TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1953

VOL. XVII PART V.

EDITED BY E. A. ELLIS

NORWICH
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1954

PRICE 10/-

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"	1933—34
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E. T. BOARDMAN	1938—39
HUGH WORMALD, M.B.O.U.	1939—40
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E. C. KEITH	1941—42
A. J. RUDD, O.B.E., F.Z.S.	1942—43
MISS C. E. GAY	1943—44
SIR H. E. S. UPCHER	1944—45
H. W. BACK	1945—46
R. G. BUXTON	1946—47
THE EARL OF LEICESTER	1947—48
R. PEARCE GOULD	1948—49
JAMES FISHER	1949—50
J. E. SAINTY, B.Sc.	1950—51
DR. J. M. LAMBERT, M.A., F.L.S.	1951—52
R. P. BAGNALL-OAKELEY	1952—53

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Norfolk and Norwich Naturalists' Society

Patron

HER MAJESTY THE QUEEN

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(retiring 1955)

MISS E. M. BUTTERY
K. C. DURRANT
E. T. DANIELS
(retiring 1954)

Ex-officio

R. R. CLARKE

Norfolk & Norwich Naturalists' Society

LAWS (1954)

SECTION I.—Name and Objects

1. The Society shall be called the "Norfolk and Norwich Naturalists' Society," and shall have for its objects :—

   (*a*) The practical study of Natural Science.

   (*b*) The protection of species requiring protection, and the circulation of information which may dispel prejudices leading to their destruction.

   (*c*) The publication of papers on Natural History contributed to the Society, especially such as relate to the County of Norfolk.

   (*d*) The encouragement of intercourse between local naturalists by means of meetings for the reading and discussion of papers and for the exhibition of specimens ; and by excursions.

SECTION II.—Members

1. The Society shall consist of two classes of members, viz., Ordinary and Honorary Members.

2. Candidates for membership may be proposed and elected at any meeting of the Society ; three dissentient votes shall exclude the candidate.

3. Ladies or gentlemen distinguished for their attainments in Natural Science, or who have rendered valuable services to the Society, may be nominated by the Committee as Honorary Members, and elected by show of hands at the next meeting of the Society, and shall have all the privileges of Ordinary Members.

4. Every member shall receive notice of his or her election from the Secretary, and shall be supplied with a copy of the Laws, and a syllabus of meetings for each year. A copy of the Transactions for the current year will be supplied on Publication.

5. Ordinary Members shall pay a subscription of fifteen shillings per annum. This may be compounded for by a single payment of £12. All members of a family may become Ordinary Members on payment of an annual subscription of 25s. Schools may cover the cost of membership for any six pupils on payment of two guineas.

   All subscriptions shall be payable in advance, the first being due on election and subsequently at the beginning of each financial year, Members elected after December shall not be liable for the subscription for the financial year in which they are elected. All members whose subscription shall be two years in arrear, and who shall neglect to pay the same on a second application from the Treasurer, shall cease to be members.

6. The financial year shall end on March 31st ; and subscriptions for the ensuing year shall become due forthwith.

7. Any member who, in the opinion of the Committee, contravenes the objects of the Society, is liable to have his or her name erased from the list of members.

SECTION III—Officers and Management

1. The Management of the Society shall be in the hands of the Committee.

2. The Committee (three of whom shall form a quorum) shall consist of the officers of the Society, together with nine members, three of whom shall be elected annually for a period of three years. The retiring members shall not be eligible for re-election until after the lapse of one year, but, should any vacancies occur sooner, they shall be eligible for filling up such vacancies.

3. The Officers of the Society shall be a President, President-elect, Vice-Presidents, Secretary, Excursions Secretary, Treasurer, Auditor and Editor, all to be elected by show of hands yearly at the Annual Meeting and all to be eligible for re-election.

4. The Committee shall prepare a list of the names of members they recommend to serve in the offices which will become vacant at the Annual Meeting, and such names shall be sent to each member with the circular calling the meeting ; any member shall be at liberty to propose other names.

5. The Committee shall have power to enact such bye-laws as they may deem necessary, which bye-laws shall have the full force of laws until the ensuing Annual Meeting. The Committee shall take such other steps and make such appointments as they may deem advisable for the benefit of the Society. All such actions shall be submitted for confirmation at the next Annual Meeting.

6. A special meeting of the Committee shall be called at any time by the Secretary, on receiving a written requisition signed by any five members of the Society.

SECTION IV—Publications

1. The Society shall sponsor an annual publication under the title of "The Transactions of the Norfolk and Norwich Naturalists' Society." Responsibility for this publication shall be vested in an Editor and Sub-Editor.

SECTION V—Meetings

1. The Annual Meeting for the election of Officers for the ensuing year shall be held in April, when the Committee shall submit a Financial statement and Report of the year's work. Any Law, or alteration, or repeal of existing Laws, passed at the Annual Meeting, shall at once come into operation.

2. The President on receiving a request in writing signed by not less than seven members shall, within fourteen days from the receipt thereof, summon a Special General Meeting of all members of the Society ; at the same time giving them due notice of the agenda ; and the meeting so summoned shall have the same powers of altering and dealing with the constitution, laws, funds and property of the Society, as the Annual Meeting.

SECTION VI—Property

1. The property of the Society, other than invested funds, shall be held in trust by the Treasurer for the time being. Accumulated funds shall, at the discretion of the Committee, be invested in the names of two joint Trustees, to be appointed at an Annual or Special General Meeting.

Note.—Information concerning the Library can be obtained from the Hon. Secretary.

NORFOLK AND NORWICH NATURALISTS' SOCIETY.

BALANCE SHEET

As at 31st March, 1952 and 1953

LIABILITIES

	1952 £ s. d.	1953 £ s. d.
Amalgamated Funds	714 11 0	577 1 0
Add Surplus this year	—	83 12 11
Less Deficit this year	137 10 0	—
	577 1 0	660 13 11
Subscriptions in advance	17 10 0	73 0 0
Barclays Bank	196 7 0	—
Sundry Creditors	20 7 7	272 3 6
	£811 5 7	£1005 17 5

ASSETS

	1952 £ s. d.	1953 £ s. d.
Subscriptions due	43 0 0	—
Investments (4)	723 5 5	723 5 5
East Anglian Trustee Savings Bank (5)	16 0 2	216 8 2
Office Equipment at cost	37 6 2	37 6 2
Less Aggregate depreciation to date	22 6 2	27 6 2
	15 0 0	10 0 0
Barclays Bank	—	23 6 1
Sundry Debtors	14 0 0	32 17 9
	£811 5 7	£1005 17 5

Income and Expenditure Account

For the Years ended 31st March, 1952 and 1953

	£ s. d.	£ s. d.
Cost of Transactions	230 17 6	219 9 0
General Expenses :		
Postage, Printing and Stationery	31 10 3	78 4 1
Library Rent	6 5 0	6 5 0
Cost of Lectures and Excursions	17 8 9	16 16 0
Subscription to Scientific Society	3 17 6	2 17 6
Norfolk Naturalists' Trust	—	—
Norfolk Research Committee	5 0 0	—
Sundries	5 17 4	5 11 4
Depreciation	5 0 0	5 0 0
Special Events :		
Annual Dinner	—	—
Tea Party	—	—
Festival Exhibition—Norwich Castle Museum	51 17 0	—
Surplus for the year	—	83 12 11
	£357 13 4	£417 15 10

	£ s. d.	£ s. d.
Subscriptions :		
Annual	180 17 6	301 4 0
Life	8 0 0	36 0 0
	188 17 6	337 4 0
Sale of Publications	1 10 10	1 4 3
Interest and Dividends	29 15 0	24 18 0
Sundry Receipts	—	1 13 0
Special Events :		
Garden Fete	—	40 14 1
President's Public Lecture	—	12 2 6
Peter Scott Lecture	—	—
Deficit for the year	137 10 0	—
	£357 13 4	£417 15 10

Audited and found correct,

H. RILEY,

Hon. Auditor.

I

SECRETARY'S REPORT, 1952–53

ORDINARY meetings of the Society were held at Norwich Castle Museum (except where otherwise stated) as follows:

1952

OCTOBER 18TH. Mr. A. Leutscher, B.SC., F.Z.S., of the British Herpetological Society, gave a most interesting account of the six species of British reptiles and illustrated his lecture with specimens and slides. The Misses A. M. Davies, N. E. Ireland, J.P., E. Forsythe and I. M. N. Cresswell, Messrs. W. G. Bailey, P. R. Page, J. S. R. Pankhurst and P. Stroud and Lord Amherst of Hackney were elected members of the Society.

NOVEMBER 11TH. Mr. R. P. Bagnall-Oakeley gave a Public Lecture at the Stuart Hall, Norwich, on "Rare Birds in Norfolk," illustrated with his own colour films taken at Cley, Holkham Park and on the Broads.

NOVEMBER 15TH. The President gave a delightful account of a journey through England from a southern county to the Farne Islands and of the flora and fauna of the Farnes, with special reference to the bird life and the local colony of Atlantic seals. A series of coloured slides and a colour film added considerably to the afternoon's enjoyment. At this meeting it was announced that Her Majesty the Queen had graciously granted her patronage to the Society. Mrs. E. M. Brooks, Mrs. J. E. Gurney, Mrs. R. B. Hayes, Miss E. Hayes, Miss J. Bush, Miss S. Woolley, Miss J. Wheeler and Messrs. I. Brett, C. Hill and M. Sendall were elected members. Under the new School Affiliation Scheme, the following schools were registered for membership: Town Close School, Notre Dame School and The Blyth School.

DECEMBER 13TH. A "Country Questions" programme arranged by the Hon. Secretary proved of considerable interest. The team, which dealt ably with fifteen widely diverse questions, consisted of the President, Mr. W. E. H. Fiddian, Mr. H. J. Howard and Mr. J. E. Sainty. The following new members were elected: Mrs. E. Orgill, Mrs. G. Mason, Dr. and Mrs. J. C. Johnston, Miss G. Armitage, Miss M. S. Dunbar, Miss E. M. V.

Fletcher, Miss A. E. George, Mr. R. H. Gardner and Mr. R. I. Hook. The City of Norwich School was accepted under the School Affiliation Scheme.

1953

January 3rd. Mr. Ian Hepburn spoke on "Coastland Plants," illustrating the ecological features and specialised vegetation of the coast by means of a fine series of coloured lantern slides. The following new members were elected: Dr. Susan Palmer, Miss G. Beeson, Rev. A. Prescott and Messrs. P. J. K. Edmonds, R. Gray, Roland Green, F. T. Braybrooks, A. P. Baggs, A. Dady, A. Gordon and R. G. Thurrell.

February 14th. In the unavoidable absence of Mr. John Markham, the President gave a running commentary on a series of Mr. Markham's film strips of British Mammals. The following new members were elected: Miss M. A. Bidwell, Miss S. M. Barmby, Miss M. Pennington, Miss E. Nichols, Messrs. K. E. Cotton, J. H. Brummage, K. Lawrence, A. G. Heawood, A. B. Levell and Charles Green.

March 3rd. Miss Frances Pitt gave a public lecture on "Wild Life in Norway" at the Stuart Hall, showing colour films to illustrate her Scandinavian journey. Afterwards, Miss Pitt showed films of some of her special pets.

March 14th. The President gave his Presidential Address, entitled "Recording Nature with a Camera," tracing the progress of photography applied to Natural History and reviewing the methods and equipment used. The following new members were elected: Mr. and Mrs. G. Nicholls, Miss G. E. Read, Miss C. E. Lewin, Miss E. Gayford, Mr. R. Rae, The King Edward VI School, Norwich, and Rockland St. Mary School.

April 18th. The 84th Annual Meeting was held at Norwich Castle Museum, when the following officers were elected: President (for two years), Mr. E. A. Ellis; Vice-Presidents, as before, with the addition of Mr. J. E. Sainty; Hon. Secretary, Mr. F. J. Taylor Page; Hon. Excursions Secretary, Miss R. M. Barnes; Hon. Treasurer, Mr. D. A. Pearce Gould; Hon. Auditor, Mr. C. E. J. Moore; Hon. Editor, Mr. E. A. Ellis. Messrs. R. P. Bagnall-Oakeley, E. Q. Bitton and W. E. H. Fiddian were

elected to serve on the Committee for three years in the places of those retiring by rotation and Mr. E. T. Daniels for one year in the place of a member retiring prematurely. The Hon. Treasurer's report was accepted. The retiring President, Mr. R. P. Bagnall-Oakeley, referred to the additional activities planned for the Society in the near future, including a Biological Survey of one of the Bure tributaries, a joint excursion with the Suffolk Naturalists' Society, an Annual Dinner and an Annual Christmas Lecture. The Hon. Secretary reported that the Society's membership was the largest in its history. It was proposed to ask all members to record their special interests and to arrange for specialist group meetings to be held from time to time in addition to the ordinary general meetings. At the conclusion of the business meeting members were entertained to tea and went on to view the Annual Exhibition which had been staged in the Museum Lecture Room.

F. J. T. P.

Report on excursions held by the Norfolk & Norwich Naturalists' Society in 1952.

May 15th. About 40 members and friends were shown the cliff formation at West Runton by Mr. J. E. Sainty. The fulmars were seen at their nesting site. Some members did some shore collecting.

June 8th. 20 members were shown the woodlands at Melton Constable Park by Mr. T. W. Irvine, who explained forestry methods. Deer were seen in the park and bird and plant life of the lake provided additional interest.

June 26th. The excursion to Walberswick was cancelled for lack of support (Norfolk Show week).

July 13th. 28 members travelled in cars to Scarning Fen and Foulden Common, where, under the guidance of Mr. K. C. Durrant and Mr. E. Q. Bitton, many interesting plants were seen and listed. Tea at the George Hotel, Swaffham.

July 20th. About 30 members visited Scolt Head Island to study plants, birds and insects of the dunes and salt marshes.

July 26th. About 20 members explored Holt Lows under the guidance of Mr. P. H. Simon. The rich flora of bog and heathland was seen at its best.

August 14th. About 15 members visited Alderfen Broad and Heron's Carr, Barton Broad in the afternoon.

September 10th. About 20 members explored Buxton Heath, Hevingham.

October 19th. 18 members took part in a fungus foray at Wheatfen Broad, Surlingham. Specimens were named and laid out for inspection at the end of the foray.

Ruth M. Barnes,
Excursions Secretary.

THE "TRANSACTIONS."

Note by The Editor.

With the issue of this Part, which completes Volume XVII, the traditional character of the *Transactions* is maintained but for the exclusion of a Bird Report, which was issued jointly with the Norfolk Naturalists' Trust earlier in the year. In future, the *Transactions* will be published in special sections, viz., Botany, Freshwater and Marine Biology, Entomology and allied subjects, Mammals, Reptiles and Amphibians, and Geology (embracing Topography and Palaeontology), in addition to an annual Bird Report for Norfolk. The first Part of the new series will include a short *Flora* of Norfolk.

The Society holds a limited stock of back numbers of *Transactions* and enquiries concerning these should be made through Miss D. M. Easter, 99, City Road, Norwich. The price of all parts of Volume XVII is 10s. 6d.; all earlier parts are available at 2s. 6d. each.

II

PRESIDENT'S ADDRESS

Digest of a commentary on films and slides in colour given by R. P. Bagnall-Oakeley to members of the Norfolk and Norwich Naturalists' Society at the Assembly House, Norwich, on 14th March, 1953.

RECORDING NATURE WITH THE CAMERA.

It is difficult to say when nature photography first began but it was certainly less than eighty years ago. Though it is true that a few pictures of nature subjects had appeared before 1873 they were not the work of photographers whose interests were directed towards natural history, but chance exposures of subjects which attracted their attention and happened to have a natural history flavour about them.

Probably the factor which militated most against the production of nature pictures was the use of the wet plate as the only form of sensitised emulsion in the early days. Apart from this almost insuperable drawback for work in the field, the size and weight of photographic equipment was considerable. Moreover the " speed " of photographic emulsions was very slow by later standards and this limited subjects to stationary objects such as flowers, nests and the occasional bird incubating eggs.

The impetus given to nature photography by the introduction of the dry plate was not as rapid as would have been expected, for now no place was too remote for the energetic enthusiast.

