithstanding what is stated in books, it is a biennial (not a perennial), as I find in my garden, and at Filby. But I think I could gather it in three counties still.

That the plant must have been fairly abundant formerly, is shown by its having acquired a real local name, *i.e.*, "Trumpets," at Halvergate, Norfolk. The name of "Trumpets" does not occur in Britten's and Holland's 'Dictionary of English Plant Names,' as applied to any species of *Senecio*. We have here a local name solely preserved by a marginal note in an old Flora.

In former days the ground around Acle and thence to Halvergate must have been very wet; even in the present day the new line to Acle was not made without a great many difficulties being encountered.

SUFFOLK EAST.—Abundant by the turnpike gate at Haddiscoe, Mr. Wigg!

Haddiscoe, Suffolk, 1791, I. W. ex. herb. Woodward. Winch herb. at Linnean Society!

Burgh near Yarmouth. Winch herb., *l.c.*

Geldeston Fen, Mr. Woodward. As Mr. Woodward gave this from Geldeston, Norfolk, it probably occurred on both sides of the river.

Worlingham Common, Rev. G. Crabbe. At the first after you come into Lovingland. J. Sherard in Dill. Ray.

Belton. Paget's 'History of Yarmouth.'

SUFFOLK WEST.—Lackford, June, 1774. Sir T. G. Cullum in herb., Skipper. 'Suffolk Flora,' 208.

Wangford; Herb., Mrs. Casbourne. Flora, *l.c.*

Brandon; Herb., Forster in British Museum! First found by Mr. F. R. Eagle.

NORFOLK EAST.—Caistor Common near Yarmouth, 1781. Winch herb.!

Brakenham in Ormesby.

Halvergate, and here called "Trumpets." Mr. J. Crowe in Hudson's Fl. Anglica, the three last localities.

Geldeston, Mr. Woodward.

Near Acle Bridge, Sherard.

St. Faith's Newton Bogs, Sir J. E. Smith.

By the side of Haddiscoe Dam, Sir J. E. Smith!

By Heigham and Ludham Bridges, D. Turner.

Heigham Bridge. Paget in herb., Watson.

Wroxham Broad near Hoveton, June, 1854.

Rev. Hort in C.C. Babington's herb.!

At Antingham, Mr. B (ryant), 1781.

Runham; Martham; Stalham; Somerton; Rollesby.

Rev. K. Trimmer in Fl. of Norfolk and Supplement.

Filby for many years from 1865! It occurs here in two stations, in one very sparingly; but in the other sometimes in abundance. I have seen, within eye-view, thirty specimens in full flower; and the year after a "botanist" (to whom I unfortunately showed the station) took nearly a hundred good specimens.

NORFOLK WEST.—Skoulton (Scolton) Mere near Hingham, Mr. J. Crowe. Methwold Fen, 1832, Mr. W. Marshall in herb., H. C. Watson!

CAMBRIDGESHIRE.—In a ditch at the edge of the moor near to the Park at Chippenham, Relhan. About March and Chatteris, Ray. I know of no recent occurrence of this plant in this county.

HUNTINGDONSHIRE.—Near Ramsey, Woodward. In Withering's Brit. Plants, ed. 7, vol. 3, p. 943, 1830, the Ramsey plant is given as 'var. 3'; but the plant is very variable in leaf-cutting.

LINCOLN SOUTH—This is an error, it should be Lincoln North; as the East Fen where it occurred is situated in North Lincoln. Fen near Revesly Abbey, autumn, 1785, Sir J. Banks in herbarium, British Museum! "In some years in vast abundance, in others very scarce," Sir J. Banks in Turner and Dillwyn's 'Botanist's Guide,' 391, 1805.

SUSSEX WEST.—Amberley, specimen, Dr. Manningham\* in Rand's herbarium (at British Museum), 1725. I do not think this has been published as a Sussex species; but the Amberley Wild Brooks must have been in those days an exceedingly wet morass.

The other counties given for this plant, all extinct (if found) are:

WESTMORLAND.—In Hildverston Moss, by Burton Lawson about 1680.

LANCASHIRE.—Pillin Moss, Ray.

GLAMORGANSHIRE—Sandy meadows by the seaside at Aberavon, Ray.

STAFFORDSHIRE.—Mr. Spark in Garner's 'Natural History of Staffordshire.'

CORNWALL.—Mr. Pascoe in Watson's 'Cybele,' vol. 3, p. 461, 1852.

*SENECIO PALUSTRIS* D.C. IRELAND.

19. KERRY.—In the barony of Clanmarvine, near Linnan, in several ditches. Dr. Smith, 'History of Kerry,' 1766.

\* Was Rector of Slinfold, Sussex, for thirty-nine years.





"FLINT JACK" IN 1863.

*From Photograph kindly lent by Major Fitch.*



## VIII.

## "FLINT JACK:" HIS LIFE-HISTORY.

BY W. G. CLARKE.

*Read 28th February, 1899.*

THE very Prince of fabricators of antiques," was the description "Flint Jack" given by Mr. Llewellyn Jewitt, F.S.A., in an article in the 'Reliquary' for October, 1867. It is improbable that "Flint Jack" surpassed some of the Brandon knappers of the present day in the production of spurious flint implements, and none of these can claim his wonderful versatility. Prior to his death, and when his fame was at its highest, there appeared numerous articles in the magazines dealing with this wonderful impostor. The details of his life have chiefly been culled from these, although various correspondents have rendered material assistance. In addition to the article already mentioned, others were published in the 'Malton Messenger,' 'All the Year Round,' the 'People's Magazine,' and the 'Catalogue of the Salisbury Museum.'

So far as can be ascertained, "Flint Jack's" correct name was Edward Simpson, and he was born in the village of Sleights, near Whitby, in the year 1815. He was, in later years, equally well known as John Wilson of Burlington, Jerry Taylor of Willerydale, and Edward Jackson; while his other *aliases* included "Fossil Willy" (on the Yorkshire coast); "Bones" (at Whitby); "Shirtless" (in the Eastern Counties); "The Old Antiquarian" (Wilts and Dorset); "Snake Billy," "Cockney Bill," and "Flint Jack" universally.

His father was a sailor; and at the age of fourteen Edward Simpson entered the service of Dr. Young, the historian of Whitby, from whom he acquired his knowledge of geology and archæology, frequently accompanying his master on fossil-hunting expeditions. He left Dr. Young to serve Dr. Ripley, with whom he remained

until the doctor's death in 1840. At that time he was described as an "active and more than ordinarily intelligent young fellow." Upon his master's decease, Edward Simpson took to a roving life around Whitby and Scarborough, gathering and cleaning genuine fossils. During this period he appeared before the Scarborough magistrates for some offence, but escaped on the plea of being a geologist. In 1843 he was shown a barbed flint arrowhead by a dealer at Whitby, who asked if he could make one like it. At first he had many failures, and was musing one morning, when he took off the hasp of a gate, and with the curved part absent-mindedly struck a piece of flint. A flake flew off, and he tried again, soon acquiring the knack of chipping however he wished. At that time he could make and sell fifty flint arrowheads per day. Thenceforth dates the extraordinary supply, and the life of imposture which he led for so many years.

The distinctive signs of prehistoric flint implements were then not so well understood as they are at the present day; and although no fault could be found with the *shape* of the spurious implements made by "Flint Jack," the *chipping* was of the crudest description. The spurious implements made by Brandon knappers nowadays are distinctly superior. He studied various antiquities in museums, and set himself to the fabrication of all kinds of antiques, for which purpose he spent years in comparative seclusion. In the beginning of 1844 Edward Simpson was at Bridlington, and by judiciously leavening his spurious with genuine implements, made a collection of six hundred "genuine" for a local antiquary. He ordinarily walked thirty or forty miles a day, vending his wares and collecting materials. Towards the end of the year he started making British and Roman urns, first near Bridlington, and then near Raven's Hall. After a "baking-day" he would proceed either to Whitby or Scarborough, and there dispose of his "collections," which he solemnly declared were taken from tumuli (pronounced *toomoolo* by him) on the moors. These urns were too thick in the walls, of wrong material, ornament, shape, and burning, but the knowledge of British antiquities was then but small, and there was little risk of detection. "Flint Jack" was asked his opinion of a set of *genuine* implements, and, in a moment of weakness, confessed that he made them. At Malton, he sold a local antiquarian a spurious hatchet of ironstone for one shilling. Out of



Spurious Axes, made in Suffolk in 1898. Chipped ones of Flint; unchipped of Plaster,  $\frac{1}{2}$  size of originals.



Spurious Flint Arrowheads and Spearhead; made in Suffolk in 1898,  $\frac{1}{2}$  size of originals.

was a meeting of the Geologists' Association, in their rooms in Cavendish Square, when a paper was read by the Rev. T. Wiltshire, on "The Ancient Flint Implements of Yorkshire and the modern fabrication of similar specimens." "Flint Jack" was present, and demonstrated his simple method of manufacture.

"Flint Jack" again visited Salisbury in 1863, when his photograph was taken by Mr. Treble. Mr. Fitch has a copy of this, and another is to be found in the Lynn Museum. A full-page engraving from this photograph appeared in the 'People's Magazine' and the 'Reliquary.' Lower and lower did he sink in vice and misery, until at length, in April, 1867, he stole some goods at Bedford, while in an intoxicated and half-starved condition. He was sentenced to twelve months' imprisonment, and was confined in Bedford Gaol, where John Bunyan had preceded him in durance vile. It was, however, stated in January of that year that "among antiquarians he could generally raise a trifle for pressing needs—a proof of their placable disposition, but when possessed of a little cash he drank without ceasing until it was gone." At that time many archæologists had hanging in their residences a portrait of "Flint Jack" framed in spurious flint implements of his making. In the 'Reliquary' for October, 1867, the editor appeals for help to assist "Flint Jack" when he came out of prison, and says: "The man possesses more real practical antiquarian knowledge than many of the leading antiquarian writers of the day; and he is a good geologist and palæontologist." The pity is that his talents were not put to better use. The 'Newcastle Daily Journal' of May 14th, 1868, says: "The celebrated 'Flint Jack' has been released from prison, and is engaged in his old trade of fabricating flint arrowheads." Further than that I have been unable to find, and know neither the date nor the place of death of this most remarkable man, whose wonderful career of deception must always have a certain amount of interest for the antiquary.

IX.

SOME ADDITIONS TO  
THE NORWICH CASTLE-MUSEUM IN 1898.

BY THOMAS SOUTHWELL, F.Z.S., V.-P.

*Read 28th February, 1899.*

It is pleasing to find that the interest in the Castle-Museum has survived the novelty of its early days, and in the third complete year of its removal to the Castle has attracted nearly 129,000 visitors; in this large number of people of all classes there has not been a single instance requiring the intervention of the attendants, and the intelligent interest evinced in the collections, as indicated by scraps of conversation one hears in passing through the rooms, is very gratifying.

The most conspicuous addition to the Mammalian collection is a very fine specimen of the Ice Bear (*Ursus maritimus*), killed in Wyche's Land by Sir Savile Crossley, by whom it was presented. In life this must have been a grand animal, and it is to be regretted that the fancy of the taxidermist has, by studying to produce a startling effect, given to it an attitude which may occasionally be assumed by a "begging" poodle, but never by a Polar Bear in a state of nature. We have often been indebted to Mr. E. H. Bostock for animals which have died in his travelling menagerie, and which as they are "set up" from fresh skins, made excellent specimens; the Quadrumana are proverbially short-lived in such institutions, and the Museum has on previous occasions been indebted for specimens to this source; in the past year, Mr. Bostock has given us an excellent, but of course immature specimen of the

Ourang-outang (*Simia satyrus*), which is a good addition to the collection. A fine head of the Indian Wild Ox (*Bibos gaurus*), presented by Mr. Sims Reeve, is a very handsome object; and to Mr. Russell J. Colman the Museum is indebted for a Canadian Beaver (*Castor canadensis*), and a pair of Egyptian Ichneumons (*Herpestes ichneumon*).

Many additions have been made to the collection of British Birds, amongst which may be mentioned a female Goshawk, shot from the nest at Westerdale, Yorkshire, in 1893, also two of her four eggs; the nesting of this bird in Britain is an occurrence as interesting as it is rare. Mr. Gurney has given us an adult male Woodchat Shrike, shot at Henham, in Suffolk, a Parrot Crossbill from Earham, a pied variety of the Moorhen, and an interesting hybrid between the Greenfinch and the Linnet. A very remarkable chestnut variety of the Common Partridge and a handsome hybrid between the Pheasant and the Domestic Fowl have also been received. Colonel Feilden has presented three pretty little nestlings of the Little Stint which he obtained in North Russia, also an Ivory Gull and a Brunnich's Guillemot with two nestlings, killed by him in Novaya Zemlya; a specimen of *Tinamus robustus* with a skeleton of the same has been purchased, a welcome addition, as this family of birds is very imperfectly represented in the Museum.

Of the additions to the Birds of Prey, Mr. Gurney has kindly favoured me with the following notes:

“Our chief acquisition, Mr. Butler's new Sparrow Hawks—an old and a young—described as *Astur (Scelopizias) butleri*, G., in the ‘Bulletin,’ B.O.C., no. 1. p. xxvii., and to be figured in the ‘Transactions of the Bombay Natural History Society,’ were shot by Mr. A. L. Butler, on the island of Car Nicobar, in the Bay of Bengal. The young one is bright chestnut colour, like an hepatic Cuckoo, a phase never observed in the allied species, *A. poliopsis* and *A. badius*. Mr. Butler obtained four in this plumage, and observed others probably more advanced in change, in which the crown was rufous. The fellow specimens to our two are added to Mr. Rothschild's magnificent collection at Tring, and no others have reached this country at present, nor are likely to do so. I should like here to mention that there are three Hawks in the Norwich Museum of the small Sparrow Hawk

(*Accipiter*) type, which my father left under the name of *Accipiter hartlaubi* (Verr.); but one of them, marked an adult male from the river Gaboon in West Africa, must certainly be *A. büttikoferi*, Sharpe, for the two centre tail-feathers are absolutely black without trace of spots, and the thighs are grey. These are the characteristics of the Liberian species, *A. büttikoferi*, which is figured in Büttikofer's 'Reisebilder aus Liberia,' ii. plate xxx.

"It is to Mr. Sclater we are indebted for kindly offering us two examples of the quaint little Chinese Falconet (*Microhierax melanoleucus*) (Blyth)—a miniature among Birds of Prey—from near Foochow, which, deposited at the Zoological Gardens, did not long survive their confinement in smoky London. During the two months they lived there, their large heads, and eyes directed very forward, led Mr. Tegetmeier to credit them with crepuscular habits, as described in 'The Field' of January 29th, 1898, where their portraits are admirably given. Though described in 'The Field' as a pair, they both proved to be females; but one only has the white nuchal spot distinctive of *M. chinensis*, Dav., which in the opinion of Mr. C. B. Rickett, must sink into a synonym, and at any rate is not a distinctive sexual mark. This species has strong claws and a notched beak, and is by no means exclusively insectivorous, having, according to L'Abbé David, the rapid flight of the large Falcons.

"Turning now to Owls, a female *Ninox (Spiloglaux) fusca* (Vieill.), labelled by Mr. A. Everett, 'Atapupu, island of Timur, August, 1897,' agrees with plate xii. of vol. ii. of the B. M. Catalogue of Birds. Dr. Meyer has given a key to the distinctive marks of this and some other closely allied Owls in 'The Ibis,' 1882, p. 234, where he remarks on the small longitudinal bars on the under surface of *N. fusca*, and the absence of white spots upon the head. They are entirely absent in our specimen, which only differs from Dr. Sharpe's plate in having more spots on the scapulars. Excellently mounted by Mr. Gunn are a male and female *Ninox rudolphi*, A. B. Meyer, also obtained through the late Mr. Everett, for many years a contributor to the Norwich Museum, and whose loss we so greatly deplore, both taken in September, 1896, at Waingapo, on Sumba or Sandlewood Island in the Indian Ocean. The female agrees very well with the plate in 'The Ibis,' 1882, pl. vi., but the male is a good deal redder on

the breast and belly, and the back and wings are darker; males sent to the Tring Museum have been found by Mr. Hartert to be larger than females (*cf.* Nov. Zool. v. p. 473)), which is another distinction. It is a first-rate species, coming nearest, perhaps, to *Ninox* (*Spiloglaux*) *novæ-zealandiæ*, with which it cannot be confounded.

“Three Mexican skins of *Pholeoptynx*, offered to the Museum by Mr. Edward Bidwell, are seemingly all *P. cunicularia*, and the Institution is indebted to him for *Scops leucospilus* from Halmahera Island near New Guinea, of which we have now a nice series.”

The eggs of the Goshawk have already been mentioned, in addition to which Mr. Crowfoot has sent an egg of the curious Crab Plover (*Dromas ardeola*), and a number of British and foreign nests; a goodly number of additions have also been made in the departments of Ichthyology, Crustacea, and Entomology, but none requiring special mention.

A most important addition to the local Geological collection has been made by Mr. Russell J. Colman, who has given to the Museum the extensive series of fossil Mammalian remains, numbering some four hundred and fifty specimens, derived from the Forest-bed and Glacial formations of the Norfolk coast—made by the late Mr. J. J. Colman. These, added to the already rich collection presented by the late Mr. Gunn (adequately to display the whole of which considerable additions to the wall-cases will have to be made), form an altogether unique series representing the remarkable fossil fauna of these celebrated local beds, and thus fulfilling one of the main purposes of a provincial Museum.



## X.

## METEOROLOGICAL NOTES, 1898.

(From observations taken at Bradestone House, Brundall, Norfolk.)

BY ARTHUR W. PRESTON, F. R. MET. SOC.

*Read 28th February, 1899.*

## JANUARY.

THIS was the warmest January for forty-seven years past, and one of the mildest of the present century. The mean temperature (43.1 degrees) was nearly 6 degrees above the average, and although this mean was nearly approached in 1884 we have to go back to January, 1851, for quite so high a value. The only other instances since 1800 were in 1804, 1834, and 1846, which were nearly the same. The thermometer rose to 56 degrees on three days and to 55.8 degrees on one day, and exceeded 50 degrees on as many as twelve days. There was practically no frost, the lowest reading being 29 degrees on the 11th. There was hardly any rain between the 5th and 29th, and the month's fall was not much over half the average. The barometer remained continuously high between the 3rd and 31st, and there was but little wind till the 30th, when a gale of some severity occurred from the West and North-West. The effect of the abnormally fine weather was remarkable. Winter Aconites and Snowdrops were in bloom in the first week, and on the 30th I counted over thirty Crocuses in full bloom in my garden, as well as many Hepaticas, Wallflowers, Primroses, and other early Spring flowers. On the marshes the Marsh Marigold (*Caltha palustris*) was beginning to bloom about two months before its usual time, and the Hawthorn and "Myrobella" were showing their leaf-buds.

## FEBRUARY.

Although the mean temperature was  $2\frac{1}{2}$  degrees lower than in January, mildness again characterised this month, and a deficiency of rainfall was again chronicled. It was the fifth month in succession with an excess of temperature, and with the rainfall under the average. There was a great prevalence of westerly and north-westerly winds, which were on some days very rough and ungenial, and generally the month exhibited more winter traits than January. One of the most remarkable occurrences of the month was the excessive warmth of the first day, when the unusually high reading of the thermometer, 60.2 degrees, was registered. This value has been recorded in the last week of the month on two or three previous occasions during the last half-century; but in the first week it is almost unprecedented, although Luke Howard mentions 65 degrees as registered on the 1st and 62 degrees on the 4th February, 1828, and Whistlecraft recorded 60 degrees on the 10th February, 1831. Some thunder and lightning were observed in Norwich in the early morning hours of the 5th.

## MARCH.

March was colder than any of the three preceding winter months, the mean temperature being 0.2 degrees lower than December, 3.4 degrees than January, and 1.0 degree than February. It was the coldest March for six years past, but not nearly so cold as in 1883, 1887, 1888, or 1892. Until the 23rd day the weather was of a medium character generally, but with a deficiency of rainfall. On the 23rd, after two or three very genial days, a sudden depression of the barometer brought a very unpleasant change. A severe gale from the N. and N.E. blew with but little intermission for nearly seventy-two hours, accompanied by snow, sleet, hail, and heavy rain. The cause of this visitation was the arrival of a cyclonic disturbance from the north-west, whose centre was situated in the vicinity of Western Germany, and became nearly stationary there for some days. The track of this depression was an unusual one, and although its centre was not very deep, it developed much energy over a considerable area. As it filled up the weather improved, but its effects were disastrous both at sea and on the coast, where,

in some places, its visitation was almost as severely felt as in the great storm of the previous November. Vegetation, at the close of the month, was more backward than it had been for several years at this period, notwithstanding the early start it received during the mild days of January.

#### APRIL.

The mean temperature was slightly above the average. It was 2 degrees higher than in the corresponding month of the previous year, and much the same as in 1895 and 1896. The rainfall was about half an inch deficient. The early days of the month were fine, bright, and warm, followed by a week of showery weather at Eastertide. For ten days from the 18th the wind was almost continually from the East, with cold, bleak weather, but the month concluded with some warm, showery days.

#### MAY.

The highest temperature recorded this month (66.2 degrees) was an unusually low maximum for May, and we have to go back to 1877 for another May when 70 degrees was not reached. The mean of the month was 2 degrees below the average, and during the first fortnight there was a considerable excess of rain. It was altogether an ungenial month.

#### JUNE.

The mean temperature of the month was about one degree under the average, and although the thermometer exceeded 70 degrees on eight days, the highest elevation recorded was 74.4 degrees on the 18th, against 83 degrees on the 24th in 1897, and 81 degrees on the 16th in 1896. The five days, 12th to 16th inclusive, were exceedingly cold for the season, accompanied by a bleak north-easterly wind and much cloud. During this period the thermometer did not once touch 60 degrees. Thunder occurred on the 2nd, 6th, 10th, 22nd, and 25th. The rainfall of the month was 1.37 in. above the average, chiefly caused by a torrential downpour on the night of the 9th—10th, when the total registered was 1.80 in., being the heaviest fall recorded in this neighbourhood in the twenty-four hours ending 9 a.m. since the 13th July, 1889.

## JULY.

This was a dry, but rather cool month. Rain fell on eight days only, and the mean temperature was 2 degrees under the average. With the exception of half an inch of rain on the night of the 1st, and an inch on the 20th, the falls of rain were but trifling. There were no exceptionally hot days, although the thermometer exceeded 70 degrees on twelve days. It was the first July for six years in which 80 degrees was not touched, the highest reading for the month being 76 degrees.

## AUGUST.

The variations of temperature during this month were considerable, both by day and night. On the 13th the screened thermometer attained 86 degrees, on three other days 80 degrees was reached or exceeded, and on many other occasions very high readings were observed. On the 7th the highest degree attained was only 58 degrees. By night the thermometer exceeded 60 degrees on three occasions, the minimum on the 15th being as high as 61 degrees and the 27th 61.4 degrees; whereas, on the 29th, it fell to 44.2 degrees in the screen and to 39 degrees on the grass. The early part of the month was rainy, 1.33 in. falling in the first ten days. The remainder of the month was very dry, and the weather for the ingathering of the harvest (which commenced about the 16th) was of an ideal character.

## SEPTEMBER.

This month was remarkable for the excess of its heat, the great range of temperature, and the extreme smallness of its rainfall. The thermometer reached 70 degrees and upwards on sixteen days, 75 degrees and upwards on twelve days, 80 degrees and upwards on five days, and on the 9th it attained 89 degrees, a height which seems to be the highest recorded for September, in these parts, since 1795; although in Suffolk 88.5 degrees was noted on the 7th September, 1868, and 92.1 degrees at Greenwich on the same day, which latter reading was again observed at the same station on the 8th September, 1898. A sudden drop in the temperature occurred on the 22nd, and the remainder of the month was cool, especially by night, the reading on the 29th (on the grass) having

been as low as 27 degrees, or 62 degrees lower than the highest "screen" reading of less than three weeks previous. The mean temperature for the month was above 4.5 degrees above the average, and the excess would have been much greater had it not been for the sudden drop above alluded to. The great heat was accompanied by a very violent drought, which made itself felt with great intensity in many parts of the country. Rain was measured on four days only to the extent of 0.17 in., and it was thus the driest month since April, 1893, when only 0.10 in. was registered. In September, 1895, rain fell on three days only, but the falls were heavier; the September of 1865 was, however, the driest of all, no rain whatever being registered during the month at many stations in East Anglia.

#### OCTOBER.

This was the warmest October since 1876, and only on five occasions during the present century has this month given as high a higher mean reading, viz., in 1811, 1831, 1857, 1861, and 1876. The thermometer attained 60 degrees and upwards on sixteen days, and no frost was recorded. The severe drought which prevailed during September continued, with but slight intermission, until October 11th, when rain and thunder occurred, and the weather was very stormy and unsettled for a few days with low pressure. A thunder-storm occurred late in the evening of the 29th with heavy rain, but the total rainfall for the month was not quite up to the average. The absence of frost kept garden flowers in bloom to a later period than usual.

#### NOVEMBER.

The weather was unusually mild to the 21st, with but little rain, the mean temperature of the first nineteen days having been as high as the same period of the previous May. There was a good deal of fog, cloud, and wet mist at times, and heavy rains during the last ten days. The mean temperature was 4 degrees above the average, and nearly the same as in 1894 and 1895. It is remarkable that the thermometer exceeded 50 degrees on twenty-one days during the month, whereas in 1896 it only just touched 50 degrees on three days. The rainfall was slightly above the average, the excess occurring during the last week of the month.

## DECEMBER.

This month was exceptionally mild, notwithstanding a few rather cold days just before Christmas. The mean temperature was 44.1 degrees, which was upwards of 6 degrees over the average, and no December appears to have been so mild since 1868. The thermometer exceeded 50 degrees on seventeen days. The mean of the first eighteen days was 47.5 degrees, which is higher than the mean of April; and the night of the 5th, when the thermometer did not fall below 53.6 degrees, was the warmest December night recorded in these parts since 1856. There were but few frosts, and none severe. Snow fell on one day only, and the rainfall of the month was in close agreement with the average. There were gales on the 2nd and 27th, that on the latter date being severe.

## THE SEASONS.

The following Tables show the mean temperature and rainfall for the four seasons, together with those of the five previous years, and of a twenty-year approximate average. Winter comprises the three months December to February inclusive; Spring, March to May; Summer, June to August; and Autumn, September to November.

TEMPERATURE.								
Seasons.	1893.	1894.	1895.	1896.	1897.	1898.	20-year average.	Departure of 1898 from average.
Winter ...	degrees. 36.5	degrees. 39.2	degrees. 34.7	degrees. 39.6	degrees. 38.3	degrees. 41.3	degrees. 37.8	degrees. + 3.5
Spring ...	49.1	47.7	47.6	48.0	46.9	45.8	46.2	— 1.1
Summer ...	61.2	59.3	60.4	61.1	61.9	59.7	60.2	— 0.5
Autumn ...	50.0	50.1	51.4	48.5	50.3	54.0	49.5	+ 4.5
Year ...	49.6	49.2	48.4	49.3	49.5	50.5	48.4	+ 2.1

RAINFALL.								
Seasons.	1893.	1894.	1895.	1896.	1897.	1898.	20-year average.	Departure of 1898 from average.
Winter ...	in. 5.80	in. 4.81	in. 7.35	in. 3.28	in. 7.86	in. 4.11	in. 6.02	in. — 1.91
Spring ...	1.61	5.62	4.15	5.18	5.05	6.18	5.21	+ 0.97
Summer ...	5.37	8.74	7.51	4.88	4.17	6.90	7.17	— 0.27
Autumn ...	6.10	7.12	7.13	8.49	6.42	5.65	8.50	— 2.85
Year ...	19.66	27.32	24.91	23.28	22.07	23.33	26.90	— 3.57

It will be seen from the above that the temperature of the Winter was considerably in excess of the average, that of the Spring and Summer slightly below, and that of the Autumn greatly in excess. The rainfall was deficient in each season except the Spring, which gave nearly an inch of rain more than usual. The dryness of the Autumn was most abnormal, the deficiency of rain during the three months amounting to nearly three inches.

#### THE YEAR.

The mean temperature of the year (50.5 degrees) was more than 2 degrees above the average, and was higher than in any year since 1884. In January, September, October, November, and December, the excess of temperature ranged from 4 degrees to nearly 7 degrees above the average. May, June, and July were somewhat colder than usual, but the departure from the average was so slight that it did but little to counterbalance the excess of warmth in the other months. The rainfall of the year, for the fourth year in succession, was considerably deficient, such deficiency having been, in 1895, 1.99 in.; in 1896, 3.62 in.; in 1897, 4.83 in.; and in 1898, 3.67 in., or a total deficiency of 14.11 in. in the four years. In other words, we have had only  $3\frac{1}{2}$  years' rain in the four years. September was the driest month, and June the wettest. There was a general tendency to dryness until May, which month, with June, was wetter than usual, and gave rise to predictions in many quarters that, owing to the so-called "nineteen-year weather cycle," the ensuing Summer was to be exceptionally wet. The fallacy of this prediction was exemplified by the result, which showed a deficiency of rain during July, August, September, and October, amounting in the aggregate to as much as 4.70 in. The number of days in the year on which rain was measured was only 166, being the fewest in any year since 1884.

1898.

MONTH.	BAROMETER.				THERMOMETER.				HYGRO-METER. Relative Humidity, 9 a.m.	CLOUD. Estimated proportion	RAINFALL.		WIND.										
	Highest.	Date.	Lowest.	Date.	Highest.	Date.	Lowest.	Date.			Inches.	No. of days.	N	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Mean esti- mated force.		
JAN.	30.65	13	29.42	1	30.283	5, 6, 19	29.0	11	43.1	90	7.9	1.07	14	0	1	3	14	7	5	2.3			
FEB.	30.32	11	29.22	21	29.884	1	22.4	22	40.8	84	6.5	1.22	17	2	0	0	0	3	11	12	3.6		
MARCH	30.26	10, 11	29.40	26	29.873	18	22.8	6	39.7	85	6.6	2.18	16	2	1	1	2	0	6	7	3.4		
APRIL	30.25	8, 24	29.42	12	29.927	8	27.4	1	47.3	79	6.5	1.22	12	1	0	10	4	1	5	6	3	3.0	
MAY	30.31	7	29.14	11	29.842	23	33.4	15	50.3	82	7.1	2.78	19	5	3	4	1	3	2	6	7	3.3	
JUNE	30.29	13, 17	29.50	25	29.985	18	36.8	1	56.9	82	7.5	3.22	16	4	6	0	2	4	3	9	2	3.2	
JULY	30.36	10	29.62	23	30.085	18	40.0	21	59.5	78	6.4	2.00	8	8	0	1	4	1	1	4	12	3.4	
AUG.	30.27	25, 31	29.60	8	30.012	13	44.2	29	62.6	83	5.5	1.68	12	4	5	2	0	4	6	9	1	3.2	
SEPT.	30.42	4	29.73	27	30.106	9	35.7	29	61.5	79	4.5	0.17	4	3	3	1	4	6	4	7	2	2.5	
OCT.	30.40	4	28.94	18	29.854	2	37.0	2	54.2	90	6.8	2.48	15	2	1	11	4	3	5	4	1	3.0	
NOV.	30.40	18	28.90	25	29.859	2	29.2	23	46.3	94	6.6	3.00	19	2	2	3	5	3	4	7	4	2.6	
DEC.	30.50	22	29.10	29	30.026	4, 18	26.2	31	44.1	93	6.8	2.31	14	1	0	0	0	6	6	11	7	3.7	
MEANS					29.978				50.5	85	6.5											3.1	
EXTREMES & Totals	30.65	Jan. 13 & 15	28.90	Nov. 25th		Sept. 9th	22.4	Feb. 22nd		89.0		23.33	166	34	32	33	27	36	53	87	63		



## XI.

## NOTES ON THE HERRING FISHERY OF 1898.

BY G. H. HARRIS.

*Read 28th March, 1899.*

So far as Yarmouth boats were concerned, failure is writ large over the Herring Fishery of 1898. No fish, no prices; so runs the tale. One day there was a big catch—nearly a record catch—but prices fell at once to zero, and the fisherman's labour and his torn nets were all in vain. But whether the catch were large or whether it were small, prices were always low. That great variation in price which comes from hitting a full market, or hitting an empty one, was nearly invisible. The excitement of a gamble of which there is nearly always something in the Herring Fishery, and which helps to revive depressed spirits nearly to the end, was absent. We always look for a small catch to be compensated by a rise in price, but 1898 was a law to itself.

Sometimes a season is spoiled by a sudden gale wrecking boats and ruining nets. There was rough weather in 1898, but it gave plenty of warning. It kept boats at home, but it did not take them unawares in the open water. Indeed, on one or two occasions, our boats were in harbour, not because the weather was bad, but because it was threatening. The men would not venture. They did not consider it worth while. It is indeed a heavy risk and where is the return? The men rightly think, that where life and limb are involved, there should be a very reasonable prospect of getting a commensurate return. That the men should fish the North Sea from the equinoctial gales of early Autumn to the snows of December, only to find, when the boats "make up," not so much as will buy a new suit of clothes for their backs, is a state of things that must be abolished if the fishing is to endure. No surprise can be felt under the circumstances that the crews refuse to fish when skies are lowering and the barometer falls. I believe I am correct in saying that the Lowestoft system operates better. There

the share-system seems to assure a fair bonus at the end of the voyage.

Prices were, undoubtedly, held down this year by the poor quality of the fish. It was a mild season, and in mild weather Herring are never good. There was noticeable this year as last year, a great demand for the pickled Herring in barrel, a trade which bids fair to entirely supplant the old bloater business, so far as foreign markets are concerned.

The bloater is a somewhat discredited commodity on the Mediterranean shores, shipments having seriously deteriorated in quality during the last few years. The year 1898 may be taken, too, as signalling the advent of the steam drifter, which must be carefully distinguished, of course, from the steam trawler. Steam drifters are not a novelty, but their muster has been too small to exercise an appreciable influence in the trade. This year they numbered twenty, and can no longer be reckoned a negligible quantity. Probably they are destined to extirpate the sailing lugger, just as the capitalist who will own them will drive out the small boat-owner, and so the Herring fishing will develop on the lines of the trawling industry. The new fashion of following the fish round the coast, and the Mackerel fishing off Ireland, all tends to pull things in this direction. It would not pay to build a steamer that could follow her business for three months only and lay up on the "hard" for the rest of the year, as the old luggers did. But if a plan can be found whereby she can drift for the better part of the year, she may pay. And apparently, in the development of the West Coast and Irish fishings, such a place has been found. Opinions, however, differ as to whether the effect will be detrimental to the trade or no. Many people think the fishing pays only as gambling may be said to pay, where some people get rich prizes and others suffer ruin. Markets, they argue, will always be in equilibrium, the speculative element will be nearly eliminated; and a constant supply of the Herring, as a food-stuff, will pay no one a sufficient dividend to make the game worth the candle.

The land of fish on the Yarmouth Fish Wharf (19,025 lasts) was about 21 per cent. below that of last year; that of Lowestoft (about 11,905 lasts) 18 per cent. below. The number of boats fishing from the two ports was 638 (332 from Yarmouth including 190 Scotch), a decrease of no less than 218 boats, due to the small number of Scotch boats at Lowestoft. These 638 boats caught 30,430 lasts, giving an average catch of about 47.75 lasts, or 5.25

lasts per boat more than last year, a result which looks well, *prima facie*; but it should be borne in mind that with the advent of the large steam drifter has come about the disappearing of the small Scotch lugger, a change which makes the average catch look larger, when it is really smaller, if the respective capacities of the new and old style of boats be taken into account. Perhaps it may be as well to point out again this year as I did in 1896 that, owing to the fact that much Lowestoft fish is landed at Yarmouth, no comparison can be made between the respective average catches of Yarmouth and Lowestoft boats. Worked out, the averages give 57 lasts per boat to Yarmouth, 37 lasts only to Lowestoft, a result obviously absurd. It should therefore be borne in mind that the catch landed on the Yarmouth Wharf is the Yarmouth catch *plus* part of the Lowestoft.

The Scotch boats did fairly well, but left early, owing to loss of nets. This loss was due, not to bad weather, nor, in all cases, to heavy catches, but chiefly to the rotten state of their nets. In the old days the Scotch boats would come straight from their lining operations off the Scotch coast, which employed them during the Summer, to the Herring Fishery at Yarmouth. Between the two fishings only a short interval would take place for repairs and the necessary change of gear. They would arrive at Yarmouth at the end of September with brand-new strong nets. Now they begin the fishing earlier and fish as they come. Consequently they are fishing in the hot month of August at Scarborough, where there is little or no accommodation for net drying. The nets lie in the hold of the boat, exposed to the heat of the August afternoon, pending the owner's departure at night. Rotting at once sets in, and the Scotchmen say that, now-a-days, a fleet of nets new when they started for Yarmouth is old by the time they get there.

There were 306 boats fishing from Lowestoft, only about 70 of which were Scotch. The Lowestoft catch was 11,405 lasts.

## RETURN OF HERRINGS LANDED AT YARMOUTH IN 1898.

Month.	Lasts.	Month.	Lasts.
January	—	Brought forward	182
February	—	July	478
March	—	August	957
April	—	September	1,854
May	35	October	7,601
June	147	November	6,817
		December	1,136
Carried forward	182	Total	19,025

## XII.

## NATURAL HISTORY NOTES FROM YARMOUTH.

BY A. PATTERSON.

*Read 23th March, 1899.*

1898.

March 1st. Saw the end of the most remarkable "shooting season" I ever remember. I never saw fewer wild-fowl. In one day, last year, Durrant had more fowl on his stall than during the whole of the past season. The open weather accounted for much of this paucity.

In March, however, the greatest number of Widgeon visited Breydon, "more in fact," said Chambers (the watcher), "than he had seen for several years." He thought the numbers increased yearly.

Eight Redshanks appeared on the Bure marshes on March 13th. I think, if unmolested, these birds would increase. I saw one flock of over a hundred individuals, one day last autumn, on a Breydon side "Rond;" the greatest flock I had seen for years. They were, doubtless, bred in the neighbourhood. Now the close season is *extended one month longer* few will be shot.

An uncommon number of Craig-flukes (*Pleuronectes cynoglossus*) have turned up this spring. They must be very numerous in the Wash. They are sold cheaply and eaten for Dabs. A left-handed Plaice, about ten inches long, came in on the 10th March.

On March 28th a Shag was brought in from sea. It was, with a long cord tied to its leg, enjoying a dip in the river when I first saw it. I purchased it, and found it for three weeks an interesting pet. It soon answered to my call, and would catch fish when thrown to it. When hungry, it uttered a harsh discordant trumpet

note. It ate  $2\frac{1}{2}$  lbs. of fish a day. All the indigestible bones were vomited in a compact mass, reminding one of the pellets of the Owl.

Hundreds of Hooded Crows on Breydon flats; many had apparently paired, on March 31st. They were evidently gathering prior to departure. I saw several, with Carrion Crows, as late as April 15th.

March 29th. A fine example of the Sea Bream; it had been taken in a draw-net.

April 2nd. Jackdaws going seawards. Heard Redwings cry overhead at night on same date.

April 4th. A Cuckoo Ray (*Raii meraletus*) came to the wharf.

April 6th. An Otter, weighing  $24\frac{1}{2}$  lbs., found dead at Berney Arms. Its back was broken: and it was thought the animal met with its death in the machinery of a drainage mill.

April 8th. A curious Plaice brought me. It had a fin with rays extending quite across the under part of the fish.

A Spoonbill on Breydon from April 8th till the 16th.

A Greenland Bullhead, 7 inches long, brought in on April 19th.

May 18th. An example of Scribbled Mackerel came into my possession, and on the same day I saw two Sting Rays (*Trygon pastinaca*) on the Fish Wharf, one weighed at least 15 lbs. This species has turned up with more than ordinary frequency of late.

A very fine double Turbot, coloured on both sides, but with the lower "face" white. The eye fitted so into the notch that the fish could see on either side it.

On May 20th (at nightfall) saw a goodly number of Bartailed Godwits, and some Grey Plovers with the breasts conspicuously black (all day it blew a stiff east wind). Hitherto they had been scarce as far as my observations showed.

Saw three Godwits on the 21st; also five Sheld-Drakes.

On May 23rd, on Breydon, saw twenty Knots, some nicely "red;" also six Grey Plovers, and three Terns, apparently Arctic; and one Black Tern on May 24th.

May 26th. Several Knots, three Grey Plovers. I think the spring migration of Knots is more apparent than formerly. Some common Sandpipers same date.

May 30th. A trip of three Kentish Plovers. They were close enough to be plainly visible through my glasses and to hear their distinguishing "peepy" cry.

I have been allowed a peep into "Ducker" Chambers' (the Breydon watcher's) memorandum book, which contains his scanty lists of birds seen. His records this year, so far, are as follows:—

March 9th. 200 Widgeon, with few Pintails and Shovellers.  
 „ 10th. 1000 Widgeon.  
 April 8th. 1 Spoonbill.  
 „ 16th. 1 Swan.  
 May 16th. About 700 Godwits and "Plovers" (undoubtedly Grey, A.P.), Wimbrel and Knots.  
 „ 24th. 2 Goosanders.  
 „ 27th. 2 Spoonbills.

June 19th. A Scribbled Mackerel.

July 7th. First lot of young Dunlins on Breydon, and the same day a 10-foot Thrasher Shark was brought to Fish Wharf.

August 8th. Four Greenshanks on Breydon.

August 14th. I was much interested in observing some Sand Martins popping in and out of holes in a wall rising perpendicularly from the water at Thorpe. The birds evidently had nests inside the wall.

On the evening of the 15th August (it was very warm and quiet) I took a stroll on Breydon walls. The tide was low, the flats uncovered. Along the edge of the 5-stake drain many Gulls were lying asleep, with here and there one doing sentry. I estimated, after attempting to count a portion of them, that there were at least 2000 of various species. On another flat I counted 24 Herons feeding and sleeping. There were about 200 Curlews, also which, when disturbed, made a din that sounded loudly enough in the stillness of the evening. I observed also one Greenshank, one Green Sandpiper, and several common Sandpipers.

August 18th. Four Greenshanks on Breydon. On the same day a Seal swam up the river, played round the bridge, and went back to sea again unmolested—for a wonder.

September 15th. Saw a good flock of Curlew Sandpipers on Breydon very tame.

October 7th. A young Bittern and a White-fronted Goose, on a game dealer's stall.

An extraordinary invasion of Gold-crested Wrens, first week in October.

On the 8th I also obtained a live Great Spotted Woodpecker from the skipper of a lugger.

October 10th. Durrant had altogether forty-four Scaups, also a Bewick Swan.

*Mus rattus*. I find the Black Rat has become numerous north of Regent Street. I obtained a magnificent ♂ on October 13th, and one was sent me from Market Row on the 18th.

One boat brought in three lasts of Mackerel (39,600 fish) on October 20th. It was a fine sight, this £300 odd worth of Mackerel in one lugger. The largest Mackerel I ever saw was on the 21st. Its length was 21½ inches, girth 12 inches, weight 3 lbs. 7 ozs. My longest previous was 20 inches.

October 25th. The "Morning Leader" of to-day mentions the stranding of nine Porpoises near Palling, the position indicated being Winterton. I have not myself gleaned any facts respecting them.

October 25th. I was on the Wharf this morning and think I never saw so many Herring there before in one day. The boats lined the Quay from the beginning of the Fish Wharf quite up to the grand stand on the racecourse opposite Gorleston Ferry.

On the 7th November a 14 ft. 4 in. example of the Thrasher or Fox Shark was taken into Lowestoft Harbour.

On 19th November I saw a Green Sandpiper. This is rather a late date for this species, which generally departs at least by October 1st.