Apparatus was, of course, still heavy and cumbersome but a supply of plates could now be transported anywhere, from the sea shore to the remote fastnesses of mountain crags and peaks.

It is probable that the first man to photograph wild birds in Britain was R. B. Lodge, who although a professional portrait photographer was one of the pioneers of the recording of wild life with the camera. It is not my intention to trace in detail the history of nature photography which would necessitate the consideration of the work of numerous photographers from the earlier pioneers to the outstanding members of the host of present day workers, many of whom have achieved a standard of

technical excellence which is almost beyond criticism. I shall therefore mention only a few names and endeavour to select factors which have most markedly contributed to nature photography as it is to-day.

No mention of the early photographers would be complete without the names of the Kearton brothers—Cherry and Richard—whose tireless energy and constant experiment were potent factors in the advance of photographic technique in the field and whose books—the first on nature ever to be illustrated wholly by photographs—opened the eyes of so many people to possibilities of this relatively new medium for recording nature.

As yet, the use of hides for the concealment of the photographer and his apparatus were not used and most of the pictures of wild creatures were stalked shots. King and Heatherley were busy stalking sea birds the former using his famous black cloth under which he successfully approached so many of the birds of his island home, probably without realising the significance of the comparatively recent discovery that birds recognise their fellow creatures by the nature of the solid outline, which he was concealing. I shall refer to this important factor in stalking later on. Even those photographers who concealed their persons by a covering of canvas or sacking had not yet realised that much larger hides could have been used to screen from view not only themselves, but also their apparatus.

The Keartons were the first to try using hides, but they believed that these must be imitations of natural objects inside which they could operate the camera. And so the well-remembered hollow ox from which a nesting lapwing was photographed followed an earlier hide in a dummy tree trunk. Only gradually was the normal photographic hide of to-day coming into use, largely because of the extreme reluctance of these early naturalists to risk making their subjects desert their nests. Even now there is much to be learnt about hides and their uses, especially when the birds to be photographed are away from the nest and on passage. But more of this subject later.

The appearance of the reflex camera marked the next great step forward in the photographers' equipment. The old field cameras and the tripods which supported them were masterpieces of craftsmanship in wood and brass, but apart from being bulky, they had the great drawback of having to be focussed

under a dark cloth on a ground glass screen at the back of the instrument, which had then to be replaced by the dark slide containing the plate, before an exposure could be made. The new reflex principle relied on focussing by means of a mirror reflecting the image into a screen on the top of the camera, while the plate with its slide withdrawn awaited exposure behind the focal plane shutter. The subject could be watched and focussed in the screen until the moment before releasing the shutter, when the mirror was raised and the picture taken. But still there was little reduction in the weight and bulk of the photographers' apparatus and huge loads had to be dragged up hills and carried over heath and bog, saltmarsh and mudflat.

All the while that the advance in camera design was occurring, the speed of photographic emulsions was improving and their " grain " getting smaller. Both of these were important factors, for movement was becoming less of a limiting factor and degree of enlargement of pictures could be increased without producing too much of the " dottiness " of newspaper reproductions.

Even by 1910 some splendid pictures had been produced. B. B. Macpherson had published his very comprehensive series of studies of golden eagles, Riley Fortune, Oliver Pike, Bentley Beetham and others had made names for themselves and even the women were well to the fore. Miss E. L. Turner, Miss Frances Pitt and that great traveller Miss Haviland were already well known names, the former being the probable originator of what she herself called " Wait and See " photography. This was the process of erecting a hide at a selected spot where for one reason or another birds came, and chancing your luck.

Though, by now, hides were in general use many photographers were still using great ingenuity to get on terms with their subjects without using them. Remotely controlled cameras operated electrically or with wire or thread were often yielding good results. All kinds of incredible home-made apparatus were produced and the principle of the trip-wire contact was being used on all kinds of creatures from voles, by the Keartons to elephants by Radcliffe Dugmore.

By 1914 further improvements in the photographers' equipment were on the way. Smaller and more compact cameras using roll films as well as plates had appeared and wider

aperture and longer focus lenses of better quality were also available. Even to-day many photographers continue to adhere to the larger reflex cameras, but the noisy roller-blind shutters have given way to silent " luc " type. The use of open flash and later of flash bulbs opened up new fields for photographic exploitation, particularly nocturnal mammals, which up to this time had defied almost all attempts to record them in pictures. Here the automatic trip-wire which fired the flash and operated the shutter simultaneously was a fertile means of producing photographs. This branch of photography had few more energetic and resourceful exponents than H. Mortimer Batten.

Still the speed of photographic emulsions increased and still the apertures of lenses got larger, while further improvement of lens speeds has quite recently been accomplished by the process of blooming.

By the middle 1930's colour plates and films both for still and ciné cameras had improved sufficiently in speed and colour quality to attract several of the already established black and white photographers But these colour emulsions had very little latitude, so more accurate exposure meters were demanded to reduce the margin of error to a minimum. The old visual meters and calculators though not entirely displaced even to-day, gave way to the versions employing the photo-electric cell especially with workers in colour, who could not afford to make mistakes. Afford is an apt word, for colour sensitive emulsions were—and still are—very expensive. For the amateur, colour transparencies produced by a " reversal " development process give the only satisfactory colour rendering, though several makes of colour films that produce negatives from which either black and white or colour prints may be made, are on the market. Unfortunately, the equipment for colour printing these is not yet available and professional results are expensive and often far from good, since the colour quality is dependent on the opinions of the processor as to what the subject should look like.

At the present day hosts of nature photographers are record- all kinds of subjects from big game to diminutive fungi.

The improved quality of colour transparencies in spite of the slow speed of the emulsion was attracting increasing numbers of

photographers who had now a new and accurate way of recording botanical and mycological specimens without collecting them. The essential details of date, place and special circumstances could all be noted and the resulting transparency became a record in the form of a slide. In some cases colour negatives were produced and the records were pictures with data entered on the reverse side.

In the early 1940's the appearance of the strobotron tube—a means of producing a flash of intense brilliance and very short duration—heralded one of the greatest advances in nature photography in the whole of its short history. By synchronising the camera shutter with the flash, so that it came during the relatively short period in which the shutter was fully open, exposures could be made in dull light or darkness. The most important factor, however, was the tremendous speed of the exposure—from one five thousandth of a second to twice or even three times that speed being obtainable. The apparatus which could produce this remarkable result was made portable and could be operated in the field under reasonably dry conditions. As with so many new inventions High Speed Flash was used at first to obtain only spectacular results, and though the full possibilities of the new apparatus may have been realised by a few workers or, more probably, by a few people who did not possess an outfit, it was not for two or three years that we began to see many of the special advantages of this revolutionary advance fully exploited. The early H.S.F. pictures were mostly of birds in flight, and some remarkable photographs which "froze" the action of the subject and obtained needle-sharp definition were taken. A new interest was aroused in the mechanics and aero-dynamics of bird flight as picture after picture of birds in all kinds of attitudes, and with every sort of bend and twist on the flight feathers and tail, was published. Moreover, the majority of these photographs were of nocturnal birds—owls, nightjars and others—returning to their young with food. Such was the clarity of definition that the prey could be identified with certainty in most cases ; a factor contributing to accuracy of ornithological knowledge.

In H.S.F., too, there was a new medium for recording nocturnal mammals, many of the smaller of which had been more or less completely neglected photographically except in

captivity. Moreover, in normal weather conditions mammals are more easily attracted with bait than birds, since the majority hunt largely by scent. However, there were other nocturnal subjects than mammals and birds to which the new technique could be applied. Pictures of snails, slugs and even cockroaches appeared, not that the first two of these required the speed of flash to " stop " their movement : it was simply the easiest way of taking their photographs.

Bats provided another obvious subject for flash, especially since their means of ingress and egress to their roosts could be restricted if necessary, thus making them pass through small apertures. The relatively prescribed hunting areas of some species also gave chances of exposures, though good results were much more difficult to obtain.

Gradually the cult of H.S.F. increased the number of its adherents as the apparatus became safer (the early ones could produce severe electric shocks when damp), more portable and cheaper, and all the time new designs were being contrived to give more and more brilliant flashes with two or more flash units from each set. Other refinements were added such as a ray device on the on principle of the burglar alarm, which the bird operated as it crossed the beam, thereby taking its own picture. Perhaps no single photographer did more to popularise H.S.F. than Eric Hosking, whose book " Birds in Action " showed what could be done, with skill, ingenuity and patience. His studies of various of the smaller passerines attacking stuffed cuckoos placed in the vicinity of their nests are now famous, while his flying shots of birds captured in ringing traps and released through a cardboard cylinder are almost equally well-known.

Still the quality of apparatus and number of refinements and accessories increases, the speed of sensitised material and quality of colour plates and films improves, and the number of nature photographers mounts steadily.

My own photographic career began at the age of fourteen when I was given a reflex camera and the necessary apparatus to process my own plates and make my own prints. I learnt my early lessons the hard way—by making mistakes and learning from them : and learning all the more thoroughly by having to find the majority of my working materials from my own pocket

PHOTO. I. Typical hide for migrant waders; small and well camouflaged.

PHOTO. II. Dunlins, Cley, August, 1952.

PHOTO. III. Red-necked Phalarope, Binham, November, 1954.

PHOTO. IV. Kittiwakes, Farne Islands, April, 1952.

PHOTO. V. Grey Phalarope, Cley, October, 1952.

PHOTO. VI. Glaucous Gull, Seahouses, Northumberland, April, 1952.

PHOTO. VII. Bird's Nest Orchids (*Neottia nidus-avis*), Holt Woods, June, 1953.

PHOTO. VIII. Waxwing, Cley, January, 1951.

money. From caterpillars, I graduated to flowers and then to garden birds, though I hardly took a presentable bird photograph until I had left school. At the university and later as a schoolmaster living on the North Norfolk coast, I developed an addiction to wildfowling, which became almost a mania. In the nesting season I continued to photograph birds, but in the winter the camera was discarded for the gun, except for pictorial work mostly landscapes.

It was probably this wildfowling experience which determined the nature of my later photography. Eight or ten years of striving to get on terms with the wildest of all birds—the ducks, geese and waders—and the views of these at relatively close quarters after a successful stalk, decided me to give up the gun for the ciné camera and my periods of operation changed from dusk and dawn to the lighter hours of the day. The quarry remained the same, but the shots produced permanent records in colour as well as black and white. Moreover they give pleasure to hosts of other ornithologists who are unlucky enough not to live near that unrivalled part of the British Isles for passage migrants—the North Norfolk Coast.

The rest of what I have to say concerns the methods employed in order to come to photographic grips with birds away from the nest. The following observations are the results of my own experience and may well be different from the findings of others. Discussions with other bird watchers leads me to believe that there are numerous ways of getting close to birds and these may differ with conditions and species.

The chief attraction for most birds to any particular vicinity is food. This is especially obvious in the case of berry-eating birds in hard weather, but all species may be observed to return again and again to the same feeding grounds so long as the food supply lasts. Among the waders certain individuals or small groups of birds can be seen to have definite preferences for particular pools, and usually have a limited number of other places to which they go when flushed. It is important to observe the departure of the birds from a pool where a hide has been prepared so that an assistant—an indispensable ally—may put them back to the photographer after a suitable lapse of time.

A second attraction for birds, especially when they want to rest, is shelter. Pools in the lee of high banks or in the quiet

seclusion of the reed beds, regularly draw a variety of waders and duck which come in to rest and bathe.

Seed-eating birds and scavengers can often be " baited " to a selected spot. In this way I have lured such otherwise elusive species as Lapland Buntings, Shore Larks and Glaucous Gulls.

The driving of birds up to a hide or even an unconcealed photographer can frequently be accomplished by an experienced beater, though in the case of many species such as snow-buntings and the finches it is often better to set up the camera ahead of the obversed direction of feeding, and let the birds approach of their own accord. One definite warning—the result of bitter experience on more than one occasion—never attempt to sandwich a bird or group of individuals between the beaters and the camera, if the latter is less than 40 yards or so from the former. No bird however tame, will tolerate being confined in a smaller and smaller space between two unknowns, probably both suspected enemies. It will always " run out " or fly. It is surprising how vigorous movement at a distance will serve to guide and keep a bird moving towards a hide or even an unconcealed photographer. Driving the photographer's quarry up to hides should always be a slow process, however far the distance to be covered may be, owing to tendency for the birds to maintain the fast speed of the early part of a drive, and thus give the photographer very little chance for making exposures. The general tendency of most birds to " drift " slowly away from relatively distant people is the best characteristic to exploit.

Another form of driving birds up to a concealed position is that of using the incoming tide. This is easiest on large estuaries where well raised islands or promontories have become accepted resting places between the ebbs. Such is the famous Hilbre Island in the estuary of the Cheshire Dee. However the tidal flats of the East Coast have few suitable places for such work though carefully selected shore positions may yield results.

The drastic restrictions of feeding areas for water birds and waders in very hard weather and the resulting tameness of hungry photographic subjects, may be used to great advantage. The winter light is poor in quality, but bright days in snowy

weather may give good opportunities for both colour and still photography. Open sites, are however, essential for colour work. Seed-eating birds are compelled to forage among the standing plants since the fallen seeds are snow-covered. Thistles, burdocks, orache and other plants are worked over again and again. Thrushes, blackbirds, redwings and fieldfares may be attracted by raking out hedge bottoms after clearing away the snow, especially if berries are scattered on the exposed ground. Scavengers are quick to locate carrion on the surface of the snow, though they are usually very wary and suspicious of all but the most camouflaged hides.

Another productive method of obtaining pictures is stalking, though this requires practice and complete disregard for personal comfort. It is seldom possible to get really close to duck and waders which tend to feed in the open without being seen, but it is surprising how often a human figure in a completely prone position is disregarded or treated with indifference provided movement is slow. The human face should always be masked by some dark-coloured material—a fact well known to serious pigeon-shooters—while a most important point to remember is that birds recognise their enemies as much by outline and solid shape as by any other characteristic. Thus, if the completely prone position is precluded by the nature of the ground, it is essential to adopt some kind of headgear which fills in the tell-tale gap between the shoulders and the head, so as to mask the most characteristic feature of the human form. Where there is a certain amount of cover in the way of bushes, large tufts of grass or clumps of plants, a small screen may be made behind which the stalker may move, but the old adage which has appeared for so many years in military manuals of fieldcraft ; " A bush moving across an open space is bound to attract attention " ! must be heeded, since movement should be very slow.

The photography of birds in flight requires abundant practice especially with long focus lenses on a ciné camera. Specially adapted instruments fitted with a gun-type stock and pistol-grip control are a great help in swinging the camera steadily, and holding the subject in frame but these are by no means essential. Long continued practice without a film in the camera is easy to obtain and is the only means of yielding good results,

especially if the bird to be filmed is a fast-moving, quick-turning species like the swallows or flycatchers. When the light allows, slow motion ; i.e. exposing at a large number of frames per second and projecting the result at normal speed, will produce effective results, especially if the purpose of the film is to reveal recognition features or show the movements of flight.