About a month ago, a dead Eel, about 2 feet long, was observed floating on the surface of the water at Horsey Mere. On being more closely examined it was found to have a Water Vole fast in its gullet, having been choked in attempting to swallow it.

On November 24th, one Golden-eye Duck (immature) on Durrant's stall.

On November 30th a long-tailed Duck (a ♀) was shot on Breydon.

On December 11th a Porbeagle Shark, six feet long, was brought to the Fish Wharf. Porbeagles have been more frequent on this coast of late than any other species of that family.

On December 12th thousands of Wild Pigeons crossed over the town, flying East to West. Quite a cloud of them.

On December 17th seven Wild Swans were observed at Potter Heigham by my friend Mr. W. U. Moore.

December 31st. To-day ends the quietest year for birds, and I think the least eventful year I ever remember in any branch of Natural History in Yarmouth and the neighbourhood. Scarcely any Ducks or Wild Fowl have visited Breydon.

1899.

On January 5th a Red Crossbill was killed by a boy who knocked it down with a stick, out of a bush at Burgh Castle.

January 9th. Enormous gathering of Gulls (Black-headed) on a "flat" near the ship drain on Breydon. I estimated 3000. When they rose it was a pretty sight.

January 11th. A 12-inch Doree or Dory washed up alive on the beach.

On January 14th I saw an Iceland Gull on a flat near Vauxhall Station. It allowed of a very near approach. I watched it for some time through a powerful little telescope. Unfortunately for the bird others got on its track and confirmed my identification.

On January 17th a Lemon Sole (*Solea lascaris*) was handed to me by a local fish dealer, which I sent to Mr. Southwell to confirm my finding. It is a rare fish with us.

January 20th. A fawn-coloured Blackbird was shot at Bradwell. Two Brent Geese on Durrant's stall early in first week in February; one was much larger than the other.

An albino Brill brought in in first week in March.

March 21st. During a snow-storm I saw about 150 Widgeon on Breydon, and 12 Redshanks.

---



XIII.

ON THE OCCURRENCE OF THE "WELL-SHRIMP,"  
*NIPHARGUS*, NEAR NORWICH.

By SIDNEY F. HARMER, Sc. D., F.R.S.

*Read 28th March, 1899.*

In January, 1899, I received two living specimens of *Niphargus*, from a well at my father's house at Cringleford, near Norwich. The well, which is about twenty-five years old, is forty feet deep, including some three or four feet of water. It is sunk in the chalk, which at that spot comes within two or three feet of the surface and is overlaid by humus only. As I have been unable to find any previous notice of this genus as an inhabitant of East Anglia, its occurrence at Cringleford may be worth putting on record. The British localities given by Spence Bate and Westwood\* are all from the Southern Counties, with the exception of Worcestershire and Dublin, although the genus has been recorded from many localities on the Continent of Europe.

*Niphargus* is a small Amphipod Crustacean, and is interesting as being a typical member of the cavernicolous fauna, with rudimentary eyes. It can readily be distinguished from *Gammarus pulex*, the common "Freshwater Shrimp," by its colourless, semi-transparent appearance, and by the slenderness of its form.

Three species of this genus are recognised as British by Spence Bate and Westwood; and are distinguished from one another principally by the form of the "hands" of the "gnathopods" (the appendages of the first and second free thoracic segments), and by the shape of the abdominal segments. The form of the hands of the Cringleford specimens at once excludes *N. kochianus*, leaving the choice between *N. aquilex*, Schiödte and *N. fontanus*, Spence Bate. Although I have had a little difficulty in deciding

\* 'History of the British Sessile-eyed Crustacea,' vol. i. 1863, pp. 311-325.

between these two species, it appears to me that the animal is to be referred to *N. aquilex*\*, with which it agrees in the relatively small size of the hands and in their shape, as well as in the rounded form of the lateral parts of the abdominal segments. The length of the head and body of the larger specimen, not including the appendages, is one-fifth of an inch.

The genus *Niphargus* was established by Schiödte, in a paper on the Subterranean Fauna†; a species, *N. stygius*, being described from the Adelsberg Caves. In 1855 Schiödte described as a second species, *N. aquilex*‡, the form which had been obtained from wells at Maidenhead, and at first supposed to be referable to *N. stygius*.

Spence Bate in 1859§ described two new species, *N. fontanus* and *N. kochianus*, from specimens taken from wells at Ringwood in Hampshire, in company with another new subterranean Amphipod, *Crangonyx subterraneus*; *N. fontanus* being at the same time recorded from wells at Corsham in Wiltshire. Hogan, in the same volume||, gives an account of the habits of the living *N. fontanus*, mentioning his suspicion that these animals sometimes devour one another. This is confirmed by the fact that although two living specimens were received by me in a small tube, the smaller one was shortly afterwards found in a fragmentary condition under circumstances which indicated that it could only have been the larger individual which had attacked it.

The occurrence of these subterranean Crustacea in wells which are not apparently connected with other masses of fresh water has always excited much interest, and the literature of the subject has become very voluminous. In addition to the works which have

\* *N. aquilex* should perhaps be more properly considered a synonym of *N. puteanus*, Koch. See, on this point, Wrzesniowski (quoted on p. 491) p. 662.

† "Bidrag til den underjordiske Fauna," 'Kgl. danske Vid. Selskabs Skrifter' (Copenhagen), Naturh. og Math. Afdeling, 5 ser. vol. ii. 1851, p. 26.

‡ "Om den i England opdagede Art af Hulekrebs-Slaegten *Niphargus*," 'Oversigt over det Kgl. danske Vid. Selskabs Forhandl. i Aaret 1855' (Copenhagen), p. 350. An abstract of this paper and the preceding one, with figures, appears in 'The Natural History Review,' vol. iv., 1857, "Notices of Serials," p. 41.

§ Proc. Dublin Univ. Zool. and Bot. Assoc. vol. i. 1859, p. 237.

|| p. 241.

ready been mentioned, some account of the genus will be found in Spence Bate's 'Catalogue of the . . . Amphipodous Crustacea in the . . . British Museum' (1862), p. 174. A very complete summary of the literature of Amphipoda, including the papers on *Niphargus*, is given by the Rev. T. R. R. Stebbing, at the beginning of the first half of the Challenger Report on Amphipoda.\* A more recent paper on Subterranean Crustacea is that by A. Wrzesniowski, who, besides describing a new species (p. 643) and a new variety (p. 655) of *Niphargus*, gives a list (pp. 673—675) of fourteen species which are possibly distinct, and a summary (pp. 694—698) of the geographical distribution of the Gammaridæ found in subterranean waters, and in the deep waters of lakes.

A most valuable paper has even more recently been published by Dr. Charles Chilton,† who emphasizes the occurrence of a large system of underground waters beneath the Canterbury Plains of New Zealand, as a means of communication between the isolated localities in which the subterranean Crustacea have there been found; and quotes Lyell's 'Principles of Geology,' in further evidence of the general existence of underground waters which would account for the distribution of these animals.

It has been suggested by various writers that *Niphargus* is, probably, a common animal. The object of the present communication will have been attained, if it should direct attention to the examination of the fauna of ordinary wells of drinking water.

It is probable that *Niphargus* may be obtained in many localities by the simple method of tying a muslin bag over the spouts of available taps, a device which has been successfully employed by Mr. W. T. Calman in the search for Rotifers, and by Professor Erdman‡ for the examination of the surface fauna of the ocean during an ordinary trans-Atlantic passage.

\* 'Zoology,' vol. xxix. part lxvii, 1888.

† "Über drei unterirdische Gammariden," 'Zeitschr. f. wiss. Zool.', vol. l. 90, p. 600.

‡ "The Subterranean Crustacea of New Zealand: with some general remarks on the Fauna of Caves and Wells," Trans. Linnean Soc., ser. 2, vol. vi., 1894—97, p. 163.

§ Brit. Association Rep., Toronto Meeting, 1897, p. 695.

## XIV.

RADDE'S BUSH WARBLER (*LUSCINIOLA SCHWARZI*)  
IN LINCOLNSHIRE.

BY G. H. CATON HAIGH.

*Read 31st January, 1899.*

THE occurrence of *Lusciniola schwarzi* at North Cotes in Lincolnshire, on October 1st last, adds a species not only to the British but also to the European avi-fauna.

The bird in question was skulking in a very thick Thorn hedge, about a quarter of a mile inland from the sea bank, and would certainly have been passed over but for its exceedingly loud and remarkable note. This note, which somewhat resembled the scold of the Reed Warbler, was uttered incessantly whenever the bird was disturbed. Though the hedge in which it was hiding was by no means a large one, my gamekeeper had great difficulty in forcing it to take wing, and it moved rapidly along the interior of the hedge for a considerable distance before doing so.

The following description was taken from the bird in the flesh. Colour of upper parts, dark olive green. Large and very conspicuous eye stripe, pale buff. A dark brown patch behind the eye. Cheeks, mottled brown and buff. Throat, nearly white; breast, belly, and axillaries washed with yellowish buff; thighs and under tail-coverts, bright buff. Beak, brown above, but under mandible yellow nearly to the point; inside of mouth, yellow; eyes, brown. Legs, pale brownish flesh colour, length 5.3; wing, 2.5. Bastard primary very long; second nearly equal to eighth, fifth longest.

The weather was fine and hot, with light S.W. wind. On September 29th the wind was light S.E., with some rain at night. On 30th it was fine, with a fresh E. wind. The prevailing winds throughout September were light E. and S.E., with fine, hot weather. These being exactly the conditions which the late

Dr. H. Gätke of Heligoland considered most favourable for the appearance of eastern species on that island.

Although during last autumn there was no movement amongst the small birds sufficiently pronounced to be called a "rush," yet there was a steady and continued influx of Warblers, Pied Flycatchers, Robins, Redstarts, Thrushes, etc., during the greater part of August and September.

The range of *Luscinola schwarzi*, as at present known, is entirely eastern, extending in summer throughout South-east Siberia, from the neighbourhood of the town of Tomsk, to the Pacific (*cf.* *Sunders, 'Ibis,'* 1899, pp. 1, 2); and in winter from Southern China to Lower Burma, Pegu, and Tenasserim (*Oates, B. Brit. Mus.,* pp. 399, 400).

## XV.

### FAUNA AND FLORA OF NORFOLK.

#### ADDITIONS TO PART I., MAMMALIA (FOURTH LIST).\*

BY THOMAS SOUTHWELL, F.Z.S.

*Read 28th March, 1899.*

THERE is little to add to the previous lists in this section of the Fauna and Flora; perhaps the most singular feature is the abundance of *Mus rattus* at Great Yarmouth, a fact quite unsuspected until Mr. Patterson brought it to light. We may also, I think, fairly add another species to our list, making a total of forty-three species which have been observed in the county, through the interesting discovery by Mr. Miller Christy of the passage in "Purchas his Pilgrimage," referred to below. The Chiroptera are still waiting the closer investigation which I feel sure would yield fruitful results.

\* Previous lists will be found in the 'Transactions' of the Society, vol. i. p. 71; vol. iii. p. 657; and vol. v. p. 632.

**MARTES SYLVATICA.** Marten.

Mr. W. G. Clarke mentions (Trans. vol. vi. p. 304) on the authority of Mr. W. H. Tuck, a Marten preserved at Riddlesworth Hall, which was trapped in Blackwater Carr, which has not, that I am aware of, been recorded. No date is given.

**MELES TAXUS.** Badger.

Mr. Clarke (*l. c.* p. 305) also mentions that a Badger which was suckling two young ones, was trapped at West Wretham, in the latter end of April, 1895.

\* **MONODON MONOCEROS.** Narwhal.

Mr. Miller Christy gives an interesting account of the finding of what must undoubtedly have been a Narwhal, on the coast of Norfolk, so long ago as the year 1588. The mention is to be found in "Purchas his Pilgrimage," most fully related in the 2nd Edit. (Lond. fo. 1614) p. 739. Mr. Christy's paper is in the present volume of our 'Transactions,' p. 204.

**ORCA GLADIATOR.** Grampus.

Two very juvenile examples of this Cetacean were taken on the Norfolk coast on November 13th and 19th respectively, 1894. The fact is of interest as showing the season at which this animal reproduces, and the occurrence of two individuals, so nearly of the same age, would seem to indicate that the Grampus occasionally produces two young at a birth, an occurrence by no means frequent with the Cetacea (*ante* p. 58).

**MUS RATTUS.** Black Rat.

Mr. Patterson has called attention to the presence of this animal in considerable numbers in certain localities in Great Yarmouth. He has found no difficulty in securing all that he required. He first discovered it early in 1896, and tells me that it still exists in undiminished numbers

## XVI.

## FAUNA AND FLORA OF NORFOLK.

## ADDITIONS TO PART IV., FISHES (FOURTH LIST).

BY JOHN LOWE, M.D., F.L.S.

*Read 28th February, 1899.*

Following notes of new or rare species are due chiefly to the observations of Mr. A. Patterson of Yarmouth, who has for a long time proved himself most active and careful in his search after the most interesting species of fish. Since the publication of my list in 1873—4 (vol. i. p. 21), supplementary lists have appeared in the 'Transactions of the Norfolk and Norwich Naturalists' Society' for 1884, vol. iii. p. 677; and in vol. v. 1894, p. 4. Mr. Patterson's latest published list is in 'Zoologist,' vol. xvi. p. 10, 1897.

**PROSTIUS PUNGITIUS (L.).** Ten-spined Stickleback.

Southwell writes "three were sent me by the Rev. W. Southwell, from a ditch near Shimbling." Dr. Lowe says it is "not common" in West Norfolk. The number of spines varies.—A. P.

**BRACHYRHOCHUS LUPUS (Cuv.).** Bass.

Although occasionally met with is not in the adult state on the Norfolk Coast.—A. P.

**PLATYCHTHYS SURMULETUS (L.).**

Although this must now be regarded as a rare fish on the Norfolk coast, quite a number were brought in by the trawlers in May, and September, 1896.—A. P. Sir James Paget in his list of Yarmouth in 1831: 10,000 were sent to London market in one week in May. These were apparently sent from Yarmouth. It is not strange, therefore, that the supply has so greatly diminished.

PAGELLUS CENTRODONTUS (Cuv. and Val.). Sea Bream.

A fine example was taken in a draw-net off Yarmouth beach, 1st April, 1898. This species is seldom captured.—A. P. Two others have been recorded in Norfolk.

\* SCORPENA DACTYLOPTERA (De la Roche). Rose Pinck.

The fish recorded in the last list (vol. v. p. 635) as the Bergylt (*Sebastes norvegicus*) subsequently proved to be this species. See also 'Zoologist,' 1894, pp. 230 and 431. Mr. Patterson saw a second example, obtained at Lowestoft on December 10th, 1895, which measured 8 inches in length. The first specimen April 29th, 1894, from Yarmouth, measured 5½ inches only.—T. S. Noted February, 1889, as new to Norfolk.

COTTUS BUBALIS (Suppe.). Bubalis.

An example, 4½ inches long, was taken in a draw-net on Yarmouth beach, on 17th August, 1895. Seldom met with on the East Coast of Norfolk.—A. P.

COTTUS SCORPIUS (L.) var. GRÆNLANDICUS. Greenland Bullhead.

Occasionally captured by the Shrimpers. One on March 7th and another December 19th, 1895. A 7-inch example taken on a line with Cods and Congers off Yarmouth, April 18th, 1898.

TRIGLA HIRUNDO. Bull-dog variety.

Recorded in 'Zoologist,' June, 1897, by Mr. Patterson.

TRIGLA LINEATA. Streaked Gurnard.

Examples of this fish are not seldom brought in by trawlers at Yarmouth and Lowestoft; the precise locality in which they are captured is of course uncertain. One, landed at Lowestoft on March 9th, 1896, was said to have been taken near that port, which its fresh condition seemed to render probable.—A. P.

SCOMBER SCOMBER var. SCRIPTUS. Scribbled Mackerel.

Mr. Patterson says that since the fishermen have learned to distinguish this fish, examples have been met with yearly; he has recorded several in the months of June, September, and December. The first he saw was in December, 1894. He has met with a variety having the whole of the back of one colour unrelieved by any other. The last Mackerel of 1897 were brought in on 6th December.



**SCOMBER SCOMBER (L.).** Mackerel.

No less than 3 lasts (39,600 fish) brought in by one boat, October 20th, 1898. Enormous examples: largest on local record, October 21st, length  $21\frac{1}{2}$  inches, girth 12 inches, weight 3 lbs. 7 ozs. Fine one landed on Wharf, May 18th, 1898; another June 18th, 1898; and another measuring  $19\frac{1}{2}$  inches long, on the 16th October. Heavy catches (reminding one of old times of Spring Mackerel Fishing) on May 9th, 1898, and one or two days previously; heavy West wind on the 11th.—A. P. Dr. Day says the ordinary size of Mackerel for the table is from 14—16 inches in length. Buckland recorded one in 1879, 18 inches long, and which weighed 2 lbs. 11 ozs. Mr. Cornish recorded one from Penzance,  $18\frac{1}{2}$  inches long, and 2 lbs. 8 ozs. in weight; one taken at Poulton,  $2\frac{1}{2}$  lbs.; while one taken at Hastings in 1856 weighed 2 ozs. more. So that Yarmouth beats the usual record.—A.P.

**ZEUS FABER (L.).** Doree.

A Doree,  $8\frac{1}{2}$  lbs. in weight, was taken in a drift-net with Herrings off Yarmouth, 2nd October, 1896, a very unusual capture; its last meal consisted of seven Herrings. A very small one,  $4\frac{1}{3}$  inches long, was caught in a shrimp-net on 18th of the previous May.

**\* CENTROLOPHUS POMPILUS (Cuv. and Val.).** Blackfish.

A living specimen was found cast up on the beach at Sea Palling, after the severe N.E. gales, about 27th March, 1898; seen by me shortly after.—T. S.

**BRAMA RAI (Bl.).** Ray's Bream.

Specimens occurred at Caistor on the 23rd November, 1894, and October, 1895. Generally found left by the tide after heavy weather.—T. S.

**ZIPHIAS GLADIUS (L.).** Sword-fish.

One was landed at Lowestoft, 27th September, 1897.—A. P. (Trans. Norfolk and Norwich Nat. Soc. vol. vi. p. 294; 'Daily Press,' September 30th, 1897).

**LOPHIUS PISCATORIUS (L.).** Angler.

Frequently met with on our coasts; sometimes of very large size in summer and autumn. One brought in Yarmouth, 3rd June, 1897,

weighed 1 cwt. Smallest I ever saw locally taken (in shrimp-net) 9 inches only, June 3rd, 1898.—A. P. Quite a number were captured by the Mackerel boats at Lowestoft in autumn of 1897.—T. S.

*GADUS MINUTUS* (L.). Power Cod.

Since its first detection in 1890, has been occasionally taken by Longshore and Shrimp-netters from 7—10 inches in length. A small one in draw-net, May 9th, 1898.

*HIPPO-GLOSSOIDES LIMANDOIDES* (Günth.). Long Rough Dab.

“Not unfrequently seen on our Fish Wharf since I first detected it.”—A. P.

*ZEUGOPTERUS PUNCTATUS* (Loll.). Muller's Top Knot.

“Another specimen, the second,  $6\frac{1}{2}$  inches long, and  $3\frac{1}{4}$  inches wide, was taken off Smith's Knowle, March 4th, 1894.”—A. P. Mr. Patterson records it as above, and on 20th January, 1896, same year; also two, January 17th, and five, 3rd February, 1898.

*RHOMBUS MAXIMUS* (L.). Turbot.

One with white under face notched in the usual place. The travelling eye in the notch opened both sides. Saw it May 24th, 1898.—T. S.

*PLEURONECTES OYNOGLOSSIS* (Moreau). Pole or Craig Fluke.

Two examples at Yarmouth, April 3rd, 1895; January 20th, 1896. The former in Cambridge Museum.—A. P. This fish, locally known as the Witch, is not seldom seen in the Yarmouth Fish Wharf.

*PLEURONECTES PLATESSA* (L.). Plaice.

Abnormality (Trans. 1898, p. 408), worthy of mention.

*SOLEA LASCARIS* (Risso). Lemon Sole.

Mr. Patterson sent me a good example,  $10\frac{1}{4}$  inches by  $3\frac{3}{4}$  inches, 18th January, 1899.—T. S.

*SALMO SALAR* (L.). Salmon.

An occasional visitor; one caught with fly, by Mr. G. F. Buxton, in the Stoke river, on 20th May, 1897, weighed 6 lbs. Mr. Buxton had it preserved for the Norwich Museum.—T. S. One  $13\frac{1}{2}$  lbs. taken in draw-net at Gorleston, May 17th, 1898.

*CLUPEA HARENGUS*. Herring.

It is not unusual in the West of England, I believe, to take Herrings with the hook. It is most rare to hear of or see them thus taken here; but on July 22nd I saw boys catching them on tiny hooks, with bits of Shrimps, in Lowestoft harbour. Length about 4 inches.—A. P.

*CLUPEA PILCHARDUS* (Cuv.). Pilchard.

Some taken June 23rd, 1897 (Trans. vol. vi.). A few are taken every spring; several in May and June, 1895; and one which I did not see, in the week ending Oct. 15th, 1898.—A. P.

*ANGUILLA VULGARIS* (Flem.). Sharp-nosed Eel.

An albino with body of a creamy white; the lips pink, the dorsal and anal fins tinted with the same colour, eyes (?) Was taken in the River Bure, 6th June, 1895. Since the last report on the Fishes, Professor Grassi has read his most interesting account of the "Reproduction and Metamorphosis of the Eel," at the Royal Society, 1896. In his paper he has proved that Eels of all kinds breed only in the sea at great depths, and he has shown that *Leptocephalus* in its various forms are larval conditions of *Muraenoids*, Conger, *Anguilla*, &c.—J. L. See also present volume, p. 262.

*ORTHAGORISCUS MOLA* (L.). Sun-fish.

One taken off Yarmouth, 12th September, 1896, was 18 inches long, and weighed 10 lbs.—A. P.

[*ORTHAGORISCUS TRUNCATUS* (Flem.). Oblong Saw-fish.

One was taken in a "Dyde" (a sort of landing net) over the side of the trawler "Result." Very doubtful if this should be entered, as the locality is uncertain.—J. L.]

*ACIPENSER STURIO* (L.). Sturgeon.

The capture of a Sturgeon on a hook is a sufficiently rare event to be worth recording. On the 7th December, 1894 (Zool. 10th December, 1894), a beach fisherman caught one 6 feet 6 inches in length, having baited his hook with a Herring.—A. P.

*ALOPECIAS VULPES* (Gm.). Thrasher.

Mr. Southwell (Zool., October, 1897) mentions two other instances of the capture of the Thrasher at Lowestoft (September 11th and

29th, 1897); not unfrequently met with during the Mackerel season. One 10 feet long, which seems to be the average length brought to Fish Wharf, July 7th, 1898. Another brought into Lowestoft, November 7th, 1898, by boat "Forget-me-not." Length 14 ft. 4 inches.—A. P.

*RAIA CIRCULARIS* (Couch). Cuckoo Ray.

Two examples were brought into Yarmouth on February 4th and 16th, 1897, by longshore boats and three others (one of which is in Norwich Museum) on April 16th of the same year. A beautiful specimen taken on long-line off Yarmouth, 5th April, 1898.—A. P.

\* *RAIA RADIATA* (Couch). Starry Ray.

One 22 inches long was landed at the Yarmouth Ferry Wharf, 11th May, 1897. From its freshness Mr. Patterson had little hesitation in claiming for it a local origin.

*TRYGON PASTINACA* (L). Sting Ray.

One weighing 30 lbs., brought in by a Yarmouth boat, taken at Winterton, May, 1894. Another seen on Fish Wharf, 5th January, 1897.—A. P. A 15-lb. example on Fish Wharf, May 18th, 1898; another nearly as large with it; not unfrequent this month.

N.B.—Since this list was in type Mr. Southwell informs me that he has received from Mr. Patterson a specimen of *Blennius gattorugine* (Block), the largest of the British Blennies. It was taken in a shrimp-net off Yarmouth, on the 21st May, 1899, and sent to Mr. Southwell on the 25th. This is a new and important addition to the Fishes of Norfolk.

---

## XVII.

## FAUNA AND FLORA OF NORFOLK.

## ADDITIONS TO PART XI., BIRDS (THIRD LIST).\*

BY J. H. GURNEY, F.L.S. AND THOMAS SOUTHWELL, F.Z.S.

*Read 31st January, 1899.*

THE close of the sixth volume of our 'Transactions' offers the usual opportunity of revising the lists of the Fauna and Flora of the county, and we now have the pleasure of handing in the second supplement to the original list of Birds, the completion of which was presented to the Society in February, 1887, and included 288 species; to this, in 1894, we were able to add eight others, and in the present list there will be found a further addition of ten, one of which (the Aquatic Warbler) was already in the list of doubtful occurrences, and the recognition of two others as entitled to specific value, viz., Pallas's Shrike and the Scandinavian Rock Pipit, increases the total number of fully recognised species to 308. One other species, *Puffinus assimilis*, Gould, although new to the list takes the place of *P. obscurus*, to which it was erroneously assigned.

The birds new to the list are the following:—Pallas's Shrike, the Aquatic Warbler and the Scandinavian Rock Pipit, transferred from the doubtful list, and Pallas's Warbler, the Yellow-browed Warbler, Tawny Pipit, Holboell's Redpoll, Russian Bullfinch, Red-banded Crossbill, Great-spotted Cuckoo, Mediterranean Herring Gull, and the White-billed Diver, which have either occurred or been recognised since our last supplement. Eight others may also be mentioned, viz., the European Coal Tit, Grey-capped

\* The previous lists will be found in vol. iv. pp. 259 and 397; and vol. v. p. 642.

Wagtail, Red-winged Starling, Green-backed Porphyrio, Eastern Golden Plover, Ringed Guillemot, Pelican, and Hooded Merganser which for various reasons, we do not at present feel justified in admitting.

Of these 308 recognised species 108 may be recorded as regular breeders in this county; eight as occasional breeders, viz., the Hobby, Short-eared Owl, Ruff (?), Spotted Crake, Hooded Crow, Common Sandpiper, Roseate Tern, and Baillon's Crake. Ten others are suspected of having bred in the county, viz., the Pied Flycatcher, Golden Oriole, Ring Ouzel, White Wagtail, Rock Pipit, Red-necked Grebe, Eared Grebe, Little Bittern, Pintail, and Sandwich Tern. Fourteen others, which formerly bred in Norfolk, have now ceased to do so, viz., the Peregrine Falcon, Marsh Harrier (?), Hen Harrier, Raven, Savi's Warbler, Black Grouse, Great Bustard, Avocet, Black-tailed Godwit, Black Tern, Cormorant, Bittern, Spoonbill, and Greylag Goose, leaving 168 non-breeding species. Mr. Gurney has, with great care, drawn up the following table indicating the comparative numbers of seven very representative birds formerly common on the Broad-land marshes, nesting in the last five decennial periods. Of course this must not be accepted as perfectly exact, but it probably fairly represents the gradual falling off in the numbers of these birds breeding in that district then and now :—

		Approximate Number of Nests.				
		1858.	1868.	1878.	1888.	1898.
Ruff	... ..	14	5	2	1	0
Bearded Tit	... ..	140	125	90	45	33
Garganey	... ..	20	15	12	7	2
Montagu's Harrier		6	5	3	2	1
Marsh Harrier	... ..	6	4	3	0	0
Hen Harrier	... ..	2	0	0	0	0
Short-eared Owl	... ..	6	4	4	3	1

If to these we add eight others whose claim is not considered fully established, there will be found a grand total of 316 species mentioned in the list.

It will be observed on looking over the present list, in which only the scarcer species are mentioned, how exceedingly productive in rare autumn immigrants the season of 1896 proved to be—such exceptionally rare visitors as the White-winged Tern, Great Shearwater,

Barred Warbler, Gull-billed Tern, Icterine Warbler, Bluethroat, Aquatic Warbler, Sabine's Gull, Great-spotted Cuckoo, Pallas's Warbler, Black-breasted Dipper, and Red-breasted Flycatcher followed each other, to quote Mr. Gurney's report (Zool. 1898, p. 106), "in bewildering succession;" nor were our neighbours at the mouth of the Humber less fortunate. In addition to many rarities, the months of September and October in that year produced three new species with us, and one (*Phylloscopus viridanus*) at the Humber mouth.

Mr. Preston, in the valuable Meteorological Notes which he contributes annually to our 'Transactions,' supplies us with the key to this remarkable state of things; he describes the weather in the month of September, 1896, as stormy, wet, and unsettled throughout, much cloud, the rainfall was about an inch above the average, and fell on twenty-one days, with great barometric variation—the bad weather culminated in the week ending the 27th, the prevailing winds were S. to W. with a mean pressure of 3.7. October was a damp depressing month, much cloud, rain fell on twenty-four days although not heavily, and the prevailing winds were S.W. with a force of 3.1.—a long period of cyclonic disturbance. Those who have carefully studied Mr. Eagle Clark's exhaustive digest of the Reports of the British Association Committee, will recognise, in the meteorological conditions just described, the ideal combination of atmospheric effects calculated to produce such a manifestation of the phenomena of what he styles the "East to West" autumnal immigration as was witnessed in the autumn of 1896. One of the present writers has had occasion to remark elsewhere ('Natural Science,' p. 248), when treating of this subject: "There is no more astonishing feature in the whole range of this wonderful subject than the arrival on our East coast of birds whose natural habitat is Eastern Asia, and which must have crossed the whole of Europe, finishing with the passage of the North Sea. Some of these, too, are delicate warblers of the smallest size, and arrive here after British representatives of their kind have left us for the south." Their departure from their summer home is undertaken when the prospects for the journey are fairly favourable, but they soon become subject to weather conditions of extreme complexity. Should fair weather favour them the usual flight takes place uninterruptedly, almost

imperceptibly, at a considerable elevation, and along the normal route, and the flights for the most part pass on unrecognised; "in somewhat unsettled weather they may be in some degree quickened, but are still normal; exceptionally heavy weather arrests all migration, and the barred-up stream is detained for a favourable opportunity; its eventual release results in one of those 'rushes' with which dwellers on the East coast are so familiar, but which never fails to excite our astonishment" (*l.c.* p. 252). Foggy weather, too, greatly embarrasses the migratory movements, causes the flight to be erratic, and the migrating hosts to wander from their proper course. Under these adverse conditions they linger where they alight, readily falling a prey to the many keen watchers who are expecting their arrival. We frequently experience a season of interrupted "rushes," but seldom one of such continued arrivals of rare immigrants as characterised the autumn of 1896.

The autumn of 1897 was a decided contrast to that of the previous year; August produced only a Pectoral Sandpiper and a Barred Warbler, and October a Tawny Pipit. August of the past year (1898) was only remarkable for a large flight of Crossbills, which reached us in the first week with a westerly wind; and the usual stream of October immigrants, Kingfishers and Great-spotted Woodpeckers in unaccustomed numbers, a flock of seventeen Bewick's Swans on the 8th, and large numbers of Scaup Ducks on the 10th. Our friends in the further north, however, were more fortunate, a specimen of Radde's Bush Warbler (*Lusciniola schwarzi*), a species new to Britain, was obtained on the Lincolnshire side of the Humber on the 1st of October. It will be noticed that in speaking of the wonderful influx of rare species, we only refer to the East and West route, as it was by that line of migration that we were indebted to most of the Central Europe and even Trans-Caspian species which visited us.

One of the most interesting facts in Norfolk Ornithology, clearly showing the value of judicious protection, is the large increase both in the number of individuals and species of Ducks found breeding in the county. The *Shoveler* had long been known to nest sparingly in the "Broad" district; Hunt mentions it in 1815, and Sheppard and Whitear, Paget, and Lubbock successively refer to the fact; Salmon was aware of its nesting at Stanford as early as the year 1826; but these facts do not appear to have been



generally known. At that time, it must be remembered, that Ducks were killed whenever met with, and one well-known Norfolk sportsman is said to have remarked that his larder was never without Wild Ducks all the year round ; since a better state of things has existed the number of breeding Shovelers has largely increased, especially in North Norfolk, where, we fear, this increase has been attended with a corresponding decrease in the number of Garganey Teal.

The *Gadwall* was only known in Norfolk as a visitor in winter and early spring previous to about the year 1850, when some pinioned birds were turned out at Narford ; since that time this species has become quite naturalised, and may now be regarded as numerous, especially on the Merton estate, where it breeds in numbers, and has now extended to Scoulton Mere.

The *Pochard* doubtless nested in small numbers in Norfolk, Scoulton Mere being the locality most referred to, early in the present century ; it has now quite deserted Scoulton, but breeds in considerable numbers in the South-west corner of the county, where, in 1850, it was only suspected of doing so.

The *Tufted Duck* is another instance in point. It had long been suspected of occasionally nesting in the county, but had escaped detection until 1873, when Lord Walsingham found a nest ; he believes it bred on his estate before 1871 ; it is now, however, a regular occurrence, and many nests are hatched off annually in that district. A correspondent of one of the writers in a letter, dated 30th January, 1899, referring to shooting in the Thetford country, says : "I have been much struck, the last few years, with the large number of Tufted Ducks and Gadwall we now find on the river above Brandon. Ten years ago Tufted Ducks were not common, and Gadwalls unknown ; three years ago we killed the first pair, now they breed there every year, and we have seen hundreds in one day. Only last Thursday [January 26th] I saw a flock of quite one hundred Tufted Ducks, and several small lots of Gadwall and Widgeon. Teal and Mallard are not so numerous as they used to be." The latter statement is corroborated by Lord Walsingham. Many of the birds referred to in the letter quoted would probably be migrants, but doubtless a fair proportion were home-bred individuals.

In the following notes it will be observed that a few of the

paragraphs are initialled ; this must be taken to indicate that the event came more especially under the notice of the recorder whose initials are appended.

RED-BREASTED FLYCATCHER (*Muscicapa parva*).

In our last list we recorded an example of this bird killed at Cley on the 13th September, 1890, by Mr. Ogilvie. Since that time an immature example has been killed by Mr. G. E. Power, on October 4th, 1894 (Zool. 1895, p. 100) ; another was seen by Mr. T. E. Gunn in September, 1896 (Zool. 1897, p. 138), all in the same favoured locality ; and a fourth, an immature female, was shot at Rollesby, on the 12th December, 1896, by Mr. Connop's keeper, and is now in that gentleman's collection.

BLACK-BREASTED DIPPER (*Cinclus melanogaster*).

Examples of this Scandinavian form were obtained at Aylsham, on the 24th October, 1894, and on the river Bure, near Yarmouth, on the 9th November, 1896. A Dipper was also seen by the Rev. Hamilton Upcher at Selbrigge pond, Hempstead, in April, 1897 (Zool. 1898, p. 110), but not obtained ; as the only previous occurrence of this bird in spring known to us was killed in April, 1872, at Felbrig, no great distance from Hempstead, and proved to be of the Black-breasted race, it would have been interesting to have ascertained to which form this spring migrant belonged.

BRITISH DIPPER (*Cinclus aquaticus*).

Sir William ffolkes kindly informed us that on November the 9th, 1898, he shot a chestnut-breasted Dipper near Hillington, the only example of the native race we have heard of in Norfolk for many years.

ICTERINE WARBLER (*Hypolais icterina*).

On September 7th, 1896, Mr. Robert Gurney obtained an Icterine Warbler at Cley, not far from the spot where Dr. Power's example was killed ; a Blue-throat was with it, and both had come over with an east wind. This bird is now in the Castle-Museum.

\* AQUATIC WARBLER (*Acrocephalus aquatica*).

In our first list we were only able to refer to the figure in Hunt's 'British Birds,' as indicating the probability of this bird

having been obtained in Norfolk. All doubt is now removed by the occurrence of an immature male, in very good plumage, which was shot by Mr. T. E. Gunn on the sand hills at Blakeney, on the 8th September, 1896. Its stomach contained the remains of Earwigs.

BARRED WARBLER (*Sylvia nisoria*).

In our last supplement we recorded two Barred Warblers, and since then three others have turned up, the five dates being :

September 4th, 1884.	August 31st, 1896.
„ 10th, 1888.	„ 27th, 1897.
„ 10th, 1894.	

One of these was watched for a considerable time, in fact, as long as desired, skulking in some low bushes of *Chenopodium*, where there was not much to hide in, only half a mile from the shore, and near where the others were detected. When driven from this retreat and forced to double back over the less congenial mud, the grey tint of its plumage was very apparent, and probably it had lately arrived and was fatigued, for its flight was laboured. It presently took refuge in the thick roots of the *Chenopodium*. It had come with a light south wind.—G.

\* PALLAS'S WARBLER (*Phylloscopus proregulus*).

This charming little wanderer was shot by Mr. Ramm, at Cley-next-the-Sea, on the 31st of October, 1896, and exhibited at the meeting of the Zoological Society of London, on the 1st of December following. Full particulars of the occurrence will be found in the volumes of the 'Zoologist' for 1896, p. 466, and 1897, pp. 8 and 135; also in the present volume of our 'Transactions,' p. 280, with coloured plate. The bird is in the Connop collection.

\* YELLOW-BROWED WARBLER (*Phylloscopus superciliosus*).

Cley-next-the-Sea, a locality which has produced so many rare migrants, also yielded an example of this rare warbler; it was killed on the 1st of October, 1894, and is like the Pallas's Warbler in Mr. Connop's collection. Full particulars of the event will be found in 'The Field' for the 3rd of November, 1894, and in the 'Zoologist,' 1895, p. 100.

\* TAWNY PIPIT (*Anthus campestris*).

A female, in rather faded plumage, now in Mr. Connop's collection, was caught in a clap-net on the North Denes, Great Yarmouth, on the 7th of October, 1897. The wind on the previous day had been from the S.W. On the 2nd September, 1889, one of these birds had been taken at Lowestoft (Zool. 1890, p. 57).

\* SCANDINAVIAN ROCK PIPIT (*Anthus rupestris*).

Mr. Gurney remarks (Zool. 1895, p. 96) that this well-marked race (or species) like the Black Redstart, only occurs on our coast on its westward migration, about the month of March. Two males were shot at Cley, on the 6th of March, 1894; and three others, also males, but showing very little of the vinous breast and grey head of the breeding plumage, were shot at the mouth of the river Glaven, on the 28th of February, 1896. We have hitherto treated this bird as merely a variety of *Anthus obscurus*, but we think we are now justified in giving it specific value.

RICHARD'S PIPIT (*Anthus ricardi*).

A specimen, now in the Norwich Museum, was taken alive near Yarmouth, on the 11th of December, 1894 (Zool. 1895, p. 102).

SERIN FINCH (*Serinus hortulanus*).

On the 1st of April, 1897, a pair of these birds were seen near Yarmouth, and the male taken; it is a much brighter specimen than one, also netted by bird-catchers at Saxmundham (Suffolk) in April, 1893. Although a common cage bird on the Continent, we think that it may now be fairly considered as an occasional migrant here.

\* HOLBOELL'S REDPOLL (*Canabina holboelli*).

Dr. Sharpe states that two specimens of this sub-species distinguished from the Mealy Redpoll by its larger bill, taken near Norwich, several years ago, are in the Natural History Museum ('Catalogue of Birds,' vol. xii. p. 251).

\* RUSSIAN BULLFINCH (*Pyrrhula major*).

A male shot on the denes near Yarmouth, on January 22nd, 1893, at which time of the year Mr. Hartert says it is very common in East Prussia, whence this may have come; others have since been taken in Yorkshire.—G.

CROSSBILL (*Loxia curvirostra*).

The first week in August, 1898, brought the largest arrival of Crossbills our county has had for many years, their presence being reported in more than twenty parishes near the coast, from Sandringham to Aldeburgh in Suffolk. We are glad to add that the recent extension of the county close time was respected, and not many were shot.

\* RED-BANDED CROSSBILL (*Loxia rubrifasciata*).

If, as appears from Mr. Dresser's supplement to 'The Birds of Europe,' *L. rubrifasciata* is to be treated as a species, it must be received into the Norfolk list, as a male Crossbill, having white or buff tips to the wing-coverts, was shot at Westwick, on September 28th, 1871 (Zool. 1889, p. 391).

\* GREAT-SPOTTED CUCKOO (*Coccyzus glandarius*).

A young male, shot by a man named Edmunds, October 18th, 1896, on Caister denes; now in the possession of Mr. E. M. Connop, to whose museum it is a fine addition, had been feeding freely on the larvæ of the Buff-tip Moth. On the same day, a Macqueen's Bustard was shot in Lincolnshire, so it is probable they had come from the same country, most likely the south-east of Europe, and arrived together.

ROLLER (*Coracias garrulus*).

On May 28th, 1898, a Roller was found dead at Yelverton, like most of those which have occurred here it was a female. Since May, 1664, when the first British Roller was killed at Crostwick, Norfolk has yielded nineteen of these birds, which are too conspicuous to be likely to be passed by.

BAILLON'S CRAKE (*Porzana bailloni*).

Mr. T. E. Gunn tells me that he had an egg of this bird brought to him which was found by a marshman in a nest composed of dry sedge, and situated in a patch of dead vegetation, near the edge of a dyke at Sutton Broad, on 2nd May, 1889. The parent bird was seen, and Mr. Gunn is quite satisfied from the description as to its species. The egg is now in the collection of Sir V. H. Crewe, Bart. A nest of this species containing four eggs, now in Mr. Crowfoot's collection, was taken at Potter Heigham, on June 9th, 1886.—S.

[GREEN-BACKED GALLINULE (*Porphyrio smaragdnotus*).

On July 19th, 1898, another of these birds was shot on Barton Broad, the tenth in this county, and the sixth at this particular broad. If they have all escaped, the instinct which leads so many to the same place is very remarkable.—G. A *Porphyrio* killed near Brandon in the spring of 1896 proved to be *P. calvus*, undoubtedly an escape].—S.

CRANE (*Grus communis*).

On April 7th, 1898, Mr. H. N. Pashley announced the arrival of four Cranes on their spring migration, which halted near the mouth of the little river Glaven, and remained all the forenoon within 200 yards of a gang of workmen, quietly resting themselves on the side of Wiveton bank. Subsequently Mr. Pashley had a good view of them as they were flying eastwards, and they were next heard of as visiting a piece of water at Weybourne. It is possible that a very light variety of the Crane shot near Feltwell, as long ago as August, 1836, in Mr. F. Newcome's collection, may be the eastern race, which has received the name of *Grus lilfordi*, Sharpe; though its white back and the spotted character of the plumage is perhaps more indicative of a partial albinism in *G. communis*.—G.

BUSTARD (*Otis tarda*).

A full account of the female Great Bustard, shot at Costessey, near Norwich, on the 1st of February, 1894, will be found in vol. v. of our 'Transactions,' p. 656. I have also given particulars in the 'Zoologist' for 1897, p. 572, and in the present volume of our 'Transactions,' p. 385, of a very fine male of the old Norfolk race (till then not recorded), which was killed on Swaffham Heath about the year 1830, and is now in Mr. Connop's collection.—S.

LITTLE BUSTARD (*Otis tetrax*).

Colonel Butler records the occurrence of a female of this species at Feltwell, on the 1st of January, 1898, in the 'Zoologist' for that year, p. 125. A beautiful male Little Bustard in full breeding plumage, a condition in which it has not, to my knowledge, been met with in Britain, was killed near Kessingland, in the adjoining county of Suffolk, early in May, 1898; it is now in Mr. Connop's collection. All previous occurrences in the East of England have been in the winter months.—S.

BLACK-WINGED STILT (*Himantopus candidus*).

An immature female was killed at Castleacre, near Swaffham, by Mr. T. M. Hudson, Jun., on the 12th of October, 1895; four days previous to that date, two of these birds had been seen on the Wolverton marshes, by Mr. C. Plowright and Mr. Petch (*ante*, p. 228).

BROAD-BILLED SANDPIPER (*Limicola platyrhyncha*).