Finally the question of hides for " away from the nest photography " is important. Few passage migrants will tolerate the sudden appearance of a rectangular hessian or canvas tent at their feeding grounds. Preparation for the erection of a small hide should be made by introducing a pile of cut reeds or some such harmless looking mass of natural material, which may be added to day by day until a hide can be concealed within or camouflaged with some of it. It is always a good idea to have a screen of reeds held loosely in position round the sides and part of the front of the hide. These can be secured with gardeners' bamboos and string, but should be carefully fixed to prevent obscuring the field of operations. They should have the leaves attached and stand about six inches clear of the sides, when the slightest breeze will cause sufficient movement and sound to mask any noises from within, while the broken shadow-pattern helps to make the sunward side less conspicuous. Permanent hides of a more rigid construction are, of course, better still, but too many of these would have to be put up if most of the " likely " spots are to be covered. However, a few of these at specially favoured pools and other feeding or resting sites can save a great deal of time and trouble since they soon become an accepted part of the landscape which the resident birds disregard, as being harmless. Migrants seem to consider them as an integral part of the countryside and provided there is not too much coming and going from them, they can be exceedingly productive of photographs and films. Portable dummy hides can also be used to advantage to get birds used to such structures. These can be moved and finally replaced by the real thing. One last kind of hide which is often extremely successful is a car. Ideally, something of the Land Rover type with station-waggon body which can get over a variety of country, is employed. I am told by experienced adherents to this technique, that a driver who can steer backwards by using the mirror, while the photographer operates

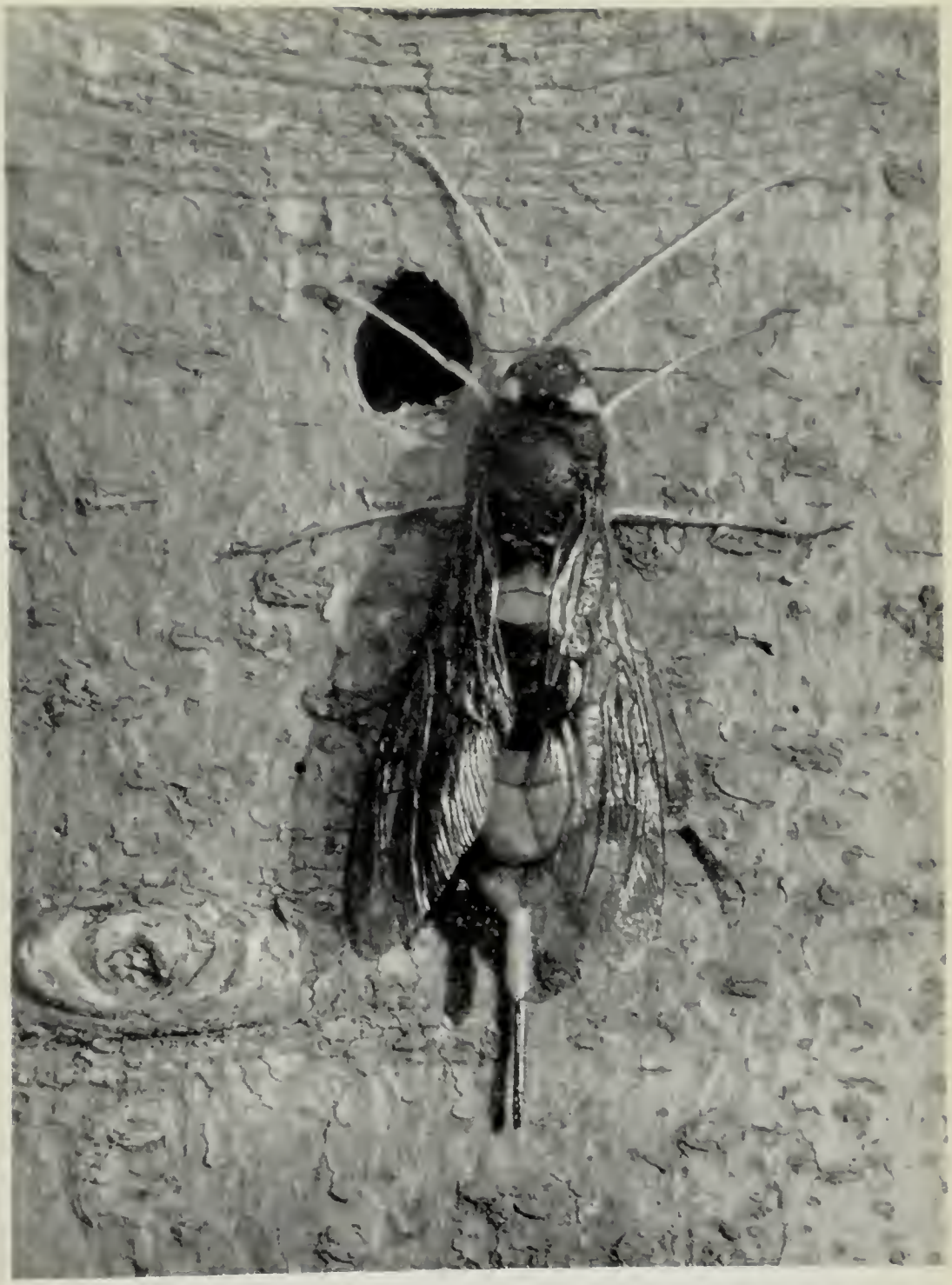


PHOTO. IX. Greater Horntail (*Urocerus gigas*), Brinton, July, 1952.

PHOTO. X. Death's-head Moth (*Acherontia atropos*), 1952.

from the back, is a valuable asset. The windows should, of course, be screened with hessian or some such material. I have myself taken many pictures at roadside pools, streams and bushes, though I have not tried the pursuit of birds in a backward moving vehicle over plough and heatherland.

No nature photographer should forget that any subjects which appear to be of special interest even if not in his own province, are worth an exposure since they may be of great interest to others and form a valuable record if the normal data concerning them are noted.

III

THE WILD DEER OF EAST ANGLIA.

By F. J. Taylor Page.

The decline in the mammal population in Norfolk and Suffolk during historical times is largely attributable to deforestation. Vast areas that once provided shelter and food for many species no longer recorded in our native fauna, gradually ceased to do so. Driven by hunting, such species sought a last refuge in the fens, where they finally perished. Evidences of this have from time to time been discovered. Abundant remains of red deer and, less frequently, roe deer, occur with bones of bear and beaver.

Whilst conditions since the time of their normal incidence have certainly not encouraged a return of the larger carnivores, just a few of the post-glacial mammals whose existence might have remained forever one of historical interest, have once again been able to establish themselves with the help of Man. Four species of deer, by direct introduction as occupants of recent woodlands, as escapes from deer-parks, or as outliers from stag-hunting, can now be included in our East Anglian fauna. Two of these, the roe and the red deer, are truly indigenous. Of fallow deer it can only be said that closely-related species inhabited Great Britain in warm inter-glacial periods, that no trace of true fallow has been found in peat or other deposit so far examined, and that fragments of antler of these creatures have not been found earlier than in refuse heaps associated with the Roman occupation. This has been taken to indicate that fallow were introduced as food, probably from Greece or Portugal where they had retained a hold. Our fourth deer is of very recent occurrence, having suddenly appeared on at least three occasions at widely different places. This newcomer, the Muntjac or Indian Barking deer, never existed as a member of the British fauna of the past. It was first introduced at Woburn in Bedfordshire during the nineteenth century. A number of escapes occurred, and their appearance on the eastern side of England suggests that they are quite well able to wander widely and look after themselves.

Roe deer (*Capreolus capreolus*) were introduced first in North West Suffolk by Sir William D. Mackenzie about the year 1884. Writing to his friend Mr. Heatley Noble, the entomologist, he says, " Roe obtained from Wurtemburg and turned down in the young Warren woods have increased considerably." The original six pairs were at first kept in a deer pen at the corner of what was then called Great Queen's Wood, below the lodge on the Thetford-Brandon road, an area of some three hundred acres which later became their home. In the thickly-wooded Downham estate they had every chance to breed and spread farther afield. Some migrated southwards through High Lodge to the Elveden estate, and records in 1903 show that they had reached West Stow, Icklingham, Livermere and Euston, some fifteen miles from their starting point.

By crossing the river below Santon Downham, they began to populate Norfolk about the year 1900, spreading from Two Mile Bottom across what is now Santon Street to the Drove Road and Grimes Graves. There they could frequently be seen in the evening feeding openly on the breck. Stragglers penetrated still farther towards Mundford, High Ash, Cranwich and Didlington. Even before 1919 they were regularly trapped and snared but despite this they increased, and it is somewhat remarkable that so little notice was taken of them by naturalists. By 1921 a peak population appears to have been reached. Keepering of the old estates was declining, and in the thick older woodlands then little cared for, such as Snake wood at Lynford, they could frequently be seen. Foresters reported quite unusually large numbers together, one even recalling seeing about thirty drinking at one of the forest dew-ponds.

With the taking over of vast Breckland areas by the Forestry Commission in 1922, the hey-day of the roe was to pass. Instructions were given to warreners to control numbers, and from that time twenty or thirty a year have probably been killed, the slaughter being greatest up to 1939. This persecution and constant harassing by forest operations have caused these grand animals to shift their ground more and more both northwards and southwards, and to seek once again shelter in the Fenland in what reed swamps still remain on its borders. From time to time more recently, roe have been seen in the plantations and reed beds near Feltwell and Methwold ; on the Stoke Ferry road

and at Oxborough; and even as far north as Wimbotsham, two miles beyond Downham Market. (K. Durrant, 1951)

General observations of Field Officers of the Forestry Commission suggest that the main trend is now in a north and westerly direction. It is to be expected that ere long Swaffham and Gaywood forests and possibly the Queen's woods at Sandringham will become haunts of a small number of roe. In their southward movement, offshoots from those reported as numerous around Brandon (Sir William Taylor, 1937) had reached the King's Forest and the River Lark near Mildenhall by 1938. By 1947 they were in occupation of marshy areas and dense carr between Tuddenham Fen and Cavenham Heath (A. E. Vine). Their most southern station so far recorded is two miles beyond Herringswell near the Bury-Newmarket road (R. P. Bagnall-Oakeley, 1951).

Fallow deer (*Dama dama*) owe their freedom in our woodlands to the breaking up of large estates, or the lack of upkeep of parklands during the two world wars. More particularly in Suffolk, feral fallow occur sporadically in suitable wooded areas from the western fenlands to the eastern coast. Some of the earliest records come from Henham, where in 1914 part of a parked herd on the Stradbroke estate escaped. Ever since they have lived in the woods around Sotherton and Blyford, with the Halesworth-Southwold road marking the southern limit of their range. Each year at the rutting season, bucks from outlying districts travel to Blyford, and as regularly go away again when the rut ends. Numbers have been controlled in recent years, but there appears to have been no decrease in the herd.

In the Ipswich neighbourhood, escapes from herds in Orwell Park and Wolverstone Park account for records of deer since 1929 at Nacton and Levington (H. E. P. Spencer) and at Belstead and Bentley (H. W. Simpson). The Forestry Commission report (1948) records fallow at Rendlesham and Butley, and they have been seen there quite recently. These last are probably escapes from the herd at Campsea Ashe.

Between 1939 and 1945, during the war-time cultivation of the park at Ickworth, numbers of fallow were able to escape into the hunting country round Bury St. Edmunds. Some are now to be found in Tuddenham Fen ; others occupy woods around

Whepstead, Lawshall, Saxham and Barrow (Maj. T. Wilson). Further north a few still occupy Livermere Thicks near the park. It is possible they are survivors of the herd that were kept on the estate before World War I.

In the Norfolk Breckland, a herd of fallow range the south-eastern forest boundaries north of Thetford. Some control of these had to be made owing to quite extensive damage to the pine woods at Roudham. In the north of the county, occasional records of stragglers have come in the past from Runton and Castle Rising. More recently in March 1954, three white fallow were seen in Gaywood forest near King's Lynn (I. Brett). Their origin is at present unknown.

About 1942, twelve dark fallow escaped from Dudwick Deer paddock ten miles north of Norwich. They spread to wooded areas and heathlands nearby, the remains of what were once extensive forests. In this almost impenetrable area they bred without hindrance until, in 1950, a herd estimated at between twenty-five and thirty existed. As further increase continued, damage was done to local farm crops, and finally steps had to be taken to diminish the numbers. In January 1954, two New Forest Keepers were brought in by the Agricultural Executive, and aided by Lt.-Col. F. E. D. Drake-Briscoe eight deer were disposed of. Even before this, regular deer drives had been held, and it is believed that the herd is now considerably reduced. Those left have dispersed towards Felthorpe, Marsham and Hevingham. The antlers of a number of these show only very slight palmation, giving them heads not unlike those of red deer. This apparently is not uncommon in feral fallow.

Movements of Red Deer (*Cervus elaphus*) are even less certain than those of fallow deer. In 1950, eight to ten outliers from the Norfolk Stag Hunt were known to exist. Two calves were born out, and subsequently records came in from Forestry Commission areas of small groups travelling together. An almost regular west to east movement has been noted now for several years during the early Spring, but its significance is quite unknown. Roe deer sometimes associate with the stags and not only feed with them but travel through the forests with them too. In the younger plantations, the visits of the red deer result in damage, which, whilst it does not usually kill the trees,

is temporarily unsightly and delays their growth. However, in some of the better established parts of the forest such as at West Harling, small herds have made a more permanent home. Once settled, they apparently do little harm and the Commission welcomes them as a natural part of the forest scene.

In Suffolk too, it is only in the past four or five years that notice has been taken of the incidence of red deer. A hind in calf turned up at Heveningham one winter, and produced a young stag in the following Spring. This was shot when about a year old. The hind was then joined by a stag and had calves by him in successive years. The Hon. A. Vanneck tried to preserve them, but owing to damage they caused to forest and crop, control had to be made. The stag was shot this winter (Lord Cranbrook, 1954).

One outlier travelled far westward into Cambridgeshire and was found lying in a field at Fen Ditton by the Cambridgeshire Farmers Harriers. They hunted it back to Stapleford and western Suffolk. About the same time a stag made a dramatic appearance in the streets of Newmarket by night, where it was reported ultimately to have headed southwards. Though there is no certainty that the two incidents are connected, they might well be, and they certainly serve to suggest big-scale movements in this species.

Of the East Anglian deer, the muntjac or " barking deer ' (*Muntiacus muntjak*) is the least known. It is a small animal, about the size of a dog fox, some twenty-one inches at the shoulder. It has a chestnut red pelage, slightly speckled with grey. The antlers are very short, and the upper canine teeth project from the mouth like small tusks. When running the gait is peculiar, the head being held lower than the flanks. Their introduction, so far as is known, does not appear to have been made nearer to us than Bedfordshire, unless a private zoo may have stocked some. Thus, unless we are to assume that they crossed the open fen country, which is unlikely, though not impossible, they have reached us from Hertfordshire where they have been common for some time. As it now transpires that a small deer shot at Parham Wood near Framlingham in Suffolk, and which was at the time identified as a roe deer in 1940, was almost certainly a muntjac (Capt. H. A. D. Walne), it is probable that a few of these creatures have edged their way in and their

presence has remained unnoticed until quite recently. A mystery that remains unexplained is the sudden appearance on July 27th, 1952 of a muntjac near the swing bridge at Lowestoft. It was ultimately captured by Inspector Frank Wood of the R.S.P.C.A., and subsequently released in the vicinity of Dunwich.

In the early summer of 1953, three of these tiny creatures were at large in Santon Forest between the River Ouse and the cross-roads at Lynford (A. Birkitt) and in September last two more were observed near Forestry Commission land at Leiston (*Trans. Suff. Nat. Soc.*, Vol. VIII, p. 177). They are thus undoubtedly filtering out in all directions from Royston their most northerly station in Hertfordshire, and we may expect to hear more of them as they become more regular occupants of our woodlands and forests.

The Japanese deer or Sika (*Cervus nippon*) a small relative of the red deer, has not, so far, travelled in our direction. It is probable that ultimately it may do so, for if it is capable of journeys such as those taken by other deer, we can most certainly look forward to yet a further addition to our fauna ere long.

IV

SHORELINE CHANGES ON THE MARSHLAND COAST OF NORTH NORFOLK, 1951–53*

By J. A. Steers and A. T. Grove

A few notes on the physiographical effects of the sea-flood of January 31st—February 1st, 1953, on the marshland coast of Norfolk may be of interest and also of some value as a record. The details of the coast were mapped in the summer of 1951, and special care was given to the mapping of Scolt Head Island and Blakeney Point in that year and also in 1953, after the floods.

Embankments were breached in several places and all the fresh marshes were flooded. There is no need to discuss here the tragic effects of the flood at Cley, Salthouse and, to a lesser extent, at other places.

Between Hunstanton and Gore Point, dunes were eroded and the sea overwhelmed the ridge protecting Holme Marsh and locally pushed it inwards. The water in the marsh helped, in draining out, to cut back the dunes at Gore Point which also suffered in the storm. A new outlet has been made for the channel draining the Marsh about 150 yards westward of the dunes at the Point ; it will be interesting to see how this will behave.