On August the 13th, 1895, two of these birds were seen at Blakeney, one of which was shot. This is the first occurrence of the Broad-billed Sandpiper at Cley, but four or five have been killed on Breydon, where this species was first recognised as British in 1836.

PECTORAL SANDPIPER (*Tringa maculata*).

Mr. J. L. Newman killed an adult female of this species on Breydon, on the 18th of August, 1897. It was in company with a flock of Ringed Plovers and Dunlins, but remained on their being flushed, and when put to flight rose silently (Zool. 1898, p. 25).

COMMON SANDPIPER (*Totanus hypoleucus*).

The chief ornithological event of the year 1897, was the discovery by Mr. Oswin Lee, on May the 25th, of a nest and four eggs of the Common Sandpiper, under a Gooseberry bush at Hickling.\* The breeding of this bird has long been suspected, but never before verified in Norfolk or Suffolk. The nest was not disturbed, nor were the birds (also seen by the Rev. M. C. Bird) molested.—G.

WHITE-WINGED TERN (*Hydrochelidon leucoptera*).

One of these birds killed on Breydon, on the 12th of August, 1896 was exhibited by Mr. B. Dye, at a meeting of our Society; it is an adult male, assuming winter plumage.

GULL-BILLED TERN (*Sterna amylica*).

On the 5th September, 1896, an adult female of this bird, approaching winter plumage, which had been killed on Breydon,

\* This curious situation for a Common Sandpiper's nest is not unique. Thompson, in the 'Natural History of Ireland' (vol. ii. 'Birds,' p. 212), mentions that "an unusual site was selected, some years ago, by a pair of Sandpipers, which built their nest in a Gooseberry bush, in a garden contiguous to a pond in the neighbourhood of Belfast."

was brought to me in the flesh for identification ; it is now in the Connop collection.—S.

ROSEATE TERN (*Sterna dougalli*).

Since the first occurrence of this bird near Hunstanton in 1880, two females, now in the Connop collection, were shot at Cley, on the 24th of June, 1896. There is good reason for believing that a pair or two have nested more than once on the Norfolk coast. In June, 1897, in company with one of the keenest observers I know, I watched a pair (possibly two pairs) of these birds in a favourite nesting locality for Terns on the Norfolk coast ; they repeatedly settled on a spot where we had no doubt their nest was situated, and we as often flushed them again, but as the precise spot was situated in a hollow we could not see them on the ground, and therefore were not certain which was their nest. Shortly after our visit a sweeping tide covered the part of the marsh where most of the Terns were breeding, but the birds were frequently seen subsequently by a very intelligent gunner who had spent his life on the shore, and who originally pointed the birds out as unusual.—S.

SABINE'S GULL (*Xema sabini*).

On the 22nd of October, 1895, at Wells, and again on the 12th of October, 1896, at Cley, examples of this bird were met with in Norfolk. Six examples have now been killed in this county, all in immature plumage, and all in the month of October.

\* MEDITERRANEAN HERRING GULL (*Larus cachinnans*).

One of these birds, a male by dissection, was killed on Breydon by the veteran gunner John Thomas, on the 4th of November, 1886. It was seen by Mr. Stevenson in the flesh, and preserved by Mr. Cole, but, probably, in consequence of the ill-health of the former, was overlooked until recently. Mr. Howard Saunders was good enough to examine the bird, and expressed himself quite satisfied with the determination of the species. See Zool. 1897, p. 572 ; also the present volume of our Trans. p. 417.—S.

GREAT SKUA (*Stercorarius catarrhactes*).

An example of this Gull, rare on our coast, was killed on the Snettisham Beach, on the 1st of November, 1895, and another at Eccles on January the 9th, 1896.



GREAT SHEARWATER (*Puffinus major*).

In August, 1896, a very large Shearwater was seen off Blakeney bar on three or four occasions, answering to the description of *P. major*, or *P. griseus*. On November the 10th, 1898, a fresh skin of *P. major*, recently shot off Lowestoft, was sent to me for identification.—S.

\* LITTLE DUSKY SHEARWATER (*Puffinus assimilis*). Gould.

In our original list (vol. iv. p. 413), as well as in the 'Birds of Norfolk' (vol. iii. p. 67), this bird, found dead at Earsham in April, 1858, is referred to as *P. obscurus*, Gmelin, but having been re-examined by Mr. Howard Saunders in February 1899, in the light of increased knowledge of the genus and more abundant material for comparison it has been decided that both this and a previous specimen killed in Ireland must be referred to a nearly allied but smaller form found nesting in the Desertas, the Salvages, and Cape Verde Islands. *Puffinus obscurus* must therefore be withdrawn from the list and the present species substituted.

BLACK GUILLEMOT (*Uria grylle*).

Rather a rare bird on our coast. One was killed at Cley on 1st April, 1895, and two others were met with in Holkham Bay, by Mr. Hamond, on the 8th of January, 1898.

LITTLE AUK (*Mergulus alle*).

The gales of January, 1895, sprinkled Little Auks broadcast over that part of Norfolk which is contiguous to the coast, the greatest number being picked up between the 10th and the 27th. On the 21st, small flocks were seen at Cley, flying a few yards above the sea, and one flock was estimated by Mr. Ramm to contain a hundred individuals. 285 picked up or otherwise obtained were recorded (cf. vol. vi. p. 67), a number raised by subsequent information sent in to the recorder to at least 302.

\* WHITE-BILLED DIVER (*Colymbus adamsi*).

It has been decided on apparently competent authority that a large Diver, with whitish mandibles, shot on Hickling Broad in December, 1872, by the late Mr. E. T. Booth, and still in his museum at Brighton, where I have twice examined it, is a White-billed Diver ('Zoologist,' 1896, p. 14). One was shot several years

ago at Lowestoft, and it visits the coast of Norway annually ('Ibis,' 1894, p. 269).—G.

SPONBILL (*Platalea leucorodia*).

In the 'Zoologist' for 1897, p. 126, allusion is made to the partiality shown for Breydon Broad by the Spoonbill, so that not a single summer passes by without some coming to this tidal resort. Thus, in the last twelve summers, ninety-three Spoonbills have visited Breydon, and, thanks to the exertions of the watcher, nearly all of them have escaped the gun. Surely if our gunners would be considerate enough to let them alone, the woods hard by of "Cauntele" and "Castre," to say nothing of "Wyrmegeye" (Wormegay), "Rungeton" (Runcton), and "Fyncham" (Fincham), further off, might again rejoice in its presence in breeding time, as Professor Newton, who has consulted a contemporary MS., tells us they did in the reign of Edward I. (vol. vi. p. 158).—G.

RUDDY SHELD-DUCK (*Tadorna casarca*).

On August the 18th, 1898, an adult female, quite perfect in plumage, believed to have been shot near Yarmouth, was sent to Mr. Cole for preservation for Mr. Connop's museum.\*

WHITE-EYED DUCK (*Fuligula nyroca*).

I was informed that a young male was shot near Yarmouth, on October the 9th, 1894, but did not see it. In January, 1897, a hybrid between this species and the Pochard was taken on Saham Toney Mere, and promptly recognised by Mr. A. W. Partridge, as the so-called "Paget's Pochard." Placed on a pond with several other species, it at once elected to consort with the Pochards, but always seemed to be the weaker bird when food was thrown, and also rather shy.—G.

\* A catalogue of this fine collection, the property of Mr. E. M. Connop of Rollesby Hall, containing more than 440 cases of birds, to which constant additions are being made, and which is so often referred to in this supplement, was prepared last year by Mr. Southwell, and has been printed for private distribution.—G.

## XVIII.

## FAUNA AND FLORA OF NORFOLK.

## ADDITIONS TO PART XII., COLEOPTERA (SECOND LIST).

BY JAMES EDWARDS, F.E.S.

*Read 28th March, 1899.*

THE following list is supplemental to that published in the 'Transactions' of this Society for the year 1893—4 (vol. v. pp. 427—508).

In addition to the very valuable assistance rendered by my esteemed colleague, Mr. H. J. Thouless, I am indebted for notices of captures of Coleoptera in this county to the following entomologists, namely, Messrs. E. A. Butler, G. C. Champion, E. G. Elliman; and the Rev. A. Thornley.

By the courtesy of the Rev. E. N. Bloomfield, I have been able to see "A List of the rarer species of Coleoptera which occur or have been taken in the neighbourhood of Harleston, Norfolk, by J. Leedes Fox, Esq., and in the neighbourhood of Bungay by W. Garneß, Esq.," which appeared in a Natural History magazine called 'The Naturalist,' for the months of January, April, and July, 1858. The continuation of the list notified at the end of the last published instalment never appeared, as the magazine came to an end in January, 1859; but the published portions appear to leave only the Brachelytra to be dealt with. The authors of this list were both coleopterists of repute. William Leedes Fox was a solicitor living at Harleston; he died in October 1866, aged 45 years, having bequeathed his collection, which was valued at £100, to his elder son, who was not, I believe, an entomologist. William Garneß was the son of Charles Garneß, a surgeon, who lived at Bungay; he settled at Repton, near Burton-on-Trent, where he practised as a surgeon, and was well known as an ardent entomologist, and the author of a "List of Coleoptera of Repton

and neighbourhood," contained in the second edition of a small volume entitled 'Contributions to the Fauna and Flora of Repton and neighbourhood'; he died in 1881. The "Mr. Muskett" whose name is mentioned by Fox as the captor of *Endomychus coccineus*, *Metæcus paradoxus*, *Odontæus mobilicornis*, etc., was probably John Muskett, solicitor, of Diss.

The number of additional species now recorded is seventy-three, distributed as follows: Carabidæ, 10; Dytiscidæ, 1; Hydrophilidæ, 3; Staphylinidæ, 18; Corylophidæ, 1; Clambidæ, 2; Silphidæ, 2; Nitidulidæ, 3; Cucujidæ, 1; Cryptophagidæ, 2; Coccinellidæ, 2; Mycetophagidæ, 1; Byrrhidæ, 1; Buprestidæ, 1; Eucnemidæ, 1; Elateridæ, 1; Dascillidæ, 2; Cleridæ, 1; Anobiidæ, 1; Cissidæ, 2; Curculionidæ, 10; Scolytidæ, 3; Cerambycidæ, 3; and Chrysomelidæ, 1. The number of species recorded as occurring in the county is thus increased to 1801.

## CARABIDÆ.

DYSCHIRIUS ÆNEUS, Dej. Waxham (Champion); Hunstanton (Thornley).

BADISTER PELTATUS, Panz. Brandon, June, 1895 (Thouless).

AMARA RUFOCINCTA, Sahl. Yarmouth (Thouless).

„ PLEBEIA, Gyll. Norwich (Thouless); running on pathways in early spring.

HARPALUS PARALLELUS, Dej. Lakenham, April, 1896 (Thouless).

„ SERRIPES, Sch. Harleston district, "occasionally in gravel pits" (Fox); under clod of earth at foot of cliffs, Cromer (Elliman).

TRECHUS RUBENS, Fab. Waxham (Champion).

BEMBIDIUM BRUNNICORNE, Dej. (AFFINE, Steph.)

„ NITIDULUM, Marsh (BRUNNIPES, Sturm.)

„ ANGLICANUM, Sharp.

} Gimmingham (Butler);  
Cromer (Elliman).

## DYTISCIDÆ.

HYDROPORUS DAVISI, Curt. Harleston district (Fox).

## HYDROPHILIDÆ.

BEROSUS AFFINIS, Brull. Hunstanton, April, 1896 (Thornley).

- HYDRÆNA GRACILIS**, Germ. Lakenham, swarming on a submerged Mangold, September, 1898 (Edwards).  
**CERCYON DEPRESSUS**, Steph. Hunstanton (Thornley).

## STAPHYLINIDÆ.

- ALEOCHARA ALGARUM**, Fauv. Hunstanton (Thornley).  
**MICROGLOSSA PULLA**, Gyll. Gimingham (Butler).  
**OXYPODA UMBRATA**, Gyll. Gimingham (Butler).  
**HOMALOTA LITTOREA**, Shp. Salthouse, at roots of *Glaucium* (Elliman).  
 ,, **PUNCTICEPS**, Th. Gimingham (Butler).  
 ,, **BOLETOBIA**, Th. Gimingham (Butler).  
 ,, **ATRICOLOR**, Shp. Gimingham (Butler); Cromer, rather common in dung and by evening sweeping (Elliman).  
 ,, **ORBATA**, Er. Cromer, one by evening sweeping (Elliman).  
**TACHYUSA SCITULA**, Er. Gimingham, rather common on damp sandy cliffs (Butler).  
**PLACUSA INFIMA**, Er. Cromer, under sappy Oak bark (Elliman).  
**LATHROBIUM PALLIDUM**, Nord. Cromer, one in a damp spot on the cliffs (Elliman).  
**SCOPEUS SULCICOLLIS**, Steph. (MINUTUS, Er.). Cromer, one under a stone on the cliff (Elliman).  
**STENUS BIPUNCTATUS**, Er. Cromer, in damp spots on the cliffs (Elliman).  
 ,, **GUTTULA**, Müll. Cromer, with the preceding species (Elliman); Gimingham (Butler).  
 ,, **ATRATULUS**, Er. Gimingham, on sandy cliffs (Butler).  
**BLEDIUS FUSCIPES**, Rye. Gimingham, abundant in sandy cliffs (Butler); Cromer, common on sides of cliffs in sandy spots (Elliman), who notes that all his specimens there taken wanted the usual dark coloration of the legs; the determination, however, was confirmed by Champion.  
 ,, **LONGULUS**, Er. Gimingham, with the preceding species, but much less common (Butler).  
**SYNTOMIUM ÆNEUM**, Müll. Gimingham, by beating Moss growing on horizontal tree trunks of about six inches diameter in hedges (Butler).

## CORYLOPHIDÆ.

CORYLOPHUS CASSIDIODES, Marsh. Horning, common in refuse (Elliman); Gimmingham, at roots of plants on sandy cliffs (Butler).

## CLAMBIDÆ.

CALYPTOMERUS DUBIUS, Marsh. Horning, one example in refuse (Elliman).

CLAMBUS PUBESCENS, Redt. Gimmingham, abundant in a manure heap (Butler).

## SILPHIDÆ.

AMPHICYLLIS GLOBUS, Fab. Cromer, by sweeping at the Roman Camp (Elliman).

ANISOTOMA LITURA, Steph. Cromer (Elliman).

## NITIDULIDÆ.

EPUREA OBLONGA, Hbst. Cromer, one example beaten from a dead Fir tree (Elliman).

MELIGETHES OVATUS, Sturm. Horning (Elliman).

„ OBSCURUS, Er. Cromer, in flowers of *Tencrium* (Elliman).

## CUCUJIDÆ.

PEDIACUS DERMESTOIDES, Fab. Cromer, under sappy bark of an Oak stump (Elliman).

## CRYPTOPHAGIDÆ.

CRYPTOPHAGUS DENTATUS, Hbst. Gimmingham (Butler).

ATOMARIA GUTTA, Steph. Horning (Elliman).

## COCCINELLIDÆ.

CHILOCORUS SIMILIS, Rossi (RENIPUSTULATUS, Scrib.). Ranworth, Whitwell (Thouless); Wretham Heath (Edwards), Horning (Bedwell).

SCYMNUS SCUTELLARIS, Muls. (MULSANTI, Wat.). Gimmingham, at roots of herbage on sandy cliffs (Butler).

## MYCETOPHAGIDÆ.

LITARGUS BIFASCIATUS, Fab. Cromer, one example flying (Elliman).

## BYRRHIDÆ.

*LIMNICHUS PYGMÆUS*, Sturm. Cromer, common in a few spots on the cliffs (Elliman).

## BUPRESTIDÆ.

*AGRILUS LATICORNIS*, Ill. Horsford, Arminghall (Thouless).

## EUCNEMIDÆ.

*MELASIS BUPRESTOIDES*, L. Gawdy Hall Wood (Garneys).

## ELATERIDÆ.

*MELANOTUS CASTANIPES*, Payk. Stratton Strawless, one dug from a rotten Birch, June, 1895 (Thouless).

## DASCILLIDÆ.

*PRIONOCYPHON SERRATICORNIS*, Müll. Norwich, one on the railings of Chapel Field Gardens, 12th July, 1894 (Thouless).

*EUBRIA PALUSTRIS*, Germ. Whitwell Common, June, 1895 (Thouless).

## CLERIDÆ.

*TILLUS ELONGATUS*, L. Harleston District (Fox).

## ANOBIIDÆ.

*CONIPORA ORBICULATA*, Gyll. Horning, one example swept from long grass (Elliman).

## CISSIDÆ.

*CIS BIDENTATUS*, Ol. Harleston District (Fox); Horning, in fungus on Willow (Elliman).

„ *FESTIVUS*, Panz. Cromer, under bark (Elliman).

## CURCULIONIDÆ.

*TRACHYPHLEUS ARISTATUS*, Gyll. Gimingham (Butler).

*SITONES FLAVESCENS*, Marsh. Gimingham, common by sweeping near the edge of the cliffs (Butler); Horning (Bedwell).

- SITONES SUTURALIS, Steph. Gimmingham (Butler).  
 PISSODES NOTATUS, Fab. "A single specimen found under a stone in an old gravel pit at Yaxham, near East Dereham, Norfolk, by Mr. Wollaston." Walton. A. & M. N. H. 1844, p. 96.  
 ERIRHINUS AGNATHUS, Boh. Horning (Elliman).  
 BALANINUS TESSELLATUS, Fourc. Dunston, one example (Thouless).  
 CEUTHORHYNCHUS VIDUATUS, Gyll. Horning, one example (Elliman).  
 " QUERCETI, Gyll. Horning, by sweeping, 13th June, 1889 (Edwards); four examples, 4th July, 1895, on a solitary cruciferous plant, ? *Raphanus raphanistrum* (Elliman). This species, which in this country is only known from Horning, was long confounded with *Ceuthorrhynidius terminatus*, and has only recently been correctly identified (cf. Champion, Ent. Mo. Mag. vol. xxxv. p. 142). Mr. E. Saunders has two specimens taken at Horning by J. A. Brewer about thirty years ago.  
 APION GYLLENHALI, Kirby. Gimmingham (Butler).  
 RHYNCHITES UNCINATUS, Th. Horning, on Willow (Elliman).

## SCOLYTIDÆ.

- SCOLYTUS MULTISTRIATUS, Marsh. Eaton, August, 1893 (Thouless).  
 DRYOCÆTUS CORYLI, Per. Cromer, in a sandpit (Elliman).  
 PITIOPHTHORUS MICROGRAPHUS, Gyll. Cromer, not uncommon in dead twigs of Fir (Elliman).

## CERAMBYCIDÆ.

- CALLIDIUM VARIABILE, L. Norwich, July, 1898 (Thouless).  
 POGONOCHERUS HISPIDUS, L. Gimmingham, by beating Whitethorn hedges (Butler).  
 GRAMMOPTERA TABACICOLOR, De G. Brandon (Thouless).

## CHRYSOMELIDÆ.

- THYAMIS LÆVIS, Duft. Gimmingham, common on various plants on the face of the cliffs (Butler).



The following notices of additional localities for species already recorded will serve to indicate their range within the county, or as evidence of the persistence of certain species in a given locality.

## CARABIDÆ.

- [*CARABUS CLATHRATUS*, Lin. "Once by my father, a few years ago, close to the town (*Bungay*), and is now in our collection" (Garneys).]
- NEBRIA LIVIDA*, Fab. Gimmingham, a few specimens in chinks in boulder clay, August, 1893 (Butler); Happisburgh, September, 1894, seven examples under leaves of Coltsfoot, on the shore (Wood).
- DYSCHIRIUS THORACICUS*, Ross. Gimmingham, common on the cliffs (Butler).
- DEMETRIAS MONOSTIGMA*, Leach. Sandhills, Holkham (Edwards); Hunstanton, Brancaster (Thornley).
- DROMIUS LONGICEPS*, Dej. Horning, one example by sweeping, 12th September, 1898 (Edwards).
- BLECHRUS MAURUS*, Sturm. Salthouse, 4th August, 1888 (Thouless).
- LEBIA CHLOROCEPHALA*, E. H. Harleston District (Fox).
- ODES HELOPIOIDES*, Fab. Harleston District (Fox).
- TAPHRIA NIVALIS*, Panz. Gimmingham, one example (Butler); Waxham (Champion); Mousehold Heath, Norwich, Reedham, Sheringham (Thouless).
- ANCHOMENUS SEXPUNCTATUS*, Lin. Harleston District, "once in a flood" (Fox).
- PLATYDERUS RUFICOLLIS*, Marsh. Harleston District (Fox); Mousehold Heath (Thouless).
- PTEROSTICHUS PICIMANUS*, Duft. Harleston District (Fox).
- " *ANTHRACINUS*, Ill. Harleston District, "frequent in Marshes in Spring" (Fox).
- AMARA CONVEXIUSCULA*, Marsh. Yarmouth (Thouless).
- " *BIFRONS*, Gyll. Horning (Bedwell).
- " *ACUMINATA*, Payk. Yarmouth, Norwich (Thouless).
- ANISODACTYLUS BINOTATUS*, Fab. Hunstanton, one example (Thornley).
- HARPALUS PUNCTATULUS*, Duft. Harleston District (Fox).
- " *AZUREUS*, Fab. East Dereham (Thouless).

*TRECHUS DISCUS*, Fab. Harleston District (Fox).

„ *MICROS*, Hbst. One example at the foot of the cliff,  
Happisburgh, September, 1894 (Wood).

*BEMBIDIUM ASSIMILE*, Gyll. Hunstanton (Thornley).

*BEMBIDIUM NORMANNUM*, Dej. Horning (Bedwell). This is usually  
a maritime species.

„ *VARIUM*, Ol. Brancaster (Thornley).

*TACHYPUS PALLIPES*, Duft. Gimmingham, running in damp places  
on the cliffs (Butler).

#### HALIPLIDÆ.

*HALIPLUS FULVUS*, Fab. Hunstanton (Thornley).

„ *FLAVICOLLIS*, Sturm. Brancaster (Thornley).

#### DYTISCIDÆ.

*BIDESSUS UNISTRIATUS*, Schr. Freely near Horsey Mere (Champion).

*DERONECTES ASSIMILIS*, Payk. Gimmingham (Butler); Brancaster  
(Thornley).

*AGABUS PALUDOSUS*, Fab. Not uncommon at Lakenham, September,  
1898 (Edwards).

„ *ULIGINOSUS*, Lin. Brandon (Thouless).

[ „ *AFFINIS*, Payk. This species must be expunged from  
our list; my Brandon specimens proving to be  
*unguicularis*, Thoms. The unsatisfactory nature  
of the characters given for the separation of  
these two species in the English text-books  
led Mr. Thouless to make a critical examination  
of authentic specimens of the males of each, and  
it is clear from the material prepared by him that  
the striæ in the series forming the stridulatory  
organ on each side of the third ventral segment  
of the abdomen are about twice as numerous in  
*affinis* as in *unguicularis*; the œdeagus of the  
former, too, has in the lateral aspect a distinct  
angular projection near the middle of its upper edge  
which is entirely wanting in that of the latter.]

„ *DIDYMUS*, Ol. Harleston District, rare (Fox); Holkham,  
Lakenham (Edwards); Gimmingham (Butler).

- AGABUS CONSPERSUS**, Marsh. Brancaster (Thornley).  
**COPELATUS AGILIS**, Fab. Hunstanton (Thornley).  
**RHANTUS BISTRIATUS**, Berg. Harleston District (Fox).  
**HYDATICUS TRANSVERSALIS**, Berg. Lakenham, one example, 13th  
 September, 1898 (Edwards).

## HYDROPHILIDÆ.

- CYMBIODYTA MARGINELLUS**, Fab. Hunstanton (Thornley).  
**HYDROCHUS BREVIS**, Hbst. Waxham (Champion).  
**CERCYON AQUATICUS**, Muls. Hunstanton (Thornley).

## STAPHYLINIDÆ.

- OCCYPUS CYANEUS**, Payk. Cromer, Yarmouth (Thouless).  
 „ **BRUNNIPES**, Fab. Gimingham, in Moss on cliffs (Butler).  
**XANTHOLINUS TRICOLOR**, Fab. Gimingham (Butler).

## PSELAPHIDÆ.

- BRYAXIS SANGUINEA**, Fab. Hunstanton (Thornley).

## SCAPHIDIIDÆ.

- SCAPHISOMA BOLETI**, Panz. Foxley Wood, August, 1888 (Edwards).

## SILPHIDÆ.

- COLON BRUNNEUM**, Latr. Gimingham (Butler).  
**NECROPHORUS VESPILO**, Lin. Holkham (Edwards).  
**SILPHA LEVIGATA**, Fab. Hunstanton (Thornley).

## LATHRIDIIDÆ.

- LATHRIDIUS LARDARIUS**, De G. Gimingham (Butler).  
 „ **ANGULATUS**, Man. Gimingham, by beating hedges  
 (Butler).

## ENDOMYCHIDÆ.

- ENDOMYCHUS COCCINEUS**, Lin. "Mr. Muskett has taken several  
 examples in this district, but I have never met  
 with it" (Fox).

## COCCINELLIDÆ.

- SCYMNUS HÆMORRHOIDALIS**, Hbst. Gimingham (Butler).

## MYCETOPHAGIDÆ.

TRIPHYLLUS PUNCTATUS, Fab. Happisburgh, September, 1894  
(Wood).

## DERMESTIDÆ.

TIRESIUS SERRA, Fab. Brandon, Stratton Strawless (Thouless).

## BYRRHIDÆ.

CYTILUS VARIUS, Fab. Hunstanton (Thornley).

## HETERO CERIDÆ.

HETERO CERUS MARGINATUS, Fab. Gimmingham, in sandy cliffs with  
*Bledius fuscipes* and *longulus*, needing to be dug  
for (Butler).

## SCARABÆIDÆ.

APHODIUS NITIDULUS, Fab. Norwich, Roudham (Thouless).  
" PORCUS, Fab. Norwich (Thouless).  
ODONTEUS MOBILICORNIS, Fab. "Once taken by Mr. Musket  
several years ago" (Fox).

## BUPRESTIDÆ.

AGRILUS VIRIDIS, Lin. Gawdy Hall Wood (Fox).

## EUCNEMIDÆ.

MELASIS BUPRESTOIDES, Lin. Gawdy Hall Wood (Garneys).

## ELATERIDÆ.

CARDIOPHORUS ASELLUS, Er. Brandon (Thouless); Hunst  
(Pegler).  
CORYMBITES TESSELLATUS, Lin. Harleston District frequent  
Whitwell Common, June, 1895 (Thouless)  
" QUERCUS, Gyll. Stratton Strawless (Thouless)  
" METALLICUS, Payk. } Harleston District, rare  
" BIPUSTULATUS, Lin. }

## TELEPHORIDÆ.

TELEPHORUS FLAVILABRIS, Fall. Horning (Bedwell).

    "    THORACICUS, Gyll. } Waxham (Champion).  
SILIS RUFICOLLIS, Fab. }

ANTHOCOMUS SANGUINOLENTUS, Fab. Gimmingham, by sweeping at edge of cliffs, after continued S.W. gales (Butler).

## ANOBIIDÆ.

BOSTRYCHUS CAPUCINUS, Lin. "Three specimens of this rare insect were taken by Mr. Muskett in this town (Harleston) some years since" (Fox).

## TENEBRIONIDÆ.

SCAPHIDEMA ÆNEUM, Payk. Harleston District, scarce (Fox).

## MELANDRYIDÆ.

ORCHESIA MICANS, Panz. Harleston District, frequent (Fox); Happisburgh, September, 1894 (Wood).

## PEDILIDÆ.

XYLOPHILUS BOLETI, Marsh. Gimmingham, one example (Butler).

## ANTHICIDÆ.

ANTHICUS ANTHERINUS, Lin. Harleston District (Fox).

## MORDELLIDÆ.

MORDELLISTENA BRUNNEA, Fab. Gimmingham (Butler).

## RHIPIDOPHORIDÆ.

METECUS PARADOXUS, Lin. "Mr. Muskett has taken numbers of these insects from Wasps' nest in this (Harleston) neighbourhood" (Fox).

## CANTHARIDÆ.

MELOE VIOLACEUS, Marsh. Hingham (Thouless).

## CEDEMERIDÆ.

CEDEMERA NOBILIS, Scop. Thorpe (Thouless).

## CURCULIONIDÆ.

- OTIORHYNCHUS RAUCUS, Fab. Mousehold Heath (Thouless).  
 „ MUSCORUM, Bris. Drayton, Keswick, Howe  
 (Thouless).  
 BARYNOTUS OBSCURUS, Fab. Gimmingham (Butler); Norwich,  
 Yarmouth (Thouless).  
 SITONES PUNCTICOLLIS, Steph. Gimmingham, abundant on the cliffs  
 (Butler).  
 HYPERA POLLUX, Fab. } Gimmingham, one example of each (Butler).  
 „ POLYGONI, Lin. }
- CLEONUS SULCIROSTRIS, Lin. Hunstanton (Thornley).  
 BALANINUS NUCUM, Lin. Dunston (Thouless).  
 „ VILLOSUS, Hbst. Salhouse, June, 1898 (Thouless).  
 OROBITIS CYANEUS, Lin. Yarmouth, commonly, April, 1898  
 (Thouless).  
 ACALLES PTINOIDES, Marsh. Gimmingham, by beating old White-  
 thorn hedges (Butler).  
 „ TURBATUS, Boh. Gimmingham, one example (Butler).  
 CENTHORHYNCHUS RUGULOSUS, Hbst. Weybourne, August, 1893  
 (Edwards); Gimmingham (Butler).  
 CENTHORHYNCHIDIUS TERMINATUS, Hbst. Gimmingham (Butler).  
 POOPHAGUS SISYMBRII, Fab. Gimmingham, moderately common on  
 Watercress (Butler).  
 „ NASTURTII, Germ. Gimmingham, one example (Butler).  
 RHINONCUS INCONSPECTUS, Hbst. Horning (Bedwell).  
 BARIS PICICORNIS, Marsh. Weybourne, under *Reseda*, August, 1893  
 (Edwards).  
 APION SUBULATUM, Kirb. }  
 „ HOOKERI, Kirb. } Gimmingham (Butler).  
 „ TENUE, Kirb. }

## ANTHRIBIDÆ.

- CHORAGUS SHEPPARDI, Kirb. Gimmingham, by beating old White-  
 thorn hedges (Butler).

## CERAMBYCIDÆ.

- CALLIDIUM VIOLACEUM, Lin. Thorpe, June, 1894 (Thouless).

- SAPERDA CARCHARIAS, Lin. Gimmingham, common on an old Poplar  
(Butler).  
,, POPULNEA, Lin. Stratton Strawless.

## CHRYSOMELIDÆ.

- DONACIA IMPRESSA, Payk. Waxham (Champion).  
,, VULGARIS, Tsch. (TYPHÆ). Harleston District, plentifully  
(Fox); Waxham (Champion).  
,, CINEREA, Hbst. (HYDROCHÆRIDIS). Harleston District,  
occasionally (Fox).  
,, DISCOLOR, Panz. (COMARI). Horning (Thouless).  
,, AFFINIS, Kunze. Harford Bridges (Thouless); Horning  
(Bedwell).  
HÆMONIA CURTISI, Lac. Brancaster (Thornley).  
CHRYSOMELA GÖTTINGENSIS, Lin. Harleston District, occasionally  
(Fox).  
,, DISTINGUENDA, Steph. Hunstanton, commonly  
(Thornley).  
,, ORICALCIA, Müll. (LAMINA). Castle Hill, Norwich  
(Thouless); I remember that the late Mr. Dossator  
used to take this species at the same place.  
PSYLLIODES CUPRO-NITENS, Forst. Hunstanton (Thornley).  
,, CHRYSOCEPHALA, Lin. Horning (Bedwell).  
,, PICINA, Marsh. Gimmingham (Butler).  
CASSIDA MURREA, Lin. Harleston District, sometimes abundantly  
(Fox).  
,, VIBEX, Lin. Harleston District, occasionally (Fox).

## XIX.

## FAUNA AND FLORA OF NORFOLK.

## ADDITIONS TO PART VIII., HEMIPTERA (FOURTH LIST).\*

BY JAMES EDWARDS, F.E.S.

*Read 28th March, 1899.*

THE following is a list of the species of Hemiptera not previously recorded in the 'Transactions' of this Society as occurring in the County of Norfolk. I am indebted to the Rev. A. Thornley of South Somerton, Lincoln, for a list of species taken at Hunstanton, April 6th to 11th, 1896; and to Mr. E. A. Butler of Crouch Hill, London, for a list of species taken, chiefly at Gimingham, in August, 1898.

## LYGÆIDÆ.

SCOLOPOSTETHUS NEGLECTUS, Edw. Not uncommon by sweeping. Gimingham (E. A. Butler); Hunstanton (Rev. A. Thornley).

## ANTHOCORIDÆ.

TRIPHLEPS MINUTA, Lin. Mousehold Heath, 24th September, 1885. The *T. minuta* of my original list is now known as *T. majuscula*, Reut.

## MICROPHYSIDÆ.

MYRMEDOBIA DISTINGUENDA, Reut. "The female I found fairly common at Gimingham and Southrepps, by beating old Hawthorn hedges" (E. A. Butler).

\*The lists to which the present list is supplementary are to be found in these 'Transactions' as follows: Vol. iii. p. 700; vol. iv. p. 702; and vol. v. p. 650.



## CAPSIDÆ.

- CALOCORIS STRIATUS**, Lin. Stratton Strawless, one example, June, 1897 (Thouless).
- PÆCILOSCYTUS VULNERATUS**, Wolf. This addition to the British Fauna was discovered by H. J. Thouless on *Galium verum* growing on the South Denes, Great Yarmouth, on 17th September, 1897; it was identified by Saunders, and exhibited by Thouless at the meeting of this Society held in November, 1897. In an undated note (*ante*, p. 419) E. G. Wheler also records its occurrence in the original locality in language for the most part identical with that used by Thouless in his notice of the species (*Ent. Mo. Mag.* xxxiv. p. 15, January, 1898), but with the additional information that "it has not previously been seen on this side of the Channel." The latter statement appears to be founded on a misapprehension, since the species has certainly long been known in collections in this country.
- DICYPHUS ERRANS**, Wolf. Mousehold Heath (Thouless).
- ORTHOTYLUS BILINEATUS**, Fall. On Aspen, Stratton Strawless (Thouless).
- MACROCOLEUS TANACETI**, Fall. Mundesley, Gimmingham, common on Tansy (E. A. Butler).

## DELPHACIDÆ.

- CHLORIONA GLAUDESCENS**, Fieb. Ranworth, 16th June, 1887; Cley, 14th July, 1887. The species of this genus occur on Reeds, and can only be distinguished with certainty by the form of the male genitalia. I have given descriptions, with figures of details, of the European species in *Ent. Mo. Mag.* vol. xxxiv. pp. 58—61 (March, 1898).
- C. PRASINULA**, Fieb. Dersingham, 30th July, 1885; Cley, 14th July, 1887, 5th August, 1889; Whitwell Common, 26th June, 1890.

C. SMARAGDULA, Stål. Ranworth, 16th June, 1887. With regard to the local distribution of these species, it will be observed that *glaucescens* and *smaragdula* have occurred together as at Ranworth, and *glaucescens* and *prasinula* as at Cley; and as the latter species has occurred at an inland locality, as distinguished from our coast-marshes, it appears probable that all three species will some day be taken together.

#### BYTHOSCOPIDÆ.

IDIOCERUS CUPREUS, Kbm. This interesting addition to the British Fauna was taken by Mr. Thouless off *Salix alba* at Brandon on the 25th May, 1896. By the kindness of its captor the specimen, a female, is now in my collection; and I have described and figured it ('Hemiptera-Homoptera of the British Islands,' p. 262, pl. xxix. fig. 1). Kirschbaum described the species in 1868 from a single female specimen taken in October at Wiesbaden, of which the food plant was not noted, and with the exception of this Brandon specimen I cannot find that its occurrence has been subsequently recorded. The occurrence of an over-wintered female would indicate that the species should be found in greater numbers from the end of August onward, but though the particular tree on which the Norfolk specimen was found has been worked in the autumn at intervals extending over several years both by Mr. Thouless and myself, we never met with a specimen at that time of the year.

#### ACOCEPHALIDÆ.

DORATURA IMPUDICA, Horv. This is the name recently given by Horvath to the large form of *Doratura* which I noticed in my 'Synopsis of British Hemiptera' (1888). My original specimens were taken on the sandhills at Hunstanton in July, 1885, and I did not meet with the insect again until 21st September, 1898, when I took a female on the sandhills at Holkham in company with *D. stylata*.

The following are notes with regard to the local distribution, etc., of species already recorded as occurring in the county.

GNATHOCONUS PICIPES, Fall. Common at Yarmouth, April, 1898  
(Thouless).

ALYDUS CALCARATUS, Linn. Southrepps (E. A. Butler).

MYRMUS MIRIFORMIS, Fall. Weybourne (E. A. Butler).

METACANTHUS PUNCTIPES, Germ. }  
ISCHNORHYNCHUS GERMINATUS, Fieb. } Gimmingham (E. A. Butler).

ACOMPUS RUFIPES, Wolff. A *macropterosus* example, Horning  
(Thouless).

STYGNUS RUSTICUS, Fall. Gimmingham (E. A. Butler).

APHANUS PEDESTRIS, Panz. Common at Lakenham, July, 1898  
(Thouless).

DRYMUS SYLVATICUS, Fab. Hunstanton (Thornley).

DICTYONOTA CRASSICORNIS, Fall. Gimmingham (E. A. Butler).

HYDROMETRA STAGNORUM, Linn. }

MICROVELIA PYGMÆA, Duf. }

VELLIA CURRENS, Fab. }

GERRIS THORACICA, Schum. }

„ LACUSTRIS, Linn. }

„ ODONTOGASTER, Zett. }

Hunstanton (Thornley).

NABIS LINEATUS, Dahl. Common at Weybourne (E. A. Butler).  
*Poweri* Saunders, the name under which this species was recorded (*ante*, vol. iv. p. 705), is a synonym of *lineatus*, Dahl.

SALDA SALTATORIA, Linn. }  
„ PILOSELLA, Thoms. } Hunstanton (Thornley).

„ MUELLERI, Gmelin. This is the insect recorded (*ante*, vol. iv. p. 705) under the name of *morio*, Zett. The latter is distinguished by its very shining surface, appearing almost as if burnished, and so far as I know has only been taken on the moors at Buxton by Mr. Saunders, who pointed out that we possess in Britain the two species in Ent. Mo. Mag. vol. xxxi. p. 237.

SALDA OPACULA, Zett. This is the correct name for the insect recorded (*ante*, vol. iv. p. 705) as *S. marginella*; the latter name being a synonym.

- SALDA LITTORALIS*, Linn. } Weybourne (E. A. Butler).  
 „ *CINCTA*, H-S. }  
*MICROPHYSA ELEGANTULA*, Baer. Has occurred singly in several  
 localities (Thouless); Gimmingham (E. A. Butler).  
*MEGALOCERÆA ERRATICA*, Linn. Hunstanton (Thornley).  
*CALOCORIS INFUSUS*, H-S. Southrepps (E. A. Butler).  
*LYGUS PRATENSIS*, Fab. Hunstanton (Thornley).  
*GLOBICEPS DISPAR*, Boh. Amongst short herbage, Gimmingham  
 and Weybourne (E. A. Butler).  
*CYRTORRHINUS FLAVEOLUS*, Reut. } Weybourne (E. A. Butler).  
*ORTHOTYLUS FLAVOSPARSUS*, Sahl. }  
*PLAGIOGNATHUS ALBIPENNIS*, Fall. Weybourne (E. A. Butler).  
 „ *PULICARIUS*, Fall. Gimmingham cliffs (E. A. Butler).  
*NEPA CINEREA*, Lin.  
*NOTONECTA GLAUCA*, Lin. }  
*PLÆA MINUTISSIMA*, Fab. }  
*CORIXA GEOFFROYI*, Leach. }  
 „ *ATOMARIA*, Ill. }  
 „ *HIEROGLYPHICA*, Duf. } Hunstanton (Thornley).  
 „ *SAHLBERGI*, Fieb. }  
 „ *LINNÆI*, Fieb. }  
 „ *SEMISTRIATA*, Fieb. }  
 „ *STRIATA*, Lin. }  
 „ *DISTINCTA*, Fieb. }  
 „ *MÆSTA*, Fall. }  
*LIBURNIA VITTIPENNIS*, J. Sahl.  
 „ *BOLDI*, Scott. My original specimens of this sandhill  
 species were taken at Yarmouth in May, and in  
 September last I found it not uncommon at  
 Holkham, from whence I have specimens of both  
 sexes of the hitherto undescribed macropterous  
 form, taken in August, 1891, which owing to their  
 great superficial resemblance to *L. aubei* I mistook  
 in the field for that species.

## XX.

## FAUNA AND FLORA OF NORFOLK.

## ADDITIONS TO PART V., LEPIDOPTERA (FOURTH LIST).\*

BY CHARLES G. BARRETT, F.E.S.

*Read 28th March, 1899.*

ALTHOUGH not now resident in the county, I am enabled by the kindness of friends to furnish a further supplement to my List of the Lepidoptera of Norfolk, published in 1874, and added to in 1884 and 1889. Taking into consideration that upwards of 1400 species have already been recorded in the county, very great credit is due to the industry and acumen of our local Lepidopterists in that there is still a respectable addition to be made to probably the largest result shown by any county in the United Kingdom.

## DIURNI.

**SYRICHTHUS ALVEUS.** Hüb. Several specimens of this species—well known on the Continent—were captured in a damp valley, bordered by a wood, near Cawston, by the Rev. T. H. Marsh, about twenty-five years ago. These were, at the time, mistaken for the common *S. alveolus* (*malvæ*), and were placed under that name in Mr. Marsh's collection; the latter species being unknown to him—indeed it is far from common in Norfolk. Strangely enough *S. alveus* has never since been seen in that locality, though frequently looked for; and since it is scarcely known to have occurred in any other

\* The previous lists will be found in the Society's 'Transactions,' vol. i. 1873—4, Supplement; vol. iii. p. 688; vol. iv. p. 691.

part of the United Kingdom, the conclusion seems forced upon us that a small and very partial migration of *S. alveus*, from the Continent, may have taken place, but that the species was unable to maintain itself here. Its claim to a place in the British List rests mainly upon these specimens.

## GEOMETRÆ.

*EUPITHECIA SUBUMBRATA*. Schiff. Taken near Stoke Ferry in July, 1891, by Mr. W. T. Cross of Ely.

## NOCTUÆ.

*PLUSIA MONETA*. Fab. The capture of a fine specimen of this most beautiful species at Sprowston, Norwich, on June 26th, 1894, was recorded by Mr. B. C. Tillett, the actual captor being Mr. Eric De C. Tillett. Another was secured in the following year by them; and, subsequently, specimens have been taken in Norwich by Messrs. M. A. Pitman and F. C. Hinde. This fine species is a recent immigrant from the Continent, and by good fortune its progress has been closely observed, and recorded, from its first appearance at Dover in 1890; since which it has spread widely over the South and East of England.

## PYRALIDES.

*EBULEA STACHYDALIS*. Zinck. Taken at Denton by the Rev. C. T. Cruttwell.

## CRAMBITES.

*CRAMBUS CONTAMINELLUS*. Hüb. Found near Hunstanton by Mr. E. A. Atmore.

*EPHESTIA KUHNIELLA*. Zell. Mr. Atmore reports that this destructive insect has become far too abundant in flour warehouses in Norwich and Lynn, and similar information is furnished by Mr. Hinde as regards Downham. It is a species of comparatively recent introduction into this country—and

apparently even into Europe—but now appears to be spreading into flour mills and warehouses everywhere. Its larva feeds on flour, making silken galleries among it, and maintains itself by utilising the fine dust of this material which collects upon beams, on ledges, and in corners.