The dunes between Gore Point and Thornham were not seriously breached. There, as in many other sections of the coast, the lack of any great change is the significant point. The low ridge of sand, with some shingle and shell, which had formed in front of nearly the whole length of these dunes, was flattened and almost obliterated in parts. One gains the impression that it gave some protection to the dunes by causing the waves to expend their energy at the height of the storm.

The crescentic island at Thornham was also somewhat flattened and overswept, especially in its mid-parts. The seaward face may be a little less crescentic, but otherwise its outline is scarcely altered. A ridge running west from the island has developed and may have been enlarged in the storm.

*In 1953 the survey work was carried out by R. J. Small, P. Haggett, M. Chisholm and D. Brearley.

The derelict wall at Titchwell was badly broken and the channel formed by water draining from a breach made in 1949 was much enlarged. Scour has cut the channel well below beach-level, and the old marsh muds exposed on the foreshore have been deeply cut by gullies which extend back into the former reclaimed marshes. The dunes along the golf links were eroded but not seriously.

Scolt Head Island did not suffer badly, but some interesting changes took place. The main line of dunes at Scolt Head (the Hut dunes) were cut back 12 to 15 yards, and Norton Hills at the eastern end of the Island were eroded by a similar amount. The low dunes lying between these two accumulations were covered by the sea and for the most part destroyed. Since, however, they were very low before the storm this is a change, in itself, of little moment. The most obvious effect on the main beach was the break-through just at the west end of Norton Hills when the sea swept through a small breach which already existed and spread a large fan of sand and shingle on the marshes. Although this was not very serious and might well have healed itself, it was agreed to block it artificially. Two lines of metal posts supporting wire fencing have been put in, and it is hoped that they will collect beach sand and in time be buried by new dunes. The breach constituted a limited threat to the sea-walls and the marshes within them, and so it was closed. It is important to appreciate that this is the first major alteration of any kind, other than those by nature, made to the island. As such it must be regretted as the island formed perhaps the best feature of its type in England and Wales. The only other important changes on Scolt Head Island have been at the Far Point and at Beach Point. Far Point usually alters a good deal from year to year and, as shown in Figure 1 the changes were no greater between 1951 and 1953 than they might have been had there been no storm. It is worth noting, however, that a new ridge has appeared in the far north-western end of the Point. At Beach Point the shingle ridge south of Long Hills was completely overridden and pushed eastwards over the marshes, and the dunes at the southern end of Long Hills were seriously eroded.

At the height of the storm the island presented an unfamiliar appearance. Drift-lines make it clear that nearly all the House

Hills area was submerged and, apart from small patches here and there, the only areas of any size appearing above the sea were Long Hills, Hut Hills, the highest part of House Hills, and Norton Hills.

At Burnham Harbour more shingle has accumulated on the north side of the channel. From there to Wells Harbour surprisingly little change took place on the foreshore. The dunes were cut back in places, but rarely for more than 10 yards. Low, fairly new dunes, on the wide beach in front of the Gap, were covered by the flood, but scarcely altered. (They were mapped in 1951.) The same is generally true of the ridges, mainly of sand, near low water mark on the wide foreshore between the Gap and Wells Harbour.

The fresh marshes at Holkham were flooded and many trees damaged by salt-water were killed. Much sand was swept into the marsh through the big gap in the Wells Sea-wall near the life-boat house.

Between Wells and Blakeney again no spectacular changes occurred. Dunes were cut back on Lodge Marsh Island, and the sand and shell ridges off Stiffkey were flattened and spread more widely over the foreshore. Increased scour accompanied the retreat of the flood-water down creeks, but the effects were not sufficient to demand particular comment.

At Blakeney Point considerable changes took place at the far western end ; the ridge of shingle extending south-west from the Headland was straightened out, and the shingle accumulation of Far Point was completely cut off by a channel several yards wide, which, as Figure 2 shows, now runs where once there was a large sand dune. As at Scolt, a new ridge of shingle has been built on the north-west side of the Headland. The life-boat house was flooded and salt-water polluted the water of the well which is normally potable. Most of the lows were flooded and one of the hulks on the Headland was shifted from Beach Way across the creek to Long Hills.

Perhaps the most interesting change in all this stretch of coast occurred on the great shingle bar running from the Headland to Weybourne. Almost throughout its entire length it was rolled inland, for an average distance of about 30 or 40 yards. On the inner edge, where it was washed over the marsh, the shingle edge is locally quite steep. On the seaward side, old

marsh muds have been exposed on the foreshore and lumps of mud have been thrown onto the crest of the ridge by the waves. The ridge as a whole was somewhat lowered, but at and near Cley and Salthouse it has been pushed up again by bull-dozers. This fact is clear enough at present, but in time to come it may be forgotten that artificial raising of the beach was carried out nearly as far west as the Marrams.

A breach about 30 yards wide was made in the ridge off Salthouse and its formation may have assisted in the serious destruction that took place at Salthouse itself. In several places the old cliff lines on the south side of the main road between Cley and Weybourne were attacked by the waves and fresh scars were cut in them. The Wiveton valley was flooded and must have resembled its condition in the great storm of 1897.

Although north Norfolk faced the full force of the storm, the most remarkable point is the small effect it had on the marshlands. We are fully aware in saying this that those who have suffered loss of relatives or of houses, or whose marshes have been flooded, can hardly appreciate this. But we write from the point of view of physical change. The sea expended its power on the beaches, the low dunes and the marshlands which have not been reclaimed. The highest levels were not maintained for long, and consequently erosion of dunes along the tops of beaches was limited. Except where it was impounded by walls, the water soon retreated from the marshes and bad scour holes were not formed. Even the one at Titchwell is insignificant. One must turn to parts of Holland to see the appalling effects of scour. In Schouwen for example, the level of most of the island within the walls was much lower than some of the natural marshes of the Norfolk coast. The island was flooded, breaches could not all be mended even temporarily, and the next tides flowed in and out through them. Hence the breaches were widened and also deepened by successive tides. Some were scoured to more than 100 feet deep, and great gullies cut back far inland from them. This we have been spared and even when the storm cut breaches through the dunes, as in that part of the coast near Palling, the relatively high level of the ground within prevented the devastation which is all too apparent in many parts of Zeeland.

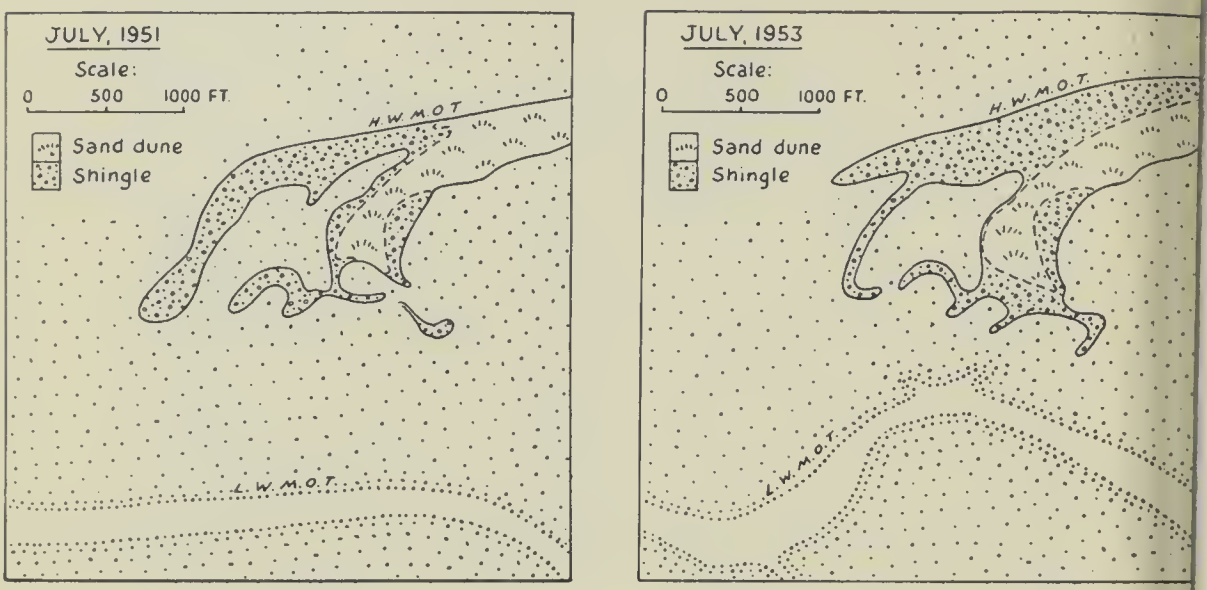


FIG. 1. FAR POINT, SCOLT HEAD ISLAND.

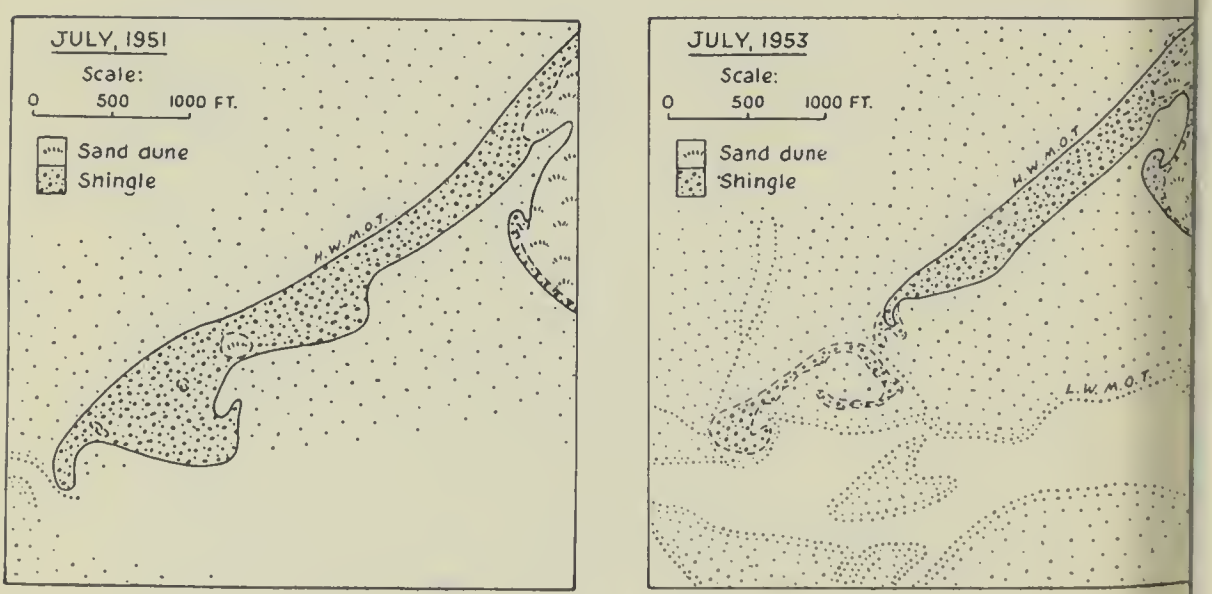


FIG. 2. FAR POINT, BLAKENEY POINT.

V

THE COASTLINE OF FLEGG

From Caister Point to Hemsby Gap, Norfolk

By Charles Green, G. P. Larwood and A. J. Martin

Introduction (Charles Green)

The mask of talus which, in living memory, had shrouded the cliff-face of the Flegg coast, was dramatically flung aside by the " great surge " in the storm of January 31st, 1953. So recently as 1951, the distribution maps in a survey of Norfolk's Pleistocene deposits could show, in this area, only the " line of contact of Great Eastern Chalky Boulder Clay with Great Eastern Jurassic Boulder Clay " (Sainty 1951). But the surge sliced away the talus as though with a knife, leaving clean vertical sections, right down to the beach, for our study. This had need to be done quickly, for the surface began rapidly to weather and, by August 1953, much of it was again covered.

Fortunately, I was able to record some of the exposures at an early date. A fruitful discussion with Mr. D. F. W. Baden-Powell led to more work. My daughter, Mr. D. Kerridge and the two friends who collaborate in this paper, came to my aid and, before it was too late, we made as full a record as was possible in the time at our disposal. My work in Caister had already led me to gather information from the East Norfolk Rivers Catchment Board (now the East Suffolk and Norfolk River Board), who built the Caister sea-wall in 1949–51. The record of their borings and the local records made in 1934 and again in 1943 and 1949, when gales stripped the beach of all sand and exposed its " clay " foundation, have enabled me to complete the tale of major formations from Caister Point in the south to the spot near the Hemsby boundary where the shrinking cliff was, and still is, obscured by sand dunes. From this point the dunes extend to Winterton Ness and beyond ; they have recently been described in these *Transactions* (Steers and Jensen 1952).

It will be seen that our observations provide evidence for the essential continuity of the Pleistocene beds exposed at Corton,

on the " mainland " to the south, and again at Happisburgh, on the " mainland " to the north. Apart, too, from their purely geological value, they throw some light on the status of Flegg as an island in the " great estuary," a subject which is touched on below, but which is to be dealt with more fully elsewhere.

Our thanks are due to Mr. P. E. Rumbelow, Mr. D. Kerridge and Mr. J. Haylett, who have placed a selection of their photographs at our disposal.

Description of the Section (Charles Green)

The gales of April 7th, 1943, and March 1st, 1949, stripped Caister beach of its sand-covering and left exposed a low cliff and beach-foundations of dark brown stiff loam or sandy clay. This clay-loam ended abruptly between Beach Road and the Lifeboat Station, where it disappeared suddenly below deposits of sand (Haylett 1951, Woodhouse 1953). It seems certain that here lay the ancient south-eastern angle of Flegg Island (see below), the sand to the south being the northern end of the water-deposited recent accumulation of the " Yarmouth Spit," to-day covered by dunes. Observations made in 1934 (Ellis 1934) and the borings of the Catchment Board (Cotton 1952) confirm this. It is noticeable, too, that the Ordnance Survey maps give this spot the name " Caister Point," though there is little in its present-day appearance to justify the name.

Northwards from this point, the dark brown clay-loam cliff and its overlying dune-sand are covered by the sloping breastwork which forms the upper part of the Caister sea-wall. Two lengths of the wall, however, are without this breastwork ; one lies just to the north of the " Coastguard Cottages " and the other to the south of Caister Halt (see map). The photograph of the now destroyed Manor House Hotel, which stood over the position of this first gap in the wall, shows the clay-loam as it was exposed in 1935. In 1953, the surge cleared away the overlying debris and it was possible to fix the top level of the clay-loam, which was approximately horizontal at about 15 feet O.D. In the second gap to the north, the dune-sand was cut back several feet farther than the underlying clay-loam, which stood here at about 16 feet O.D. The surface of the clay-loam

was smooth, as though waterworn, and a very thin skin of weathered-out small pebbles lay over it.

North of this second gap, the Railway Co.'s sea-wall covers the face of the low cliff past Dinah's Gap until, at about 1,000 feet to the north, the cliff-top begins to rise above the level of the wall-top. Here the surge came over the wall-top and cut into the cliff behind, revealing a clean waterlain bedded yellow sand with occasional pebble-seams, all capped by a thin dune-layer (see map).

Near the northern end of this wall, the slowly rising strata showed that the yellow sands overlay a stiff chocolate-brown clay-loam. From this point to the Hemsby end of our section, this clay-loam—apart from a doubtful break in the contorted sector—formed the lower part of the cliff above beach-level, the visible base of the cliff during 1953 having stood at about 10 feet O.D.

The clay-loam is hard and tough, contains a scatter of shell-fragments and pebbles and is generally marked by a reticulation of contraction-cracks filled with a lighter ferruginous clay. The colours of the freshly-broken surface may be likened to those of plain chocolate (matrix) and milk chocolate (joint infillings). It is convenient from this point to refer to this clay-loam as the " Brickearth."

At the northern end of the railway wall, the cliff is so much higher that the top of the sands was visible, capped by a layer of laminated brownish clay and sands, resembling the underlying beds, but of duller colour. The waterlain bedded sands, resting on the Brickearth and capped by this laminated-clay layer, will be referred to as Corton Sands (for this name see Reid Moir and Baden-Powell 1938).

At about this point, a bed of shelly sand was found near the base of the Corton Sands, though a careful scrutiny had revealed no trace of shell-bed in the exposure to the south. The shell-debris lay in a " pocket " in a projecting cliff-fragment, in two layers, one of white sand and one of fawn, resting on a thin layer of pebbles over the top of the Brickearth.