## TORTRICES.

- MIXODIA PALUSTRANA.** Lienig. A single specimen was taken near Lynn by Mr. E. A. Atmore in 1893. It is usually a northern species.
- GRAPHOLITHA CINERANA.** Haw. Found by Mr. Atmore, locally abundant on Poplar trees, in the Lynn district.
- COCCYX (STEGANOPTYCHA) PYGMÆANA.** Hüb. Taken by Mr. Atmore among Spruce Fir near Lynn. He reports that it is not rare, but that it flies high, and was therefore, apparently, overlooked until 1888, but has since been taken freely. Also taken commonly at Merton by Mr. J. Hartley Durrant.
- RETINIA POSTICANA.** Zett. A single example has been reared by Mr. Atmore from a shoot of Scotch Fir collected by him near Lynn. I am not satisfied that this species is distinct from *R. turionella*, of which it seems to me to be merely a dwarf form.
- STIGMONOTA OROBANA.** Tr. The capture of this species at Stoke Ferry in 1891 is reported by Mr. Cross.
- EUPÆCILIA SODALIANA.** Haw. A single specimen was secured among *Rhamnus catharticus*, near Swaffham, in 1898, by Mr. Atmore.
- CONCHYLIS FRANCILLONANA.** Fab. Found by Mr. Atmore near Swaffham, but not commonly.

## TINEINA.

- TINEA NIGRIPUNCTELLA.** Haw. Mr. Atmore has taken a single specimen at Lynn.
- MICROPTERYX SANGHII.** Stn. Also taken by Mr. Atmore near Lynn; not commonly.
- NEMOTOIS CUPRIACELLUS.** Hüb. Found by Mr. Atmore near Swaffham; local, but not rare.

CEROSTOMA HORRIDELLA. Tr. Taken at Merton by Lord Walsingham.

GELECHIA (XYSTOPHORA) SERVELLA. Z. First taken in June, 1892, near Lynn, by Mr. Atmore, and since that time in some numbers; recognised and recorded by Lord Walsingham. So far as I am aware it has not been taken elsewhere in the British Isles.

„ (LITA) SUEDELLA. Rich. First found in the year 1880, near Hunstanton, by Mr. Atmore. At that time it was regarded as a form of *G. plantaginella*, and was not therefore recorded. It is plentiful among *Sueda fruticosa* near Heacham and elsewhere along that coast.

ÆCOPHORA LAMBDELLA. Don. Taken at Merton by Mr. Durrant.

TINAGMA BETULE. Stn. Near Lynn among Birch, Mr. Atmore.

GLYPHPTERYX OCULATELLA. Z. Found by the Rev. C. T. Cruttwell, rarely at Denton.

ARGYRESTHIA ATMORIELLA. Bankes. Taken among Larch near Lynn, by Mr. Atmore, in whose honour it has received its name. He first took it in 1893, but it was then supposed to be *A. illuminatella*, Z., and was recorded under that name, but subsequently corrected. It is now found to inhabit other portions of the East and South of England, and in its original locality to be far from scarce.

CEDESTIS GYSSSELINELLA. Kuhl. Found commonly at Merton by Mr. Durrant. It was also recorded many years ago to occur at Croxton, Thetford, by the late Mr. J. B. Hodgkinson of Preston, but at the time he was supposed to be in error, since the insect was only known as having a northern range.

GRACILARIA SEMIFASCIA. Haw. Taken at Denton by the Rev. C. T. Cruttwell.

COLEOPHORA DEAURATELLA. Z. Mr. Durrant has found this very uncommon species at Merton.

„ LEUCAPENNELLA. Hüb. A single specimen in good condition was taken by the Rev. C. T. Cruttwell, in a small wood at Denton, in June, 1890. Further and frequent search has been made, but without success. This specimen is the only British example of the species of which I have any knowledge.



- COLBOPHORA PYRRHULIPENNELLA.** Tisch. Near Lynn. Mr. Atmore.
- „ **SICCIFOLIA.** Stn. Obtained at Merton by Lord Walsingham.
- „ **GLAUICOLELLA.** Wood. Found commonly near Lynn by Mr. Atmore, larvæ in cases upon a species of *Juncus*, full fed in the spring.
- „ **ALTICOLELLA.** Z. Taken by Mr. Atmore among *Juncus lamprocarpus*, near Hunstanton.
- „ **OLIVACELLA.** Stn. Found at Merton by Mr. Durrant.
- CHRYSOCLISTA SCHRANKELLA.** Hüb. Also at Merton, taken by Lord Walsingham.
- ANYBIA LANGIELLA.** Hüb. Reared by the Rev. C. T. Cruttwell from larvæ found at Denton.
- ASYCHNA ERATELLA.** Z. A single specimen was taken by myself by sweeping grass, between Lynn and Swaffham about ten years ago. Also found at Denton, more recently, by the Rev. C. T. Cruttwell.
- ELACHISTA MEGERLELLA.** Z. Denton in grassy wood-paths, Rev. C. T. Cruttwell.
- LITHOCOLLETIS SORBI.** Frey. Denton, Rev. C. T. Cruttwell.
- NEPTICOLA AUCUPARIÆ.** Frey. Near Lynn, on Mountain Ash, extremely local, Mr. Atmore.
- „ **TRIMACULELLA.** Haw. Denton, Rev. C. T. Cruttwell.
- „ **DESPERATELLA.** Frey. Lynn; local, Mr. Atmore.
- „ **FULGENS.** Stn. Taken at Lynn by Mr. Atmore; but it is very doubtful whether this is not identical with *N. tityrella* (previously included). Mr. Durrant assures me that this is so.
- „ **TURICELLA.** H.-S. Reported by Mr. Durrant as found on Beech at Merton.
- „ **ULMIVORA.** Stn. Found by Mr. Atmore at Lynn; local and uncertain of occurrence, yet the mines sometimes abundant in leaves of Elm.
- „ **SERRELLA.** Stn. Also found near Lynn by Mr. Atmore, the mines sometimes plentiful in leaves of *Potentilla tormentilla*.
- „ **CONFUSELLA.** Wlsm. Merton.
- „ **FLETCHERI.** Tutt. Merton.

- NEPTICULA ACETOSÆ.* Stn. Common at Merton. These three species obtained by Lord Walsingham and Mr. Durrant.
- ACIPTILIA TETRADACTYLA.* L. Found by Mr. Atmore near Swaffham, but not commonly.

---

FURTHER NOTES ON SPECIES PREVIOUSLY RECORDED.

- VANESSA ANTIOPA.* L. Has again been taken at Norwich, singly, and also at Hedenham. A specimen was seen alive in Shipdham Church in September, 1891, by Mrs. Quinton.
- „ *POLYCHLOROS.* L. Taken at Winterton, near North Walsham, and at Brunstead by the Rev. C. H. Bird.
- ARGYNNIS PAPHIA.* L. Taken at Runton by Mr. F. C. Hinde.
- „ *AGLAIA.* L. Taken at Winterton by Mr. J. E. Knights.
- LYOZENA ALSUS.* Fab. Found by Mr. Atmore, locally abundant near Swaffham in 1898.
- DEILEPHILA GALII.* W.V. Taken at Denton by the Rev. C. T. Cruttwell.
- „ *LIVORNICA.* Esp. A specimen is recorded by Mr. R. Laddiman as having been secured near an electric lamp at Carrow, in September, 1891.
- CHEROCAMPA PORCELLUS.* L. Taken by Mr. Atmore at King's Lynn and Hunstanton.
- SESIA FORMICIFORMIS.* Esp. Three specimens near King's Lynn in 1898, taken by Mr. Atmore; and one at Norwich by Mr. Thouless.
- ZEUZERA ÆSCULI.* L. Denton, Rev. C. T. Cruttwell.
- MACROGASTER ARUNDINIS.* Hüb. Mr. Percy C. Read of Feering Bury, Kelvedon, Essex, informs me that on August 11th, 1898, he secured three male specimens, at light, at Horsey Mere.
- PROCRIS STATICES.* L. A single specimen has been taken at Hemsby by Mr. Knights.
- NOLA CONFUSALIS.* H.-S. Taken at Lynn by Mr. Atmore, and at Denton by the Rev. C. T. Cruttwell.

- LITHOSIA HELVEOLA.** Ochs. Taken at Stratton Strawless by Mr. H. J. Thouless.
- „ **AUREOLA.** Hüb. Denton.
- LIMACODES TESTUDO.** W.V. Mr. Thouless records finding, in two successive years, larvæ of this species on Beech at Horsford, and rearing the first secured.
- LIPARIS MONACHA.** L. Larvæ found at Denton by the Rev. C. T. Cruttwell.
- ORGYIA FASOELINA.** L. Larvæ found upon Sallow at Burgh Castle by Mr. Thouless.
- „ **GONOSTIGMA.** L. This species, which seems to have become very scarce elsewhere, still maintains itself in the Norfolk Fens.
- ANGEERONA PRUNARIA.** L. Taken at Denton by the Rev. C. T. Cruttwell.
- ENNOMOS FUSCANTARIA.** Haw. Denton and Lynn.  
Records from Denton are by the Rev. C. T. Cruttwell, and those from King's Lynn, almost invariably, by Mr. E. A. Atmore.
- ENNOMOS EROSARIA.** W.V. Denton, King's Lynn.
- BISTON HIRTARIA.** L. This species which sometimes flourishes so exceedingly in London squares and parks, seems now to have become common in Norwich, and has been taken at Denton.
- BOARMIA RHOMBOIDARIA.** W.V. The black variety of this species, known as var. *perfumaria*, has also been taken in Norwich by Mr. Thouless and Messrs. Tillet.
- IODIS VERNARIA.** L. Mr. Cruttwell has established this as a Norfolk species by taking it at Denton.
- GEOMETRA PAPILIONARIA.** L. Not uncommon near Lynn.
- PHORODESMA BAJULARIA.** W.V. Taken at Denton and Lynn.
- HYRIA AURORARIA.** Gn. Found commonly by Mr. Atmore in a bit of fen near Lynn.
- ASTHENA LUTEATA.** W.V. Denton; also found by Mr. Hinde at Watton.
- ACIDALIA RUBRICATA.** W.V. One specimen, at light, at Lynn.
- „ **INORNATA.** Haw. Denton.
- CABERA PUSARIA** var. **ROTUNDARIA.** Haw. Several reared by Mr. Atmore from larvæ found on Birch and Alder

along with others intermediate between this and the typical form of *Pusaria*; also abundance of the last named.

*CORYCIA TAINATA*. W.V. Taken at Sheringham by Mr. F. C. Hinde.

*ABRAXAS ULMATA*. Fab. Found plentifully at Sheringham by Mr. Hinde.

*EMMELESIA UNIFASCIATA*. Haw. Lynn and Denton.

*EUPITHECIA SUCCENTURIATA*. L. Denton.

„ *VENOSATA*. Fab. Lynn, Denton.

„ *PLUMBIFOLATA*. Haw. Denton.

„ *PYGMEATA*. Hüb. Taken at Stoke Ferry by Mr. Cross.

„ *LARICIATA*. Fr. Sheringham, Mr. Hinde; Denton.

„ *IRRIGUATA*. Hüb. Denton; one specimen.

„ *ALBIPUNCTATA*. Haw. Larvæ on *Angelica sylvestris* near Lynn.

„ *FRAXINATA*. Crewe. Lynn, at light.

„ *EXTENSARIA*. Zell. Still found on the coast among *Artemisia*, and apparently almost confined to this county.

„ *SUBCILIATA*. Gn. Denton.

„ *ABBREVIATA*. Steph. Runton; Denton.

*COLLIX SPARSATA*. Hüb. Stoke Ferry, Mr. Cross.

*LOBOPHORA SEXALATA*. Hüb. Plentiful near Lynn.

*MELANIPPE PROCELLATA*. W.V. Denton.

„ *UNANGULATA*. Haw. Lynn; Denton.

*ANTICLEA RUBIDATA*. W.V. Denton.

„ *BERBERATA*. W.V. Brandon; Mr. Cross.

*COREMIA QUADRIFASCIARIA*. L. Denton, Cromer, taken by Mr. Hinde.

*PHIBALAPTERYX TERSATA*. W.V. Denton.

*SCOTOSIA VETULATA*. W.V. Lynn, Denton.

„ *UNDULATA*. L. Denton.

*CIDARIA SAGITTATA*. Fab. Larvæ found at Stoke Ferry by Mr. Cross.

„ *SUFFUMATA*. W.V. Denton. Lynn; not common.

*CHESIAS SPARTIATA*. Fab. Denton.

*CERURA BIFIDA*. Hüb. Found upon Aspen, at Drayton, by Mr. Thouless.

- STAUBOPUS FAGI.** L. Mr. Thouless records the capture of a black variety of this fine species at the Carrow electric lights.
- NOTODONTA CUCULLINA.** W.V. The larva has been found by Mr. Thouless on Maple at Runton and Arminghall, and by Mr. Cross at Sheringham.
- „ **DICTÆOIDES.** Esp. Mr. Atmore states that this is now of frequent occurrence near King's Lynn. Dr. Carlier has taken it at Norwich.
- „ **DEOMEDANIUS.** L. A single specimen has been taken by Dr. Carlier at a gas lamp at Norwich.
- „ **TREPIDA.** Fab. King's Lynn. Mr. Thouless has found eggs and larvæ at Horsford, on Oak.
- „ **ORONIA.** W.V. This species has been found by Mr. Thouless at Howe and Drayton, by Mr. Cruttwell at Denton, and by Mr. Hinde at Norwich.
- „ **DODONÆA.** L. Denton.
- CYMATOPHORA OR.** W.V. Denton.
- „ **OCULARIS.** L. Lynn, Denton. Taken at Yarmouth by Mr. J. E. Knights.
- „ **FLAVICORNIS.** L. Larvæ found at Stratton Strawless and Drayton by Mr. Thouless; not uncommon at Lynn.
- „ **RIDENS.** Fab. Denton.
- ACRONYCTA TRIDENS.** W.V. Larvæ found by Mr. Thouless at Dunston.
- „ **LEPORINA.** L. Lynn; not common.
- MELIANA FLAMMEA.** Curt. This species has been found commonly at Barton, Ranworth, and elsewhere in the fens of the Bure, by Dr. F. D. Wheeler.
- SENTA ULVÆ.** Hüb. Mr. Atmore has taken several specimens at light at Lynn.
- NONAGRIA CANNÆ.** Ochs. This rare species has been found in larger numbers in recent years by Dr. Wheeler at its old locality at Barton Broad, and also by Mr. A. J. Hodges at Horning.
- GORTYNA FLAVAGO.** W.V. Mr. Atmore has found the larva plentifully near Lynn, in stems of Foxglove.
- MAMESTRA ALBIGOLON.** Hüb. On the coast near Hunstanton.

- APAMEA FIBROSA*. Hüb. Common near Lynn.  
*AGROTIS RIPEÆ*. Hüb. Hunstanton and Heacham, on the sands.  
 „ *RAVIDA*. W.V. Taken by Mr. Atmore at Hunstanton  
 and Lynn.  
*TRIPHENA SUBSEQUA*. W.V. Lynn; rare.  
*NOCTUA DAHLII*. Hüb. Denton.  
*TENIOCAMPA POPULETI*. Fab. Larvæ common near Lynn in 1897.  
*XANTHIA CITRAGO*. L. Denton.  
 „ *GILVAGO*. Esp. Sheringham, taken by Mr. Hinde;  
 Denton.  
*CIRREDIA XERAMPHELINA*. Hüb. Castle Rising near Lynn.  
*EREMOBIA OCHROLEUCA*. W.V. Denton.  
*APLECTA OCCULTA*. L. Lynn; once at sugar.  
*HADENA ADUSTA*. Esp. Denton, and at Bungay near the border  
 of Suffolk.  
 „ *SUASA*. W.V. Lynn, rare; Denton.  
*CLOANTHA PERSPICILLARIS*. L. After the lapse of half a century  
 a second Norfolk specimen has occurred; a fine  
 example taken by Dr. E. W. Carlier, at a gas lamp  
 in the outskirts of Norwich, in the year 1892.  
*HELIOTHIS MARGINATA*. Fab. Taken at Hunstanton by Mr. Atmore.  
 „ *PELTIGERA*. W.V. Three taken by Mr. Cross at Cromer,  
 flying about the flowers of *Echium vulgare*, in  
 July, 1884.  
 „ *DIPSACEA*. L. Of annual occurrence near Lynn, and  
 reared by Mr. Atmore from larvæ found upon  
*Linaria vulgaris*. Also taken at Denton by the  
 Rev. C. T. Cruttwell, and reported by Mr. Thouless  
 to be still common on the sandhills near Yarmouth.  
*BANKIA ARGENTULA*. Esp. Taken near Stoke Ferry by Mr. W. T.  
 Cross of Ely. Referring to my remarks in the  
 original list (1874), it may be well to mention  
 that, within the last few years, this species has  
 been found still to exist in plenty in Chippenham  
 Fen, Cambs.  
*HELIODES ARBUTI*. Fab. Denton.  
*HABROSTOLA TRIPLASIA*. L. Taken at Hemsby by Mr. Knights.  
*PLUSIA FESTUCÆ*. L. Lynn; not common.  
 „ *V-AUREUM*. Gn. (*PULCHRINA*, Haw). Denton.

- TOXOCAMPA PASTINUM.** Tr. Now found, locally abundant, near Lynn, by Mr. Atmore.
- CATOCALA FRAXINI.** L. A specimen was found sitting on the trunk of a tree about two miles from Norwich in September, 1894, by Dr. E. W. Carlier. His gratification at the capture of this noble species was somewhat damped by the information that two specimens, reared at about the same time, in Norwich, from foreign pupæ, had accidentally escaped.
- HERMINIA BARBALIS.** L. Denton, Lynn.
- „ **ORIBRALIS.** Hüb. This fen insect has now been taken by Mr. Atmore near Lynn.
- HERBULA CESPITALIS.** W.V. Found in abundance near Hunstanton by Mr. Atmore.
- EBULEA VERBASCALIS.** W.V. Now of general occurrence on heaths near Lynn.
- SPILODES STICTICALIS.** L. Taken at Hunstanton by Mr. Atmore.
- EUDOREA COARCTALIS.** Z. Denton.
- CRAMBUS FALSELLUS.** W.V. Denton. Taken at light, Lynn.
- „ **ULIGINOSELLUS.** Z. Denton. Bogs near Lynn.
- „ **SELASELLUS.** Hüb. Near Lynn.
- HOMCEOSOMA NEBULELLA.** Hüb. Denton, Lynn. Among *Carduus nutans*.
- „ **SENECIONIS.** Vaughan. Taken at Lynn and Hunstanton by Mr. Atmore.
- EPHESTIA ARTEMESIELLA.** Steph. Reared at Lynn, from larvæ on *Artemisia maritima*, by Mr. Atmore.
- CRYPTOBLABES BISTRIGA.** Haw. Lynn.
- PHYCIS ABIETELLA.** W.V. Not uncommon near Lynn.
- ONCOCERA AHENELLA.** W.V. Found rather commonly near Swaffham by Mr. Atmore.
- MELIPHORA ALVEARIELLA.** Gn. Denton. Very mischievous in beehives in the neighbourhood of Lynn.
- HALIAS QUERCANA.** W.V. Lynn; not rare in the larva state.
- EARIAS CHLORANA.** L. Frequent at Lynn on Willows.
- TORTRIX CINNAMOMEANA.** Tr. Taken at Merton by Lord Walsingham and Mr Durrant.
- „ **ICTERANA.** Fröl. Common in the larva state near Lynn.
- „ **VIBURNANA.** W.V. Lynn. Common on all heath lands.

FAUNA AND FLORA OF NORFOLK: LEPIDOPTERA

- CHELLA GROTIANA*. Fab. Found at Merton by Lord Walsingham and Mr. Durrant.
- LEPTOGRAMMA LITERANA*. L. Lynn, scarce; Denton.
- PERONEA COMARIANA*. Z. Lynn; not common.
- " *CRISTANA*. W.V. Taken by Lord Walsingham at Merton.
- " *TRISTANA*. Hüb. The presence of this species in the county is now established, the Rev. C. T. Cruttwell having taken it at Denton.
- PENTHINA CARBONANA*. Dbl. Now confirmed as an inhabitant of the county, a specimen having been taken near Lynn by Mr. Atmore in 1892.
- " *SELLANA*. Hüb. Swaffham, not uncommon, Mr. Atmore of this species in September, 1888, while looking for that of another. It was feeding in shoots of *Carduus arvensis*, quite commonly, in some waste ground near the Docks at Lynn. The moths emerged in the following May.
- " *CESBITANA*. Hüb. Taken near Swaffham by Mr. Atmore.
- " *MICANA*. Hüb. Locally abundant near Lynn.
- EUCHROMIA PURPURANA*. Haw. Denton; also taken near Hanton by Mr. Atmore.
- ERIOPELA FRACTIFASCIANA*. Haw. Taken commonly near Swaffham by Mr. Atmore.
- PETHEOCHROA RUGOSANA*. Hüb. Taken occasionally near Lynn.
- SCIAPHILA NUBILANA*. Hüb. Denton; also taken at Merton by Lord Walsingham.
- " *PASCUANA*. Wlk. (*PASIVANA*, Dbl.). Common between Lynn and Terrington.
- CLEPSIS RUSTICANA*. Tr. Lynn.
- PHOXOPTERYX DIMINUTANA*. Haw. Denton.
- GRAPHOLITHA NIGROMACULANA*. Haw. Taken at Merton by Lord Walsingham and Mr. Durrant; and common near Lynn by Mr. Atmore.
- PÆDISCA OPPRESSANA*. Tr. Locally common on Poplars near Lynn.
- " *OPHTHALMICANA*. Hüb. Denton.
- HALONOTA NIGRICOSTANA*. Haw. Denton.
- " *TETRAGONANA*. Steph. Taken near Stoke Ferry by Mr. Atmore.



- HALONOTA RAVULANA.** H.-S. Several more taken among Birch near Lynn by Mr. Atmore.
- COCOTX OCHSENHEIMERIANA.** Z. Lynn; extremely local. Denton.
- HEUSIMENE (HEMIMENE) FIMBRIANA.** Merton, taken by Mr. Durrant.
- STIGMONOTA PERLEPIDANA.** Haw. Abundant near Lynn.
- „ **REGIANA.** Z. Lynn.
- „ **ROSETICOLANA.** Z. Lynn. Also taken near Swaffham by Mr. Atmore, and Merton by Mr. Durrant.
- DICRORAMPHA SEQUANA.** Hüb. Denton.
- „ **PLUMBANA.** Scop.
- „ **SATURNANA.** Gn.
- „ **ACUMINATANA.** Z. These three species have been taken by Lord Walsingham at Merton.
- CATOPTRIA FULVANA.** Steph. Merton, Lord Walsingham; Denton; abundantly near Swaffham by Mr. Atmore.
- „ **EXPALLIDANA.** Haw. Denton; also at Lynn, where Mr. Atmore has taken it at a gas lamp, and has reared specimens from larvæ found in flower-heads of *Sonchus arvensis*.
- „ **CITRANA.** Hüb. Taken near Swaffham by Mr. Atmore.
- TRICHERIS MEDIANA.** W.V. Denton.
- EUPÆCILIA DUBITANA.** Hüb. In the Supplement last published (1889) I remarked that this species had become abundant around Lynn, frequenting the common *Creeping-rooted Thistle* in waste ground. After a good deal of search, without success, upon that plant attention was turned to other composite plants growing in the same waste ground, and larvæ were found hollowing out the flower-heads of *Crepis tectorum*. From these I reared a long series. Presumably the Thistles afforded better shelter for the moths.
- „ **RUPICOLA.** Curt. Lynn; local but not scarce.
- „ **DEGREYANA.** Mc L. Denton, Lynn. Mr. Atmore reared a beautiful series of the second generation in August and September from larvæ found feeding in young capsules of *Linaria vulgaris*. Lord Walsingham has reared it from *Plantago lanceolata*.

- EUPŒCILIA ANTHEMIDANA. Curt. Much trouble has been taken by Lord Walsingham to verify this name—even to the extent of obtaining an examination of the late Mr. Curtis's cabinet, which is in Melbourne, Australia—with the result that it seems impossible, reliably, to connect the name with the species to which it has hitherto been referred. Indeed it appears far more probable that the species now known as *Heydeniana* was that reared by Mr. Curtis. Under these circumstances the present species has been described by Lord Walsingham under the name of *erigerana*. It is widely distributed in the county, and known to occur in the localities already stated, at Croxton, and doubtless all over the Breck district; also at Swaffham and near Lynn.
- XANTHOSSETIA ZŒGANA. L. The pretty variety, *ferrugana*, Haw., is abundant at Merton, and has been taken by Lord Walsingham at Watton.
- ARGYROLEPIA SUBBAUMANNIANA. Wlk. Taken near Swaffham by Mr. Atmore.
- „ BADIANA. Hüb. Denton.
- OCHSENHEIMERIA BISONTELLA. Lienig. Lynn, 1898.
- SCARDIA CORTICELLA. Curt. Found very commonly, by Mr. Atmore, upon the trunk and branches of a decaying Oak tree near Lynn.
- „ ARCELLA. Fab. Denton.
- TINEA FERRUGINELLA. Hüb. Lynn. Also taken at Thetford by Lord Walsingham.
- „ SEMIFULVELLA. Haw. Denton.
- „ BISTRIGELLA. Haw. Merton.
- LAMPRONIA RUBIELLA. Bjerk. Lynn; very common in 1898.
- NEMOPHORA METAXELLA. Hüb. Locally abundant near Lynn.
- ANESYCHIA FUNERELLA. Fab. Once at a gas lamp at Lynn.
- CEROSTOMA SEQUELLA. L. Denton.
- „ VITTELLA. L. Denton.
- HARPIPTERYX SCABRELLA. L. Merton. Taken by Lord Walsingham.
- ENICOSTOMA LOBELLA. W.V. Denton.
- EXERÆTIA ALIASELLA. Stn. The statement put upon record by my lamented friend, the late Mr. H. T. Stainton, as to

this species, is now confirmed, Mr. Atmore having taken two specimens, at light, at Lynn in 1892 and one in 1894.

- DEPRESSARIA HYPERICELLA. Hüb. Denton.  
 ,, VACCINELLA. Hüb. Denton.  
 ,, CILIELLA. Stn. Denton.  
 ,, GRANULOSELLA. Stn. Denton.  
 ,, ALBIPUNCTELLA. Hüb. Denton.  
 ,, CHÆROPHYLLI. Z. Denton.  
 ,, ULTIMELLA. Stn. Denton.
- PSORICOPTERA GIBBOSELLA. Z. Lynn, scarce. One specimen reared by Mr. Atmore from Oak.
- GELECHIA (TACHYPTILIA) POPULELLA. L. Merton, Denton.  
 ,, VELOCELLA. Fisch. Lynn; local. Taken at Merton by Lord Walsingham.  
 ,, (DORYPHORA) MOROSA. Z. Lynn; very local.  
 ,, " PALUSTRELLA. Dougl. Taken by the Rev. C. T. Cruttwell near Beccles, but on the Norfolk side.  
 ,, (BRYOTROPHA) POLITELLA. Dougl. Found at Merton by Mr. Durrant.  
 ,, " DOMESTICA. Haw. Abundant at Merton.  
 ,, " SIMILIS. Dougl. Merton, Mr. Durrant.  
 ,, (TELEIA) LUCULELLA. Hüb. Not uncommon at Lynn.  
 ,, " FUGITIVELLA. Z. Denton.  
 ,, (LITA) MACULEA. Haw. Denton.  
 ,, " FRATERNELLA. Dougl. Denton.  
 ,, " TRICOLORELLA. Haw. Merton, Lord Walsingham; Lynn.  
 ,, " MACULIFERELLA. Mann. Merton, Lynn.  
 ,, (PÆCILIA) ALBICEPS. Z. Merton.  
 ,, (MONOCHROA) TENEBRELLA. Hüb., and its female (known as *tenebrosella*). Merton, Denton.  
 ,, (ANACAMPSIS) TÆNIOLELLA. Tr. Denton, Lynn, Hunstanton; frequent, Mr. Atmore.  
 ,, (LAMPROTES) ATRELLA. Haw. Denton, Lynn.  
 ,, (DORYPHORA) LUCIDELLA. Steph. Lynn; scarce.  
 ,, (BRACHMIA) LATHYRI. Stn. Locally common at Lynn; Wormegay.

- GELECHIA (PŒCILIA) GEMMELLA. L. Lynn, Denton.  
 „ (ARGYRITIS) PICTELLA. Z. Frequent at Hunstanton,  
 Mr. Atmore. Lord Walsingham has taken it  
 commonly at Merton, and with it the (possible)  
 variety known as *Tarquiniella*.  
 PARASIA METZNERIELLA. Dougl. Locally common near Lynn.  
 ŒCOPHORA TRISIGNELLA. Z. Denton. Lynn; scarce.  
 „ LUNARIS. Haw. Denton.  
 „ TINCTELLA. Tr. Denton, Lynn; scarce.  
 „ FUSCO-AURELLA. Haw. Lynn.  
 BUTALIS INCONGRUELLA. Stn. Near Lynn; not common.  
 ACROLEPIA AUTUMNITELLA. Curt. (*pygmæana*, Haw.), Denton.  
 ÆCHMIA DENTELLA. Stn. Denton.  
 PERITIA OBSCURIPUNCTELLA. Stn. Denton.  
 TINAGMA SERICIELLA. Haw. Denton.  
 ARGYRESTHIA SEMITESTACELLA. Curt. Denton, Merton.  
 „ ALBISTRIA. Haw. Denton, Merton.  
 „ SEMIFUSCA. Haw. Denton.  
 „ MENDICA. Haw. Denton.  
 „ CURVELLA. L. Denton, Merton. Mr. Durrant.  
 „ CONJUGELLA. Z. Merton. Mr. Durrant.  
 „ ARCEUTHINA. Z. Denton.  
 GRACILARIA ELONGELLA. L. Denton.  
 „ TRINGIPENNELLA. Z. Denton.  
 ORNIX SCOTICELLA. Stn. Merton, Mr. Durrant.  
 „ BETULÆ. Stn. Denton.  
 „ TORQUILLELLA. Stn. Denton.  
 „ GUTTEA. Haw. Merton, Denton, Lynn.  
 COLEOPHORA FABRICIELLA. Vill. Taken at Merton by Lord  
 Walsingham and Mr. Durrant; and at Denton by  
 the Rev. C. T. Cruttwell.  
 „ LIXELLA. Z. Found by Mr. Atmore, rather commonly  
 near Swaffham.  
 „ ANATIPENNELLA. Hüb. Denton.  
 „ PALLIATELLA. Z. Lynn; scarce.  
 „ CURRUCIPENNELLA. Fisch. Denton.  
 „ ONOSMELLA. Z. Lynn; not uncommon.  
 „ THERINELLA. Stn. Denton.  
 „ LARICELLA. Hüb. Denton.

- COLEOPHORA ALBITARSELLA. Z. Merton, Lord Walsingham.  
 „ NIGRICELLA. Steph. Merton, abundant; Mr. Durrant,  
 Denton.  
 „ MÆNIACELLA. Fab. Denton.  
 „ MURINIPENNELLA. Fisch. Denton.  
 „ APICELLA. Stn. Denton.  
 „ SOLITARIELLA. Z. Denton.  
 „ CHALCOGRAMMELLA. Z. Near Lynn, scarce; Mr.  
 Atmore.
- COSMOPTERYX ORICHALCEA. Stn. Found rather commonly near  
 Lynn by Mr. Atmore.
- CHAULIODUS ILLIGERELLUS. Hüb. Lynn.
- LAVERNA RHAMNIELLA. Z. Merton, Mr. Durrant.
- ASYCHNA MODESTELLA. Dup. Merton, Mr. Durrant; Denton.
- ELACHISTA GLEICHENELLA. Fab. Denton.  
 „ MAGNIFICELLA. Tengs. A beautiful variety of this scarce  
 species, having the ground colour buff, was taken  
 at Merton by Mr. Durrant.  
 „ ATRICOMELLA. Stn. Denton.  
 „ LUTICOMELLA. Stn. Denton, Lynn; everywhere common.  
 „ OBSCURELLA. Stn. Denton, Lynn; everywhere common.
- LITHOCOLLETIS HORTELLA. Fab. Denton.  
 „ IRRADIELLA. Scott. Lynn; not common.  
 „ LAUTELLA. Z. Lynn.  
 „ AUCUPARIELLA. Scott. Taken at Merton by Lord  
 Walsingham.  
 „ SALICICOLELLA. Sircom. Denton.  
 „ SPINOLELLA. Dup. Denton.  
 „ VIMINETORUM. Stn. Denton.  
 „ SCOPARIELLA. Fisch. Lynn; not common.  
 „ ULICICOLELLA. Vaughan. Lynn; not common.  
 „ SYLVELLA. Haw. Denton.  
 „ HEEGERIELLA. Z. Denton.  
 „ EMBERIZÆPENNELLA. Bouch. Denton.  
 „ FRÖLICHIELLA. Z. Lynn; common.  
 „ STETTINENSIS. Nicelli. Common near Lynn.  
 „ SCHREBERELLA. Fab. Denton.  
 „ TRISTRIGELLA. Haw. Lynn.  
 „ TRIFASCIELLA. Haw. Denton.

- PHYLLOCNISTIS SUFFUSELLA. Z. Lynn.  
 LYONETIA CLERCKELLA. L. Denton.  
 CEMIOTOMA SPARTIFOLIELLA. Hüb. Denton.  
     "    LABURNELLA. Heyd. Denton.  
 OPOSTEGA CREPUSCULELLA. Fisch. Denton, at light.  
 BUCCULATRIX CIDARELLA. Fisch. Common at Lynn.  
     "    ULMELLA. Mann. Denton.  
     "    CRATÆGI. Dup. Denton ; common at Lynn.  
     "    BOYERELLA. Dup. Denton.  
     "    FRANGULELLA. Gn. Marshy heaths near Lynn.  
 NEPTICULA ATRICAPITELLA. Haw. Denton.  
     "    RUFICAPITELLA. Haw. Denton.  
     "    ANOMALELLA. Goe. Merton.  
     "    PYGMÆELLA. Haw. Denton.  
     "    SUBBIMACULELLA. Haw. Denton.  
     "    FLOSLACTELLA. Haw. Denton.  
     "    MARGINECOLELLA. Stn. Denton.  
     "    AURELLA. Fab. Denton.  
 ACIPTILIA GALACTODACTYLA. Hüb. Merton, Denton.  
 OXYPTILUS DISTANS. Z. (LÆTUS, Z.). Found rather commonly  
     near Swaffham by Mr. Atmore.

XXI.

OCCURRENCE OF THE RUFF (*MACHETES PUGNAX*)  
IN WINTER.

BY W. W. SPELMAN.

*Read 23th February, 1899.*

On the 14th of February, 1899, two Ruffs, both males, were killed out of a flock of Lapwings feeding in a Wheat-field, at Postwick, near Norwich, belonging to Mr. Charles Waters, who kindly forwarded them to me. As the occurrence of this species in the county of Norfolk, in winter, is probably unprecedented, and the plumage is peculiar, I have much pleasure in exhibiting them at this meeting of the Naturalists' Society. Looking at these two specimens one is at once struck by the peculiarly light colour of the neck and breast, only one or two minute dark feathers being as yet in evidence. Those that we occasionally see late in April or in May, the usual time of their occurrence, are dark in their neck and breast plumage, even if not in actual possession of their distinctive "Ruff." Stevenson (B. of N. vol. ii. p. 265) notes the appearance of a Ruff and two Reeves on the 26th of March, 1852, and mentions it particularly as a very early date, so that the fact therefore of these two specimens having been killed so early as the 14th of February, leads me to the belief expressed by Mr. Gurney, that their being so taken is unprecedented, at least in this county. In the issue of 'The Field,' of the 4th of March, I note with interest the record of a male Ruff taken at Weymouth, on the 20th of February, and two others seen at the same time. The two birds in question will be an interesting addition to my series of Ruffs and Reeves in breeding plumage. How far this early appearance of the Ruff may be due to the wonderfully mild winter I will not venture an opinion.

## XXII.

*MISCELLANEOUS NOTES AND OBSERVATIONS.*

**WATER-HEN'S NEST BUILT WITH PEACOCK'S FEATHERS.**—On July 3rd a Water-hen here brought off a brood of about half a dozen, which it had hatched in a nest made of the long tail-feathers of Peacocks. The nest was raised just above the water, being placed on a branch which dips into it. The feathered ends of the long tail-feathers were woven into the nest leaving about two-thirds of the quill ends hanging out and floating on the water; smaller tail-feathers and quills were put in, in just the same way as roots or reeds. The foundation of the nest was made of roots, the feathers forming the sides. One of the pair of Water-hens was first seen taking a quill feather; a few days afterwards it took several of the tail-feathers which happened to be lying on a lawn opposite the bough on which the nest is built. When this was found out, other tail-feathers from different parts of the garden were collected and put on the lawn for the bird to take. When it took them, it picked them up in its beak, ran down to the water and swam across, holding the feathered ends, and letting the remainder float at its side. It took the greater part of the feathers about a week, before the brood was brought off.—F. BARRINGTON, Pentney.

FROM THE 'NORWICH MERCURY' OF NOVEMBER 22ND, 1777.—  
“Mr. Marsham of Stratton has lately put in practice the advice of the learned Mr. Evelyn and Dr. Hales with respect to rubbing and washing the stems of trees to promote their annual increase. This was done last spring when the buds began to swell; when some trees were washed round from the ground to their tops; first with water and a common shoe-brush till they were quite cleared of the moss and the dirt; then only with a coarse flannel. The washings were repeated three, four, or five times a week, during all the dry time of the spring and the fore part of the summer, but after



the rains were frequent, they were only slightly rubbed. Upon a comparison of these trees with others which were unwashed, the conjecture of the two great philosophers aforementioned was confirmed, the former having increased almost double the growth of the latter. The experiment was made upon several Beech trees and will probably be succeeded by others, which may produce considerable advantage with respect to rural economy."—GEN. EV. POST, W. G. CLARKE.

ROOT TUBERCLES.—The importance of nitrogen to plant-life has long been known, but, until recently, it had been thought that it could only be assimilated by plants from its compounds in the soil, and that the nitrogen of the atmosphere was comparatively useless to the plant. Mr. Sutton, when President of this Society, gave an account of the process of nitrification which is carried on in the soil, resulting in the production of nitrites and nitrates from ammonia-compounds, by the agency of bacteria, which are specially known as nitro-bacteria. It is from the nitrates that the majority of plants get their supply of nitrogen. But it has been noticed that certain plants (*Papilionaceæ*) can flourish in soils from which all traces of nitrogen compounds have been carefully removed. These plants have been found to possess gall-like out-growths or tubercles attached to the roots. Similar structures have been found in intimate association with the roots of many other species of plants. Those from the roots of the Robinia or false Acacia were brought to our notice by Mr. Bidwell. It is thought by many modern botanists that these tubercles are, indirectly, the means by which (certainly in the order to which the Robinia belongs) nitrogen is conveyed to the tissues of the plant, and there assimilated. The process has not, I believe, been thoroughly worked out, but the tubercles are considered to be a fungoid growth, which benefits itself, and assists its host-plant, by attachment to the roots, being, in fact a case of symbiosis, such as exists, or is supposed to exist in the connection between fungus and alga, in the lichen. The fungoid tubercle is the agency by which the free nitrogen in the atmosphere is conveyed to the roots in a condition suitable for absorption into the tissues. As far as I can make out, the details of the process are, at present, unknown. It is certain that there exists in the soil a bacterial organism which is capable of forming nitrogenous compounds from

the air, in the presence of non-nitrogenous matter. S. H. Vines says, "It may be that the development of this organism is specially favoured by the presence of the tubercular roots of the *Papilionaceæ* in the soil, and that the nitrogenous substances which it produces are absorbed by the roots after having undergone nitrification," that "the tubercle eventually becomes disorganised, the gemmules are then set free, and are doubtless the means by which the fungus attacks other plants" (Text Book of Bot. p. 713). The whole subject of nitrification in the soil is an extremely interesting one, especially to the agriculturist. It is a process of fermentation or putrefaction, and consists in the reduction or decomposition of the ammonia compounds into nitrites in the first stage, and these into nitrates in the second stage. Two forms of Bacteria are concerned in this operation, the first known as the nitrous bacterium, the second as the nitric bacterium. It may be that, in the future, the isolation and cultivation of these special Bacteria, may be looked on as an important preliminary to the preparation of inferior soils for agricultural purposes. I allude here to the bacterium which can utilise the nitrogen of the atmosphere, because ordinary nitrification necessitates a supply of organic matter in the soil, to be acted upon. The importance of these tubercles to the life of certain plants must be of interest to every botanist.—  
W. A. NICHOLSON, Hon. Sec.

ACULEATE HYMENOPTERA AT TOSTOCK, NEAR BURY ST. EDMUND'S. During the season of 1898—the first half of which was very unfavourable, I added the following to my list of Aculeate-Hymenoptera:—

*Mimesa Shuckardi*, Wesm. August 14th, two females.

„ *bicolor*, Jur. August 13th, four males.

*Hoplisis 4-fasciatus*, Fab. I took several of both sexes of this marsh insect in August upon the blooms of *Angelica sylvestris*.

*Cerceris arenaria*, Linn. A small colony in a sand-pit, Aug. 13th, both sexes flying in bright sunshine, 2.30 p.m.

*Sphecodes puncticeps*, Thoms. September 2nd, one female.

*Halictus xanthopus*, Kirb. A female, May 18th, on Dutch Clover.

*Andrena denticulata*, Kirb. A female, August 15th, on Ling.

„ *fuscipes*, Kirb. A female and four males flying over Ling, August 13th.

*Nomada solidaginis*, Panz. I obtained several of both sexes in August upon Ragwort and Ling.

*Nomada jacobœæ*, Panz. A female, August 5th, upon Ragwort.

My list now is:—Ants 10, Fossores 58, Wasps 13, Bees 119: total 200. It is remarkable that both *Nomadas*, which I had yearly searched for, should turn up in this wonderful season. Another Bee, *Epeolus productus*, usually scarce, was abundant everywhere in August.

Other good things I took were: *Psen pallipes*, *Passalœcus monilicornis*, *Sphæcodes rubicundus*, *Andrena cetii*, *A. afzeliella*, *Stelis aterrima* and *S. phœoptera*.

The two common Wasps were fairly abundant, and hatched out very early. A new interest now attaches to this class, because for the first time *Vespa austriaca* has been found to be parasitic upon *V. rufa*. Mr. Charles Robson has bred both sexes from a nest, and this is the most interesting discovery of many years.

The drought of August and September killed many of the better class of food plants which I generally search. In Coleoptera, the fine Longicorn *saperda carcharias* was not uncommon upon Poplars. I had two specimens, and over twenty were taken by a friend in North Norfolk upon one tree. I leave the Suffolk Coleoptera as Mr. Claude Morley's list is published, and it will be seen how well the county of Suffolk has been recently worked.

Although I got nothing of the first importance in Diptera, the following are worth recording: *Xanthogramma citrofasciatum*, *Chrysogaster splendens*, *Myopa testacea*, *Oncomyia atra*, *Gastrophilus equi* (4 specimens), *Gonia ornata*, *Demoticus frontatus*, *Miltogramma punctata*, *Ulidia erythropterna* and *Lucilia cornicina*. On September 24th I took a good Saw-fly, *Emphytus serotinus*, upon Bungay common, and a curious Ichneumon upon a window, in August, *Fœnus jaculator*. Upon the whole, the season of 1898 may be said to have been an exceptionally good one with me.—  
W. H. Tuck.