Structurally, as far as California Gap, there was no change in the cliff-face, though a slight increase in altitude was accompanied by an increase in the height of the top of the Brickearth

which, at its highest, reached some 32 feet O.D. Beyond this point (see map), there was a gentle decline in Brickearth level.

A second pocket of shell-bearing sands was found on another projecting point of cliff.* Here it was possible to measure the section carefully and, as this was the thickest shell-deposit noted, a " detail " section of the shell-bearing layers was made.

Section No. 1. At the base is dark-brown clay-loam (Brickearth) irregularly crossed by contraction-cracks filled with lighter ferruginous clay. Shell fragments and occasional flint pebbles are scattered throughout the mass. Above lie waterlain bedded Corton Sands, showing ferruginous bands and false-bedding in places and with thick shell-beds. Above the Sands are laminated beds of brownish clay and sands, on which rests dune-sand with buried turf-lines.

Northward from the highest point of the Brickearth, the shell-beds were seen as a continuous layer lying near the base of the Corton Sands, just above the top of the Brickearth, but dwindling rapidly close to California Gap.

Section No. 2. Similar to No. 1, except that a small pit at the top (now sectioned by the retreat of the cliff-top) has lost the dune-sand and topsoil, present a few feet behind. Thick shell-beds present in the Corton Sands, but in lesser quantity than in No. 1.

Section No. 3. Similar to Nos. 1 and 2. The top of the Brickearth is descending slightly and the shell-beds are still widely spaced in the Corton Sands.

A section on the northern angle of the Gap showed that the thick beds of shelly sand had become thin lines and seams, some of which were so thin as to be almost unnoticed.

Section No. 4. At the base is Brickearth similar to that in No. 1, but with its top much lower. Above are Corton Sands, but without the thick shell-beds seen in the earlier sections. There are a few thin layers with sparse shell, but most of the beds are represented by single lines of shell fragments, with an occasional pocket of shell and small pebbles " suspended " from the line. Above, the top of the Sands and the laminated clays are obscured.

The upper part of the cliff at this point (see Section No. 4) was obscured by rain-wash, but it probably consisted of the laminated sands and clay already noted. But now, a few feet further north, a fresh formation appeared near the top of the

*The " points of cliff " just to the north of the railway wall seem to have been due to the presence of groynes in the beach. Wherever a groyne was not backed by sea-wall, the surge appears to have swirled against the cliff on the north side of the groyne and so carved out a " bay," leaving two projecting points. Similar, but smaller, " bays " appeared to the south where the lower sea-wall was not backed by the upper breastwork.

CLIFF-SECTIONS

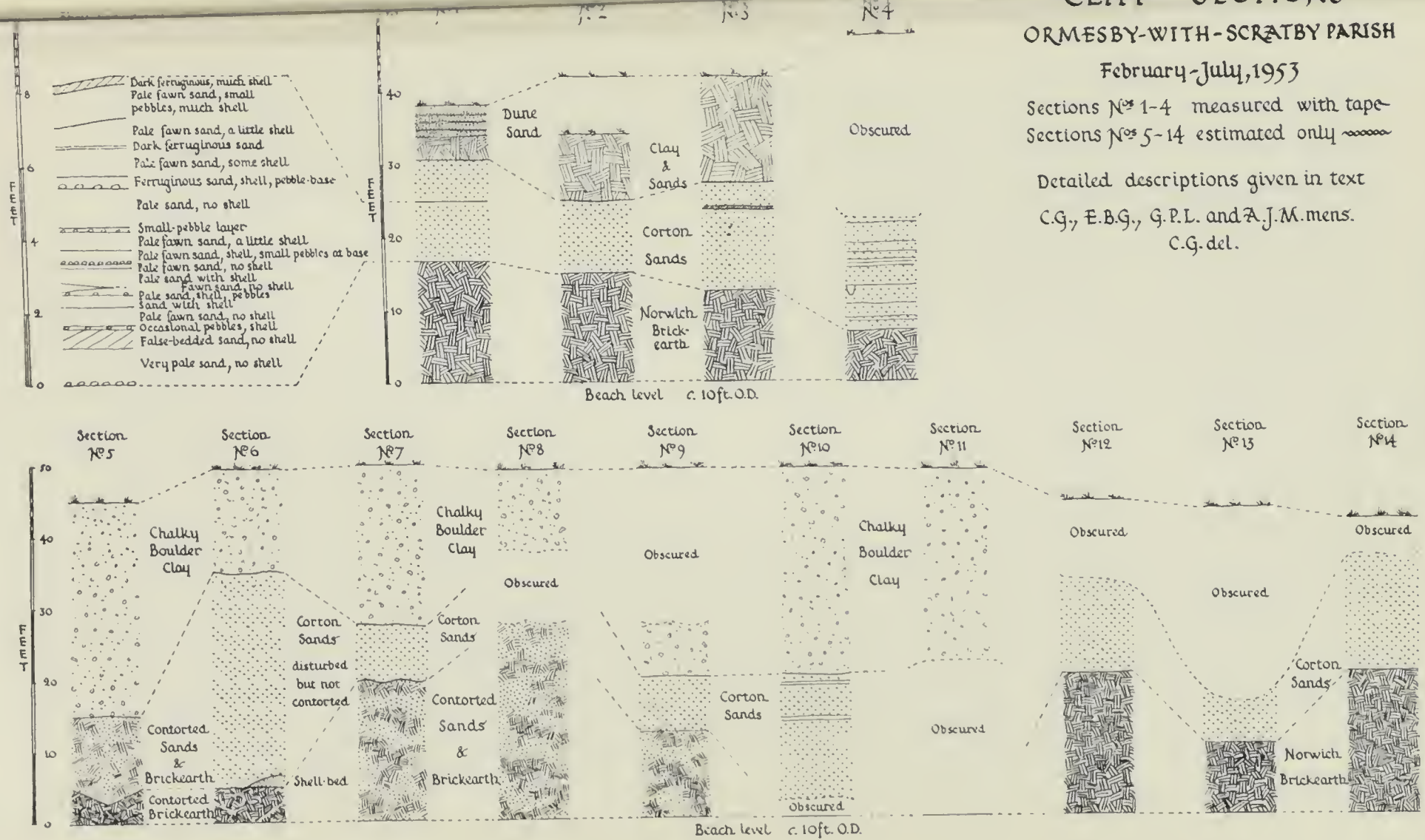
ORMESBY-WITH-SCRATBY PARISH

February-July, 1953

Sections Nos 1-4 measured with tape
Sections Nos 5-14 estimated only ~~~~

Detailed descriptions given in text

C.G., E.B.G., G.P.L. and A.J.M. mens.
C.G. del.



cliff, a mixed clay of varying pinkish and greyish colouring with a considerable mixed rock-debris content. A little beyond, the underlying Corton Sands and Brickearth began to show signs of disturbance until, at a point some 900 feet north of the Gap, the sands and clay-loam were caught up in violent whorls, whole masses of the Sands being enclosed in clay-loam envelopes (Plate II).

Contortions of this type were observed to a point some 1,600 feet north of California Gap, where the talus from the topmost clay-beds, by this time (April) accumulating in some quantity—and in places not entirely swept away by the surge—began to change colour. A bluish-white tinge slowly replaced—particularly in the more weathered material—the pinkish-grey of the upper clay to the south. This was apparently due to the occurrence of quantities of chalk debris. Hereabouts clearly lay the "line of contact of Great Eastern Chalky Boulder Clay with Great Eastern Jurassic Boulder Clay" already mentioned (Sainty 1951, following Baden-Powell 1948, with different nomenclature). The division marked in our map lies a little to the north of this colour-change. The precise method of its determination is described below (see p. 337).

From this point northward a number of sections were sketched. These show (Sections Nos. 5–14) the extent of the disturbance in the remaining part of the exposed cliff-face. The last clearly-exposed Brickearth lay some 60 feet north of Scratby "north beach staircase," though indications had been seen to a point a little further north, where the dune-belt sweeps inland (see map). By the time these sections were recorded, talus had again begun to cover the cliff-face and the points selected were those which gave the best results.

Section No. 5. At the base, contorted Brickearth without incorporated Corton Sands. Above are violently contorted mixed Sands and Brickearth. On these lies Chalky Boulder Clay, partly obscured, but appearing again at the cliff-top.

Section No. 6. At the base is contorted Brickearth without incorporated Corton Sands. Above lie Corton Sands, disturbed but not contorted. Resting on the Brickearth at the northern end is a thickened shell-bed with pebbles.

Section No. 7. At the base, contorted Brickearth with incorporated Corton Sands. Above lie even-bedded Sands without shell. Above again, to the cliff-top, is Chalky Boulder Clay.

Section No. 8. Below, a much thicker layer of contorted Brickearth with incorporated Sands, passing into an obscured area, at the top of which is Chalky Boulder Clay, visible to the cliff-top.

Section No. 9. At the base is contorted Brickearth with scattered shell-fragments, thoroughly mixed with fine light-brown shelly sands, and containing blocks of cemented sands marked by shelly ferruginous sandstones. On these contorted beds lie even-bedded light-buff Corton Sands without shell. Over these is the Chalky Boulder Clay, the top of which is obscured.

Section No. 10. A few feet of the base obscured. Above are Corton Sands, fine light yellow to brown sands without shell or pebbles. Near the top of these beds is an intermittent, somewhat clayey, band with large subangular flint nodules and chalk pebbles of wide range of size. No shell. Above again is another band of more clayey material with many chalk pebbles. Above this is bright yellow sand with very finely granulated chalk. Over this, to the cliff-top, lies Chalky Boulder Clay.

Section No. 11. The base of the cliff obscured. Boulder Clay lies above to the top of the cliff.

Section No. 12. At the base, rising towards the south, is greyish-brown clay-loam irregularly crossed by contraction-cracks with lighter ferruginous clay filling. The clay-loam is silty and not very tenacious, with a sparse scatter of shell fragments and occasional small flint pebbles. Resting on this Brickearth are even-bedded Corton Sands, their top being obscured.

Section No. 13. Similar to No. 12. The top of the Brickearth is lower.

Section No. 14. Similar to No. 12. The top of the Brickearth is higher than in No. 13.

The shell-beds which, for practical purposes disappeared north of California Gap, appeared again in this northernmost sector for, close to the Scratby Beach Road staircase—between Sections 4 and 5—a shell-bed, resting on a clayey band, was noted. In Section No. 5, the undisturbed Sands showed no shell-bed, but the sand-content of the underlying mixture was shelly. In Section No. 6, shell-debris was seen at the base of the Sands. North of this, the shell-beds were again absent.

Disturbance of the Corton Sands and Brickearth ceased a few feet south of Section No. 10. It is significant that the point where the Boulder Clay changes colour, a few feet south of where the division has been fixed, lies exactly midway between the ends of the exposed disturbance. It is noticeable also, that beyond the area of disturbance, the upper level of the Brick-earth is comparable with its level south of California Gap.

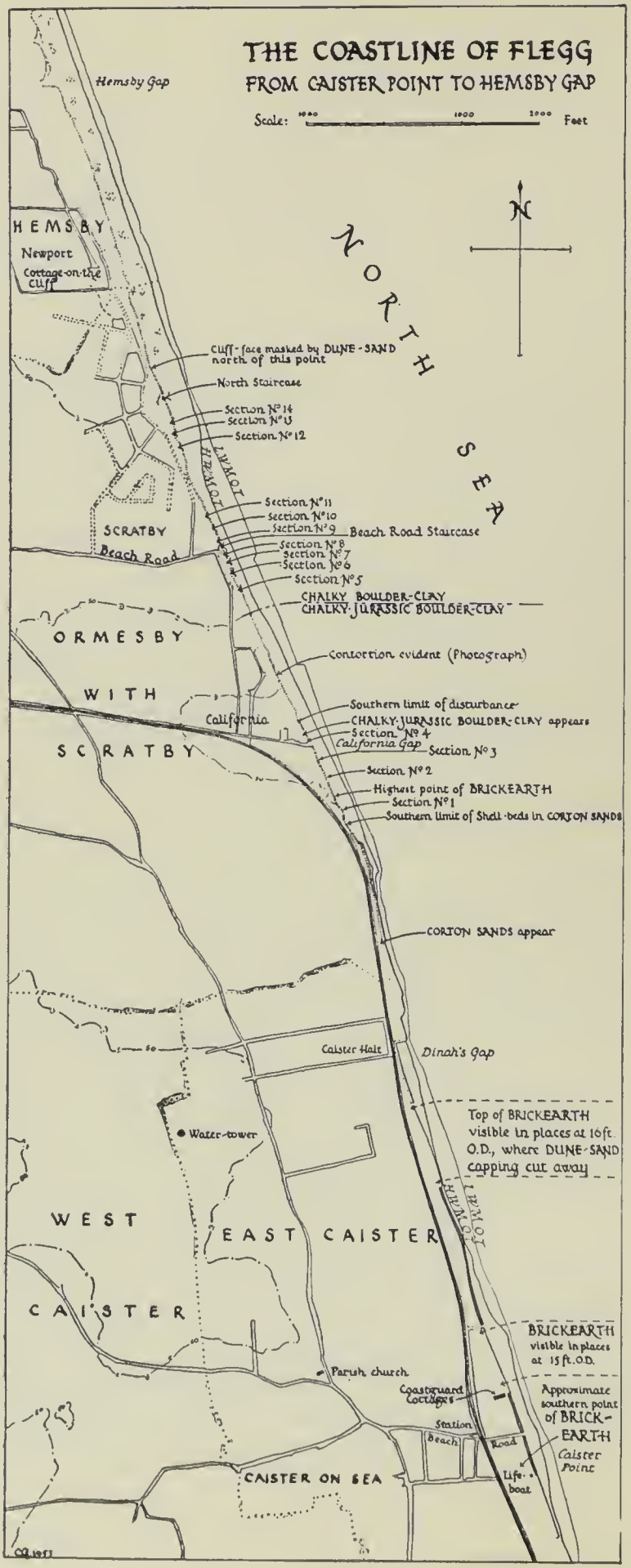

THE COASTLINE OF FLEGG
FROM CAISTER POINT TO HEMSBY GAP
Scale: 1000 0 1000 2000 Feet
Hemsby Gap
HEMSBY
Newport
Cottage on the Cliff
NORTH SEA
N
Cliff-face masked by DUNE-SAND north of this point
North Staircase
Section N°14
Section N°13
Section N°12
LAYHOT
Section N°11
Section N°10
Section N°9
Beach Road Staircase
Section N°8
Section N°7
Section N°6
Section N°5
SCRATBY
Beach Road
CHALKY BOULDER-CLAY
CHALKY-JURASSIC BOULDER-CLAY
ORMESBY
WITH
SCRATBY
Contortion evident (Photograph)
Southern limit of disturbance
CHALKY-JURASSIC BOULDER-CLAY appears
Section N° 4
California
California Gap
Section N° 3
Section N° 2
Highest point of BRICKEARTH
Section N°1
Southern limit of Shell-beds in CORTON SANDS
CORTON SANDS appear
Caister Halt
Dinah's Gap
Top of BRICKEARTH visible in places at 10 ft. O.D., where DUNE-SAND capping cut away
Water-tower
WEST
CAISTER
EAST CAISTER
LAYHOT
BRICKEARTH visible in places at 15 ft. O.D.
Parish church
Coastguard Cottages
Approximate southern point of BRICK-EARTH
Station
Beach
Road
Caister Point
CAISTER ON SEA
Life-boat

PHOTO. I. Manor House Hotel, Caister-on-Sea, April, 1935, showing Brickearth exposed in the cliff.

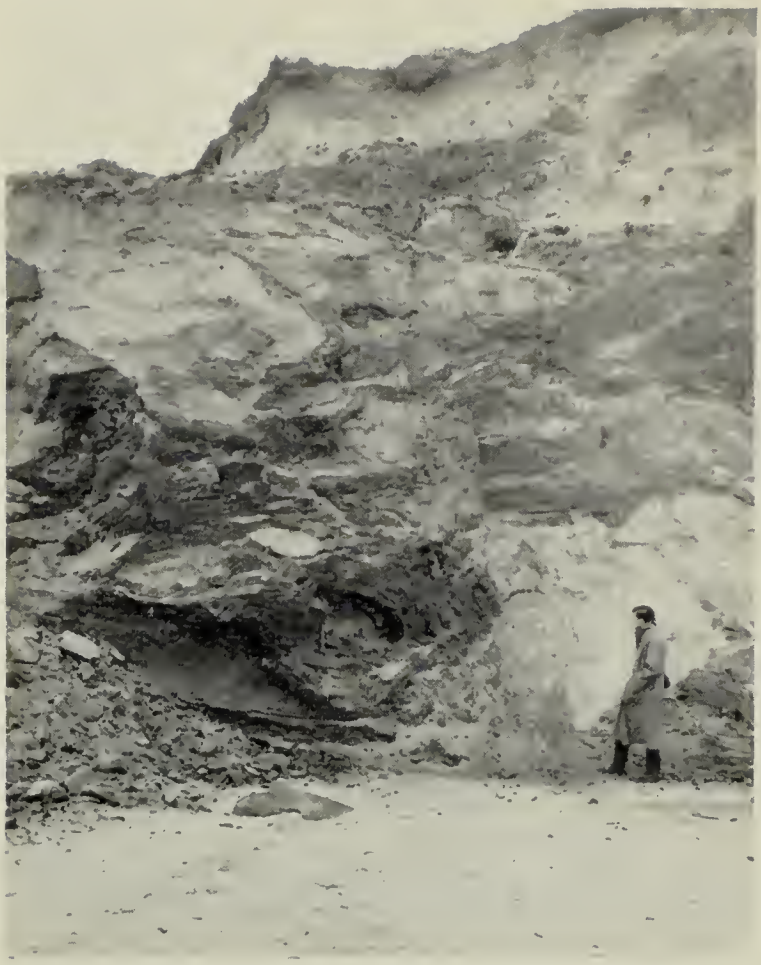


PHOTO. II. Cliff-face at South end of Contorted Sector, April 1, 1953. Intermingled Brickearth and Corton Sands, capped by 'Chalky-Jurassic' Boulder Clay.

Interpretation of the Cliff-Section

(G. P. Larwood and A. J. Martin)

In interpreting the Caister—Scratby cliff sections, the main points of interest are the lithology of the deposits present in the sections, problems of structure and evidence relating to the development of Flegg. The nomenclature is based on the analysis of Baden-Powell and Reid Moir (1942).

I. Brickearth

The basal unit throughout the cliff-section consisted of a development of the Norwich Brickearth (North Sea Drift), a fine-grained, stiff, sandy homogeneous waterlain deposit, which was dark-brown in colour. Within the deposit erratics were rare, but small rounded flint pebbles did occur frequently throughout, together with occasional quartz pebbles and rather larger rounded fragments of quartzitic rocks. Fragmentary shell-remains also were common and were well-worn and often highly polished on the surface. The following have been identified : *Macoma balthica*, *Cyprina islandica*, *Cardium edule*, *Tellina* spp., *Mya* sp., *Mactra* sp., and *Turritella* sp. Further characteristic features of the deposit were the development of many small contraction joints—the joint-planes being picked out by secondary iron-staining—and numerous small calcareous concretions incorporating occasional fragments of chalk and small flint pebbles.

The deposit resembles the Norwich Brickearth of the Norwich area (Woodward 1881) in general appearance, although there are a number of minor differences. While the Brickearth of the Norwich area contains numerous large erratics—mainly of igneous material—and is rather sandy with fewer small flint pebbles, the most important feature is one of similarity, in that there is thorough decalcification of the deposit throughout the whole cliff-section ; only one small chalk pebble was observed and this was heavily impregnated with a secondary iron-deposit. Small secondary calcareous concretions occur in the deposit at Caister. Comparison with the " standard " Till of the Cromer district shows few similarities. The finer, greyish and more tenacious Till, containing many foreign erratics, is in no way decalcified, there being many chalk blocks and fragments present.

II. Corton Sands

The Corton Sands showed well the features associated with conditions of shallow-water marine deposition, such as fine false-bedding, and repeatedly intercalated gravel-seams and coarse ill-graded sands (Wood 1872). Shell remains occurred locally, occupying small lenses and pockets within the deposit except that, immediately south of California Gap, they formed a continuous series extending laterally for some 500 feet and constituted a high proportion of the visible sands. The remains were fragmentary or comminuted and poorly preserved. Their mode of occurrence suggests accumulation in hollows or depressions in the sea-bed, as distinct from aggraded shell-banks such as are found in the Norwich Crag. Thus, while the fauna is considered as indigenous, it does not occur strictly *in situ*, and represents contemporaneous "derivation," probably over short distances. It should, however, be stated that one worn specimen of the distinctive columella of *Voluta lamberti* was found. This species is known to be locally abundant in the Red Crag, but has not been recorded from later deposits except as an obviously derived form. The specimen found would seem without doubt to be so derived.

Locally, some of the finer divisions within the deposit consisted of chalk "sands," the grain-size being usually larger than that of normal quartz sand-grains and very often developing into fine seams of pebble-grade. The constituent chalk pebbles of these coarser seams were very well rounded—often being almost spherical. The occurrence of such "sands" suggests that they were derived from only a short distance. They could possibly originate either from the erosion of a relatively large mass of chalk or from the disintegration of chalk contained in the underlying deposit.

At the top of the Corton Sands, a laminated clayey sequence is developed and this might indicate the final shallowing of the sea in which the Corton Sands were laid down. Where the beds have not been subsequently disturbed, the limits of the Sands, both above and below, are very well defined.

III. Lower Chalky Boulder Clays

Throughout the whole length of the section north of California Gap, the Corton Sands were directly overlain by boulder clay

of limited thickness. This boulder clay could be divided into two separate types—to the north the " Chalky " and to the south the " Chalky-Jurassic "—both being products of the Great Eastern or Lower Chalky glaciation (Baden-Powell 1948). The " Chalky " Boulder Clay was characterized by the presence of considerable quantities of chalk blocks and fragments incorporated in a tenacious bluish-grey clay matrix. In comparison, the " Chalky-Jurassic " Boulder Clay contained few erratics and little chalk, and had a more sandy matrix. In colour the latter was a light brown to buff deposit.

The nature of the matrix and the proportionately great increase of the erratic-chalk content within the clay were the criteria used to determine the position of the lateral junction between the two types, and this was placed some 900 feet south of Scratby (Beach Road) steps. The change in colour between the two boulder clays lay a little to the south. It is difficult, however, to define this junction closely, for a certain amount of mixing must have occurred in " Lower Chalky " times along the line where the separate tongues of the ice-sheet abutted. Furthermore, weathering and slipping on the face of the section tended to obscure the junction.

The terms " Chalky " and " Chalky-Jurassic " could be somewhat misleading as applied to the two component boulder clays exposed in these cliff-sections. For instance, in the " Chalky " boulder clay, a number of Jurassic erratics was present—as is often the case—consisting mainly of Kimmeridgian and Oxfordian types with other Mid-Jurassic and Liassic rocks. Fragments of Red Chalk, sandstones of Palaeozoic aspect and basic igneous rock-types also occurred very occasionally. Blocks and fragments of white chalk and nodular flint vastly outnumbered all other erratics. With regard to the southernmost boulder clay, the term " Chalky-Jurassic " seems to be even less appropriate. None of the erratics found could definitely be assigned to a Jurassic horizon and only occasionally were small chalk pebbles present. Flint, however, was more common. The other erratics which were found consisted almost exclusively of relatively small and quite well-rounded pebbles of quartz and well-compacted quartz sandstones with very occasional igneous and metamorphic fragments. The matrix resembled very closely that of the Brickearth at the base of the sections.

It is suggested that this boulder clay is at least partly decalcified. This process could account for the absence of chalk and, to a lesser extent, of Jurassic erratics, and for the apparent concentration of more resistant siliceous erratics of the types mentioned. Also the more open, sandy matrix of this southernmost boulder clay would possibly facilitate such a process of decalcification. However, considering the position of this boulder clay and its field-relationship to the " Chalky " boulder clay to the north, there is little doubt that it is an unusual local development of the " Chalky-Jurassic."

IV. Problems of Structure

Some 200 feet north of California Gap the cliff-section exposures show the Corton Sands and the underlying Brickearth to be disturbed, a disturbance which increases to the north and, at some 900 feet north of the Gap, becomes violent contortion (see Plate II). The latter is continued northward for some 1,600 feet, beyond which it lessens and the beds show varying disturbance with the contortion restricted to a thin basal zone, and finally disappears a further 500 feet to the north (see Section No. 10).

The distinction between " contortion " and " disturbance " is one of degree. " Contortion " involves the elongation, drawing and pinching-out of beds, together with the rolling and convolution of individual seams. The contortion involves not only considerable intermixing of beds within the Corton Sands themselves, but also between the latter unit and the underlying Brickearth. In the most intensely contorted section, tongues and masses of the Brickearth have been incorporated within the Corton Sands and vice-versa. Some of these contorted masses have been somewhat rounded by rolling and drawn out at either end of their long axes. The term " disturbance " is used to describe slightly warped and undulating beds. In that part of the cliff-section described as " disturbed," Corton Sands and the Brickearth are warped together but never mixed.

The contortions within the Corton Sands are less intense towards the top of the deposit, and the junction between the Sands and the Boulder Clay above is only slightly plucked and puckered. Throughout the section, the Boulder Clay, at the

most, was only slightly disturbed. It is significant that the contortions in the Sands and Brickearth are limited to a belt which coincides with the zone of junction between the " Chalky-Jurassic " and " Chalky " Boulder Clays. At this point, two separate tongues of the Lower Chalky ice-sheet merged (Baden-Powell 1948), and resulted ultimately in the two types of boulder clay being deposited in juxtaposition. It is thought that the merging of the two tongues of ice—possibly facilitated by side-slipping along the slopes of a wide east-west valley-feature—increased the compressional effects of the ice, and was directly responsible for producing the limited belt of violent contortions seen in the Corton Sands and the underlying Brickearth.

It is further suggested that, as the Sands and Brickearth—apart from this contorted belt—are only slightly disturbed, no great thickness of ice was developed in the area in Lower Chalky times. Only the less effective thinner fringe of the margin of the ice-sheet was present and the ice became effective as a mechanical force only where the two tongues were combined in the way suggested above. As previously mentioned, the more violent contortions tend to be limited vertically in the sections towards the base of the Corton Sands and at the top of the Brickearth. It is quite probable that, during the Lower Chalky glaciation, the Corton Sands and the Brickearth were frozen into more competent units. Apparently the Sands—in a frozen condition—moved with the ice to some extent and thus the main plane of movement was not between the Corton Sands and the ice-sheet, but at the base of the Sands and at their junction with the Brickearth. Such movement would involve only the restricted local dragging of the Corton Sands, and tended to limit the vertical extent of violent contortions to the level mentioned.

Flegg as an Individual Feature

(G. P. Larwood, A. J. Martin and Charles Green)

East Norfolk and North-east Suffolk are drained by the rivers Bure, Yare and Waveney and their tributaries. As they approach the sea, their valleys converge and widen out to form a wide plain of alluvium (drained marsh), through which

the rivers wind to join and enter the sea south of Great Yarmouth. It has long been accepted that this alluvial plain, which includes " The Broads," fills what was at one time a true estuary, in which stood various islands. In the northern part of this " great estuary," the two Hundreds of East and West Flegg together form the biggest of these islands.

Flegg island is bounded on the east by the North Sea, on the north by the " Hundred Stream " and the river Thurne, on the west by the Thurne and the Middle Bure, and on the south by the Lower Bure. This river, near the south-east point of the island, is deflected southwards by the northern part of the Yarmouth Spit which, as has already been shown, abuts on the island at Caister.

Lambert (1952) and Jennings (1952, 1953) conveniently bring together the results of their many years' work and show that two transgressions of the sea—one perhaps in Neolithic times (*cf.* Clark 1935) and a second, of greater extent, at the beginning of our era—are the proximate beginning of that " evolution " which has taken place in the valleys in historic times. This has been due to silting, to the growth of the Yarmouth Spit, which obstructed tidal scour, to the formation of peat-beds and to human activities directed to land reclamation.

But the basic structure of the estuary is far older than this. Harmer (1908) has shown that, in the valley of the Yare (Wensum) below Norwich, the Lower Chalky Boulder Clay ran down into the pre-existing valley, which was cut into the Norwich Brickearth and its overlying Sands. Similar observations have been made in the Bure valley (Chatwin 1948). On this firm foundation, a study of our sections, supplemented by those of Blake (1890), helps to give some idea of the development of Flegg as a topographical unit, and such a course of development is tentatively outlined.

The previous topography was apparently obliterated with the onset of the first major glaciation and the deposition of the Brickearth, which to-day is the basal deposit observed throughout Flegg above Ordnance Datum.

A rise in the sea-level resulted in the deposition of the marine Corton Sands over the whole area now occupied by Flegg and, as the sea sank once again, derived loamy clay was in places deposited to seal the top of the Sands.

Major valleys were now cut, producing a well-defined topography, leaving the Flegg area dissected from the " mainland " to north, west and south.

With the onset of the Lower Chalky glaciation and the resultant fall in sea-level, Flegg was a marked topographical feature. This feature, however, was not sufficiently pronounced to act as a barrier, even to the weaker margins of the ice, for a relatively thin cover of boulder clay was deposited over the area which, when later surface erosion took place, served to accentuate its prominence.

The rise in sea-level after the retreat of the Lower Chalky ice probably left the area picked out as an island. There is no recorded evidence of the occurrence of deposits of the Upper Chalky glaciation in this area, the distribution maps (Baden-Powell 1948) showing, indeed, that the nearest edges of the deposits lay far to the north, west and south.

It was, apparently, the tough, resistant base of Brickearth which met the waters of the two recent transgressions and so preserved the essential features of the island in prehistoric and early historic times. The surface exposures during this period,

(a) boulder clay on the higher inland slopes

(b) loamy sands in a surrounding belt, with

(c) a stiff brickearth periphery,

were doubtless significant in sustaining a tree-growth which discouraged early settlement before the establishment of a Roman settlement in the island (Green 1952).

[A report on the fauna of the shell-beds of the Corton Sands in the Caister-Scratby cliff-sections will be published later].

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LIST OF MEMBERS, 1952-53

Gen. = *General* | *P.* = *Plants* | *Geol.* = *Geology*
Birds | *F. W. Biol.* = *Fresh Water Biology* | *Mam.* = *Mammals*
Ins. = *Insects* | *Sp.* = *Spiders* | *M. Biol.* = *Marine Biology*
*Life Member | †Honorary Member | ‡Family Member

A

Elected.		
1952	Adcock J. A., 50, Sandy Lane, Norwich	*P.*
1939	Addison, Rev. W. R., V.C., Coltishall Rectory, Norwich	*Gen.*
1936	Ali Miss E. M. S., 60, Beaconsfield Road, Norwich	*Gen.*
1946	Allen Capt. G. S., East Hall Farm, Langham, Holt	*Birds*
1952	Amherst of Hackney, Lord, Foulden Hall, Thetford	*Gen.*
1925	Anderson Dr. T., 386a, Unthank Road, Norwich	*Geol.*
1947	Andrew E. S., 37, Springfield Rd., St. Leonards, Sussex	*Gen.*
1952	Armitage Miss G., Gordon Road, Melton Constable	*Gen.*

B

1919	†Back H. W., Hethersett Hall, Norwich	*Gen.*
1935	Back Mrs. H. W., Hethersett Hall, Norwich	*Gen.*
1945	Backhouse Rev. T. P., The Rectory, Caistor St. Edmunds	*Birds*
1933	Bacon Sir Edmund, BT., Raveningham Hall, Norfolk	*Birds*
1939	Bagnall-Oakeley R. P., Brinton Hall, Melton Constable	*Birds, Mam., P.*
1952	Bailey W. G., The Post Office, Litcham, King's Lynn	*Birds*
1945	Bainbridge P., Orchard Hill, Coltishall, Norwich	*Gen.*
1945	Bainbridge R. J., Apple Tree Farm, Gt. Plumstead	*Gen.*
1949	Baker T. H. M., Ollands, Little Baddow, Chelmsford, Essex	*Birds*
1939	*Barclay Brig. F. P., D.S.O., M.C., Cliff Lane Cottage, Cromer	*Birds*
1948	Barker Miss J., Shelfanger, Christchurch Road, Norwich	*Gen.*
1953	Barmby Miss S. M., 146, Woodcock Rd., St. Clement's Hill, Norwich	*P.*
1921	†Barnard Miss G. V., M.B.E., Longfields, Wymondham	*P.*
1948	*Barnes Miss R. M., 171, Angel Road, Norwich	*Gen.*
1953	‡Barnes R. F., 171, Angel Road, Norwich	*Gen.*
1937	Barrett J. H., Dale Fort Field Centre, Haverfordwest, Pembrokeshire	*Gen.*
1927	*Barrington F. J. F., 14a, Upper Wimpole Street, W.1.	*Gen.*
1952	Barry D. H., B.SC., Kumasi College of Technology, Private Bag, P.O. Kumasi, Gold Coast	*F. W. Biol.*
1953	Barton C., Shotesham Lodge, nr. Norwich	*Birds*
1953	Baxter N. J., Syderstone, King's Lynn	*P.*
1953	Beeson Miss G., 216, Unthank Road, Norwich	*Gen.*
1947	Benn Miss N., 49, Cromer Road, Norwich	*P.*
1952	Bennell Mrs. C. O., Quaker Farm, Haveringland, Norwich	*Gen.*
1934	*Bennett W. W., 58, Elm Tree Road, Lowestoft, Suffolk	*Gen.*
1921	*Berney F. L., R.A.O.U., c/o Archer Bros., Gracemere, Rockhampton, Queensland, Australia	*Birds*
1949	Bickmore Dr. M. H., Westfield, Lydney, Gloucestershire	*Gen.*
1953	Bidwell Miss M. A., St. Thomas's Vicarage, Earlham Road, Norwich	*Gen.*
1921	Bignold Sir Robert, 125, Newmarket Road, Norwich	*Gen.*
1947	Birkbeck H., Westacre Abbey, King's Lynn	*Gen.*
1901	Birkbeck Major H. A., Westacre High House, Castle Acre, King's Lynn	*Birds*
1946	Bitton E. Quinton, F.Z.S., Church Farm, Runhall, Norwich	*Birds, F. W. Biol., P.*
1933	Blackburne C. L., Weydown Hatch, Halsemere, Surrey	*Birds*
1930	Blake Mrs., The Red House, Bradeston, Brundall, Norwich	*Gen.*
1925	Blofeld T. R. C., Hoveton House, Wroxham, Norwich	*Gen.*

Elected		
1939	Boardman H. C., " Byways," Eaton Chase, Unthank Rd., Norwich	*Gen.*
1938	Boardman M. R., How Hill, Ludham, Gt. Yarmouth	*Gen.*
1936	Bolingbroke Miss C., Ferryside, Riverside Road, Norwich	*Birds*
1924	Boyd A. W., Frandley House, Northwich, Cheshire	*Birds, Ins.*
1915	Bradfer-Laurence H. L., F.S.A., Sharrow End, Ripon, Yorks.	*Gen.*
1947	Bradshaw A. D., 11, Ornan Road, London, N.W.3.	*Gen.*
1953	Braybrooks F. T., Penshaw, Surlingham, Norwich	*Gen.*
1944	‡Brereton J., Brampton Hall Farm, Norfolk	*Gen.*
1952	Brett I., Woodgate House, Aylsham, Norfolk	*P.*
1951	Briscoe Lt.-Col. F. E. D. Drake-, 86, Newmarket Rd., Nch.	*Mam.*
1946	Brooks A. B., Haynes Green, Layer Mainey, Essex	*Birds*
1952	Brooks Mrs. E. M., The Manor, Ludham, Norfolk	*Gen.*
1925	Brooks J. R., North Walsham Wood, Norfolk	*Birds*
1925	Brooks Mrs. J. R., North Walsham Wood, Norfolk	*Birds*
1941	Brown C. Clifton, Congham Lodge, Hillington, King's Lynn	*Gen.*
1949	Brown C. W., ' Jesmond Dene," Croxton Road, Thetford	*Birds*
1953	Brummage J. H., Heathwoods, Taverham, Norfolk	*Birds*
1953	Brunning Miss L. F., 38, Prickwillow Rd., Ely, Cambs.	*P.*
1921	Bruton M. S., Norfolk House, Aylsham, Norfolk	*Birds*
1925	Bryan H., Well Cottage, Wiveton, Holt	*Gen.*
1947	Bryan Mrs. H., Well Cottage, Wiveton, Holt	*Gen.*
1939	Buckingham Mrs. B., Aylsham, Norfolk	*Gen.*
1944	*‡Buckton Dr. P. R., Abbotsford, Vicar Street, Wymondham, Norfolk	*Gen.*
1948	Buddell Rev. J. L., Trevangon, The Rise, Sheringham	*Gen.*
1925	Bulwer Mrs., The Old Cottage, Heydon, Norwich	*Gen.*
1923	Burton A., Stenson, Cromer, Norfolk	*Gen.*
1923	Burton Mrs. A., Stenson, Cromer, Norfolk	*Gen.*
1936	Burton Miss F. W., 60, The Close, Norwich	*Gen.*
1952	Bush Miss J. M., 30, Grove Walk, Norwich	*P., Birds*
1928	Bushell M. D., Pink Cottage, Dunmow, Essex	*Gen.*
1928	Bushell Wickham Lodge, Wickham Bishops, Essex	
1949	Bussey B., The Laurels, Belaugh, Wroxham	*Ins.*
1947	Buttery Miss E. M., Norwich Training College, Keswick	*Gen.*
1921	*Buxton Major A., D.S.O., Horsey Hall, Gt. Yarmouth	*Birds, Mam.*
1923	Buxton Rev. A., Upton House, Cromer, Norfolk	*Gen.*
1923	*Buxton Major I., c/o Truman's Brewery, Brick Lane, Spitalfields, London, E.1.	*Gen.*
1946	Buxton J., Horsey Hall, Gt. Yarmouth	*Birds*
1906	Buxton Capt. R. G., Wiveton Hall, Holt, Norfolk	*Gen.*
1906	Buxton W. L., Bolwick Hall, Marsham, Norfolk	*Birds, P.*

C

1953	Cadbury C., Beaconwood, Rednal, Birmingham	*Birds*
1950	Caffyn Mrs. M. L., 3, Evesham Road, Reigate, Surrey	*Gen.*
1948	Cain J. Tyson, 8b, Christopher Close, Norwich	*Gen.*
1949	Campbell Dr. J., 272, Unthank Road, Norwich	*Gen.*
1948	Carlson Dr. K. J., 127, Aylsham Road, Norwich	*Birds*
1953	Carr J. U., Braunston House, Broomhill, Downham Mkt.	*Birds, Ins., Mam.*
1953	Carrick Miss A. M., Castle Farm, Swanton Morley, E. Dereham, Norfolk	*Birds*
1924	Carruthers D., Elders Farm, Grimston, King's Lynn	*Gen.*
1948	Cartmell Mrs. E. A., Belaugh, Wroxham, Norfolk	*Gen.*
1924	Cator Lt.-Col. H. J., Woodbastwick Hall, Norwich	*Birds*
1933	Cazenove Mrs., The Old Manor, Ham, Shepton Mallet, Som.	*Gen.*
1926	Chadwick Dr. M., 3, King Street, King's Lynn	*Gen.*
1941	*Chandler Dr. G. C. H., M.R.C.S., L.R.C.P., The Rectory House, Saxthorpe, Norwich	*Geol.*

Elected		
1945	Chenevix-Trench G. C., Rocklands, Weybourne, Holt	*Gen.*
1907	Christie J. A., Framingham Manor, Norwich	*Gen.*
1927	Clarke Miss L. R., 12, St. Phillip's Road, Norwich	*Gen.*
1952	‡Clarke R. Rainbird, Castle Museum, Norwich	*Geol.*
1948	Cock J. H., Abbey Farm, Guestwick, East Dereham	*Gen.*
1945	Coke Col. R. E., Oaklands, North Street, Sheringham	*Gen.*
1923	Cole Lowry A. C., Sprowston Lodge, Rackheath, Norwich	*Gen.*
1923	Cole Mrs. Lowry A. C., Sprowston Lodge, Rackheath, Nch.	*Gen.*
1944	Collins W. A. R., 14, St. James' Place, London, S.W.1.	*Gen.*
1945	Colman T., Framingham Chase, Norwich	*Birds*
1949	Cook A. L., 48, Telegraph Lane E., Thorpe Hamlet, Norwich	*Gen.*
1925	Copeman T. D., " The Pightle," 46, Common La., Sheringh'm	*Gen.*
1945	Corfe Miss I. W., " Brentwood," 106, Norwich Road, North Walsham, Norfolk	*Birds*
1953	Cotton K. E., M.I.MUN.E., The Vicarage, Surlingham, Nch.	*Gen.*
1921	Cozens-Hardy A., Oak Lodge, Sprowston, Norwich	*Gen.*
1935	Cozens-Hardy Miss, Oak Lodge, Sprowston, Norwich	*Gen.*
1945	Cozens-Hardy B., Glavenside, Letheringsett, Holt	*Birds*
1953	Cranbrook The Rt. Hon. The Earl of, Great Glemham House, Saxmundham, Suffolk	*Mam.*
1952	Cresswell Miss I. M. N., 20a, Christchurch Road, Norwich	*Gen.*
1951	Crickmore E., 204, Earlham Road, Norwich	*Gen.*
1953	Croghan P. C., 18, Hill House Road, Norwich	*F. W. Biol.*

D

1953	Dady A., 561, Earlham Road, Norwich	*Geol.*
1928	Daniels E. T., 352, Dereham Road, Norwich	*Ins., Birds*
1923	Daukes Major A. H., 50, Egerton Gardens, London, S.W.3.	*Gen.*
1952	Davies Miss A. M., 125, Holbein House, London, S.W.1.	*Gen.*
1914	Davies H. C., The Lodge, Old Lakenham, Norwich	*Gen.*
1948	Davis H. B., High Road, Drayton, Norwich	*P.*
1941	Davis H. H., Little Stoke, Patchway, Bristol	*Gen.*
1948	Dawson Miss E. P., School House, North Elmham, Norfolk	*Gen.*
1917	Deacon Dr. G. E., Brundall, Norwich	*Ins.*
1936	Dewhurst J. E., Riverside House, Reedham, Norfolk	*Gen.*
1941	Digby P. S. B., 12, Birch Tree Avenue, West Wickham, Kent	*Gen.*
1947	Duff Miss M. G., Norwich Training College, Keswick, Nch.	*Gen.*
1953	Duffey E. A. G., 400, Dereham Road, Norwich	*Ins., Sp.*
1952	Dunbar Miss M. S., Alderfen Cottage, Neatishead, Nch., Nfk.	*Gen.*
1948	Dunbar Capt. R. E. C., R.N., Alderfen Cottage, Neatishead, Norwich, Norfolk	*Gen.*
1949	Durrant K. C., 83, Sandy Lane, E. Dereham, Norfolk	*Ins.*

E

1950	Easter Miss D. M., 99, City Road, Norwich	*Gen.*
1953	Edmonds P. J. K., Grange Farm, Hindringham, Fakenham	*Birds*
1953	Edwards Miss W., The Villas, Redenhall, Harleston, Norfolk	*Gen.*
1939	Ellis A. E., Epsom College, Epsom, Surrey	*P.*
1929	‡Ellis E. A., F.L.S., Wheatfen, Surlingham, Norwich	*Gen.*
1938	Ellis Mrs. E. A., Wheatfen, Surlingham, Norwich	*P.*
1936	Ellis Dr. M. B., Commonwealth Mycological Inst., Kew, Surrey	*Ins., Birds*
1953	Ellison Miss P., 27, Queen's Drive, Barnsley, Yorks.	*Gen.*
1951	Emms H. C., Rose Cottage, Ketteringham Park, Norfolk	

Elected		
1946	Euren Miss H. M., 20, Recreation Road, Norwich	*Gen.*
1946	Euren Miss M. D., 20, Grange Road, Norwich	*Gen.*
1948	Evans-Lombe, Vice-Admiral E. M., 47, Hornton Court, Kensington, London, W.8.	*Birds*

F

1936	Farrell Miss E. M., 79, Christchurch Road, Norwich	*Gen.*
1927	Fawkes Dr. R. B., Rede's House, Cromer, Norfolk	*Gen.*
1950	Feetham Miss E. L., 186, College Road, Norwich	*Gen.*
1922	*Ferrier Miss J. M., F.Z.S., M.B.O.U., Blakeney Downs, Blakeney, Holt, Norfolk	*Birds*
1949	Fiddian W. E. H., 15, Russell Avenua, Sprowston, Norwich	*Birds*
1951	Fiddian Mrs. W. E. H., 15, Russell Avenue, Sprowston, Nch.	*Birds*
1936	Finch C. H., Costessey House, Norwich	*Gen.*
1946	Fisher J., M.A., F.L.S., F.Z.S., The Old Rectory, Ashton, Northampton	*Birds, Mam.*
1952	Fletcher Miss E. M. V., Woodlands, Thorpe, Norwich	*Birds*
1946	Fletcher H. N., Bracon Lodge, Braconash, Norwich	*Gen.*
1949	Fletcher Miss N. K., Hollyhocks, Kirby Cane, Bungay	*Gen.*
1949	Flowerdew R. E., Holly Cottage, Repps, Gt. Yarmouth	*Birds*
1952	Forsythe Miss E., Toeston East Farm, North Broomhill, Morpeth, Northumberland	*Birds*
1945	Forsythe J. A., Heathfield House, Brundall, Norwich	*Birds*
1952	Frost L. C., West Green, Poringland, Norwich	*P.*

G

1952	Gardner R. H., " Hollies," London Road, Harleston	*Gen.*
1953	Garlick Miss C. M., Goose Lane, Alby, Aldborough, Norwich	*P., Birds*
1953	Garrard Miss M., Westbourne House, Coltishall, Norwich	*P.*
1927	Gay Miss C. E., Little Toft, Stoke Holy Cross, Norwich	*Birds*
1953	Gayford Miss E., 39a, Thorpe Road, Norwich	*Gen.*
1952	George Miss A. E., 33, St. William's Way, Thorpe	*Gen.*
1928	George S. S., White House, Saham Toney, Thetford	*Gen.*
1951	Gibbons Miss G. O., Mercam, Cantley Lane, Cringleford, Nch.	*Geol.*
1933	Gibson Mrs. C. M., 63, Newmarket Road, Norwich	*Gen.*
1947	Gilbert Miss B. F., Deva House, Olney Road, E. Dereham	*Gen.*
1951	Giles W. W. E., M.A., F.R.G.S., Ketteringham Hall, Norfolk	*Gen.*
1950	Glendenning Lt.-Col. S. E., 84, Rosary Road, Thorpe Hamlet, Norwich	*Gen.*
1950	Goff Miss I., Fenn Farm, Barnham Broom, Norwich	*Gen.*
1944	Goff M. G. T., 293, Aylsham Road, Norwich	*Gen.*
1952	Goldsmith E. T., 58, Fair Close, Beccles, Suffolk	*Ins.*
1947	Goom Miss E. M., 78, Elmfield Ave., Teddington, Middlesex	*Birds*
1953	Gordon W. A., 70, Springfield Road, Gorleston	*Geol.*
1952	Gosling C., Seamere, Hingham, Norwich	*Birds*
1952	Gosling Mrs. A., Seamere, Hingham, Norwich	*Birds*
1949	Gosnell V., Friday's Bungalow, Salthouse, Norfolk	*Gen.*
1945	Gould D. A. Pearce, 8, Upper King Street, Norwich	*Gen.*
1939	Gould R. Pearce, Lime Tree House, Lime Tree Rd., Norwich	*Gen.*
1946	Gowing C., Rackheath, Norwich	*Gen.*
1952	Grain G. A., 33, Manor Park Road, Nuneaton, Warwicks.	*Birds*
1953	Gray R. D., Lime Tree Farm, Silfield, Wymondham, Norfolk	*Birds*
1919	Greatorex H. A., Witton, Norwich	*Gen.*
1953	Green C., 105, Beach Road, Caister-on-Sea	*Birds*
1953	Green Roland, Hickling Broad, Norfolk	*Birds*

Elected		
1952	Greenshields Mrs. A. G. D., Holly Grove, Neatishead, Nch.	*Gen.*
1945	Griffiths T., 15, Essex Street, Norwich	*Gen.*
1933	Gurney Miss C., Turleigh Mill, Bradford-on-Avon, Wilts.	*P.*
1929	Gurney J., Walsingham Abbey, Norfolk	*P.*
1952	Gurney Mrs. J. E., Longmoor Point, Catfield, Gt. Yarmouth	*Gen.*
1901	Gurney Q. E., Bawdeswell Hall, Norfolk	*Gen.*

H

1892	*Haigh C. H. Caton, Grainsby Hall, Grimsby, Lincs.	*Gen.*
1947	de Hamell Major E. A., White House, Trimingham, Norfolk	*Birds*
1947	de Hamell Mrs. E. A., White House, Trimingham, Norfolk	*Birds*
1926	Hammond C. R. A., Sprowston Grange, Rackheath, Norwich	*Gen.*
1949	Hammond E. R., Low Common, South Lopham, Diss	*Gen.*
1929	Hamond Com. C. E., R.N., Myrtle Cottage, Porchester, Hants.	*Gen.*
1949	Hamond R., Morston, Holt, Norfolk	*M. Biol.*
1946	Hare Mrs. R., The Paddock, Meadow Lane, Thorpe-next-Norwich	*Birds*
1945	Harmer R., Jesmond, Brundall, Norwich	*Gen.*
1946	Harrison G. C., 68, Earlham Green Lane, Norwich	*Gen.*
1947	Harrison J. C., Grove Cottage, Haynford, Norwich	*Gen.*
1954	Harrison R. E., Billet 8, New Site, R.A.F., Horsham St. Faith, Norwich	*Birds*
1952	Hayes Miss E., Greenacres, Little Melton, Norwich	*Birds*
1952	Hayes Mrs. R. B., Greenacres, Little Melton, Norwich	*P.*
1953	Heawood A. G., Hethersett Rectory, Norwich	*Birds*
1948	Hilbert Miss G. B., West Norfolk and King's Lynn High School, King's Lynn	*Gen.*
1952	Hill C. N. A., 428, Unthank Road, Norwich	*Birds*
1953	Hill Miss J. A., Arch Farm, Westwick, Norwich	*P.*
1920	Hinde Dr. E. B., 4, Branksome Road, Norwich	*P.*
1923	Hines E. S., Eastwood Lodge, Old Costessey, Norwich	*Gen.*
1939	Hoare Miss I. M., Little Crabbetts, Hoveton St. John, Wroxham, Norfolk	*Gen.*
1951	Hodges A. G., 37, Thunder Lane, Norwich	*Birds*
1952	Hook R. I., 1, Francis Court, Earlham Road, Norwich	*Birds*
1919	†Howard H. J., F.L.S., 6, College Road, Norwich	*P.*
1926	Howlett Dr. J. K., Links Tor, Hunstanton, Norfolk	*Gen.*
1931	Hulse Mrs. M. W., Barnham, Meadway, Berkhamsted	*Gen.*
1953	Hurley Miss B. N. E., 40, Charles Avenue, Thorpe, Norwich	*Birds*
1946	Hutchings G. E., Juniper Hall, nr. Dorking, Surrey	*Geol.*

I

1952	Ireland Miss N. E., J.P., Close Lodge, 12, Ipswich Rd., Nch.	*P.*
1951	Irvine T. W., Chedworth Roman Villa, Yanworth, near Cheltenham, Glos.	*Gen.*
1946	Ives R., Erpingham House, Norfolk	*Gen.*

J

1941	Jackson J. K., c/o Research Division, Ministry of Agriculture, Wad Medani, Sudan	*P.*
1937	Jarrold H. J., 415, Unthank Road, Norwich	*Gen.*
1953	Jeeves R. A., 106, George Borrow Road, Norwich	*Birds*
1949	Jermy A. C., Tandem, East Avenue, Brundall, Norwich	*P.*

Elected		
1946	Jessup G., *23*, Dereham Road, Watton, Norfolk	*Birds*
1946	Johnson A. E., 88, Middleton's Lane, Hellesdon, Norwich	*Birds*
1935	Johnson Miss C. M., The Training College, Keswick, Norwich	*Gen.*
1954	Johnson L. C., 36, Le Strange Close, Norwich	*F. W. Biol.*
1931	Johnston Mrs. F., Langley, Berkhamsted, Herts.	*Gen.*
1952	Johnston Dr. J. C., The Grange, Thornage, Holt, Norfolk	*Birds*
1952	Johnston Mrs. J. C., The Grange, Thornage, Holt, Norfolk	*Birds*
1885	Jones Sir Lawrence, BT., 39, Harrington Gardens, S.W.7.	*Gen.*
1946	Jones R., B.SC., 402, Unthank Road, Norwich	*Birds*
1939	Joy Mrs., Crabbetts, Hoveton St. John, Norwich	*Gen.*

K

1926	Keith E. C., Swanton Morley House, East Dereham	*Gen.*
1931	Ketton-Cremer R. W., Felbrigg Hall, Norfolk	*Gen.*
1953	Kirby P., "Midway," Woodland Drive, Thorpe End, Nch.	*Birds*
1949	Kyle Miss R. H., School House, Thurton, Norwich	*Gen.*

L

1952	*Lake Miss J., 17, Constitution Hill, Norwich	*Birds*
1943	Lambert Dr. J. M., West End Avenue, Brundall, Norwich	*P.*
1930	Lance Major H. W., Burnham Norton Lodge, King's Lynn	*Gen.*
1936	Larking R. C., 5, Mile End Road, Norwich	*Gen.*
1953	Lawrence K., 6, Tanner Street, Thetford	*Birds*
1953	Lawrence R. V., 77, Norwich Road, Thetford	*Birds*
1947	Layton D. A., Tudor House, Poplar Ave., Eaton, Norwich	*Birds*
1939	Leake Miss D. A., Plaxtole, Goodwin's Road, King's Lynn	*Gen.*
1953	Levell A. B., New Road, Shipdham, Thetford	*Gen.*
1953	Lewin Miss C. E., The Old Hall, Hethersett, Norwich	*P.*
1944	Libbey R. P., 143, Gaywood Road, King's Lynn	*P.*
1947	Lindqvist K., Drayton, Norwich	*Gen.*
1942	Lisney A. A., M.A., M.D., F.R.E.S., Dune Gate, Clarence Road, Dorchester, Dorset	*Ins.*
1946	Lloyd Major J. D., Warren Cottage, Euston, Thetford	*Gen.*
1922	Lloyd Major L. W., Taverham Mill, Norwich	*Birds*
1948	Lloyd Mrs. L. W., Taverham Mill, Norwich	*Birds*
1945	Lockett Colonel V., Framingham Pigot, Norwich	*Gen.*
1923	Long G. S. B., 18, The Crescent, Chapel Field Rd., Norwich	*Gen.*
1923	Long Mrs. G. V., The Spa Hotel, Woodhall Spa, Lincs.	*Gen.*
1946	Lyon K., C.B., C.B.E., The Old Barn, West Runton, Norfolk	*P.*

M

1924	Mackenzie Miss G., Hill House, Great Horkesley, Colchester, Essex	*Birds*
1931	Maidment Dr. F. N. H., Meadows, Harleston, Norfolk	*Birds*
1937	Maingay Mrs., The Mount, Aylsham, Norfolk	*Birds, P.*
1919	Mann Mrs. E. M., The Vicarage, Alford, Lincs.	*Gen.*
1931	Marshall E. H., Fiddler's Croft, Little Hadham, Much Hadham, Herts.	*Gen.*
1931	Marshall Capt. W. K., The Silver Hill, Radburne, Kirk Langley, Derbyshire	*Gen.*
1938	Marsham Rev. A. F., Hevingham Rectory, Norwich	*Gen.*
1946	Marsham Mrs., Stratton Strawless Rectory, Norwich	*Gen.*
1953	Marston Miss M. E., Wilcot, Stoke Holy Cross, Norwich	*Mam.*

Elected		
1912	Mason A., Guild House, Thorpe St. Andrew, Norwich	*Birds*
1952	Mason Mrs. G., Guild House, Thorpe St. Andrew, Norwich	*P.*
1893	†Mayfield A., F.L.S., Mendlesham, Stowmarket, Suffolk	*P.*
1945	*Mayhew Lady, Felthorpe Hall, Norwich	*Gen.*
1949	McClelland G. A. H., Appletree Cottage, Calbourne, Newport, Isle of Wight	*Ins.*
1948	McCulley Dr. W. J., St. Andrew's Hospital, Thorpe, Norwich	*Gen.*
1953	McDougall H., Cawston Manor, Norfolk	*Birds*
1950	McEwen L. M., 8, Stanmore Road, Thorpe, Norwich	*Gen.*
1933	McHardy Maj.-Gen. A. A., C.B., C.M.G., D.S.O., M.B.E., The Thatched Cottage, Hickling, Norwich	*Birds*
1945	McLean A. S., R.N., Humbletoft, East Dereham, Norfolk	*Birds*
1933	McLean C., Humbletoft, East Dereham, Norfolk	*Birds*
1945	McLean D. C. H., Humbletoft, East Dereham, Norfolk	*Birds*
1926	Meade Miss P., 4, Tenison Avenue, Cambridge	*Birds*
1926	Meiklejohn Mrs. R. F., Arcady, Cley, Holt, Norfolk	*Birds*
1945	Middleton W. H. H., Riverside, Costessey, Norwich	*Gen.*
1946	Mills J. W., 129, George Borrow Road, Norwich	*Gen.*
1923	Minns Mrs. H. C., Wings Place, Ditchling, Sussex	*Gen.*
1951	Moore C. E. J., 21, Camberley Road, Norwich	*Gen.*
1948	Moore R. A., 127, Cecil Road, Norwich	*Gen.*
1923	Moppes L. E. van, Tyle Mill, Sulhamstead, Berks.	*Gen.*
1946	*Morgan Dr. G. W., The Hall, Swindon Village nr. Cheltenham	*Gen.*
1949	Morton Dr. H. J. S., White Hart Cottage, Brinkley, nr. Newmarket, Cambs.	*Birds*
1946	Mosby Dr. J. F., Wymondham Training College, Norfolk	*Geol.*
1946	Moss Miss B., M.SC., Potter Heigham, Gt. Yarmouth	*Gen.*
1922	Mountfield Miss M., Horsford, Norwich	*Gen.*
1953	Mumford E. B., The White House, Keswick Road, Cringleford, Norwich	*Birds*
1921	*Murton Mrs. A. H., M.B.E., Cranbrook Lodge, Cranbrook, Kent	*Birds*
1950	Muskett F. E., 31, Rosary Road, Norwich	*Gen.*

N

1951	Nash Miss M. C., 8, Josephine Close, Norwich	*P.*
1953	Newnes M., Hill House, Tuesday Market Place, King's Lynn	*Birds*
1953	‡Nicholls G. W., 16, Portersfield Road, Norwich	*Birds*
1953	Nichols Miss M. E., 245, College Road, Norwich	*Birds*
1915	Nightingale S. R., The Grey House, Ormesby, Norfolk	*Gen.*
1939	Noble Miss E. R., White House, Saham Toney, Thetford	*P.*
1953	Notley A. T., Fishley Place, Acle, Norfolk	*P.*

O

1949	*Oldfield G., 8, Albermarle Road, Norwich	*Gen.*
1952	Orgill Mrs. E., Grey Gables, Cawston, Norfolk	*Birds*
1950	Osborne Miss K. E., 4, Gould Road, Norwich	*Gen.*

P

1949	Page F. J. Taylor, B.SC., 77, Surrey Street, Norwich	*Mam., F. W. Biol., Birds*
1952	*Page P. R., Mill Farm, Felthorpe, Norwich	*P., Geol.*
1949	Palmer A. R. M., The Manor House, Newton St. Faiths, Norwich	*Birds, Ins.*
1948	Palmer B. L., Weybourne, Holt, Norfolk	*Gen.*
1946	Palmer Miss D. G., 20, Grange Road, Norwich	*P.*

Elected		
1919	*Palmer Mrs. P. Hurry, 25, North Drive, Great Yarmouth	*Birds*
1950	Palmer P., 40, Furze Road, Thorpe, Norwich	*Gen.*
1953	Palmer Dr. S., Beechurst, East Dereham	*Gen.*
1952	‡Pankhurst J. S. R., Roxana, Toftwood, East Dereham	*P.*
1932	Patteson Miss C. E., Gt. Hautbois House, Coltishall, Norfolk	*Gen.*
1945	Paulson C. W. G., Wyresdale How, Pendleton Road, Redhill, Surrey	*Gen.*
1911	*Payler D., 29, Anderton Park Rd , Moseley, Birmingh'm 13	*Gen.*
1952	Payne J. P. H., Breynton House, Bawdeswell, E. Dereham	*Birds, P.*
1952	Payne T. P. H., Breynton House, Bawdeswell, E. Dereham	*Gen.*
1950	Peake J. F., 17, Tillett Road, Norwich	*Birds*
1953	Pennington Miss J. B., 22, Mill Hill Road, Norwich	*P.*
1953	Pennington Miss M., Glaven Cot., Wiveton, Holt, Norfolk	*P.*
1926	Percy Lord William, C.B.E., D.S.O., Horstead Hall, Norfolk	*Birds*
1946	*Pfob Mrs. A. Martin, Hill House, Little Melton, Norwich	*Gen.*
1926	Phillippo G., Church House, Sibsey, Boston, Lincs.	*Birds*
1949	Phillips H. A. P., Ivy Dene, Beeston Common, Sheringham	*Gen.*
1930	Podmore R. E., " Maynards," Matfield, Kent	*Birds*
1939	Poortvliet Mrs. J. van, The Beeches, Stratton Strawless, Norwich	*P.*
1944	Porter W. A., 14, Stokes Avenue, Brandon Road, Watton	*Gen.*
1949	Potts T. A., La Chaumiere, West Runton, Norfolk	*Gen.*
1953	Powell Mrs. V., Harbour Cottage, Brancaster Staithe, Nfk.	*P., Birds*
1953	Prescott Rev. A., The Rectory, Claxton, Norwich	*Ins.*
1952	Preston Mrs. Currie, 73, Mill Hill Road, Norwich	*Birds, M. Biol.*
1949	Prosser R. J., c/o 44 Aerodrome Crescent, Thorpe-next-Nch.	*P.*
1948	Prosser S. T., 44, Aerodrome Crescent, Thorpe-next-Nch.	*Gen.*
1950	Punter D., " Woodlands," Holt, Norfolk	*Birds, M. Biol.*
1913	Purdy T. W., Woodgate, Aylsham, Norfolk	*P.*

R

1953	Rae R. J., 67, St. Leonard's Road, Norwich	*Birds*
1929	Rait-Kerr Mrs. R. S., Paddocks, Copperkins Lane, Amersham, Bucks.	*Gen.*
1929	Ramage H. P., Thatched House, Holt, Norfolk	*Gen.*
1928	Raywood W., Honingham Thorpe, Norwich	*Gen.*
1953	Read Miss G. E., Lime Kiln Farm, Newton Flotman, Norwich	*Ins.*
1949	Read T. E., Whyte Gates, Deopham, Norwich	*Birds, Mam.*
1945	Renshaw Sir Stephen, Great Fransham, East Dereham	*Gen.*
1946	*Ribbons B. W., B.SC., A.L.S., 28, Boundary Road, Norwich	*P.*
1945	Richardson R. A., c/o Mrs. Davison, Hill Top, Cley, Norfolk	*Birds*
1950	‡Riley H., Great Moulton, Norwich	*P., Ins.*
1924	Ripplingall N. F., Langham, Holt, Norfolk	*Gen.*
1945	Rix A., 4, Intwood Road, Cringleford, Norwich	*Gen.*
1941	Roberts Sir S., Cockley Cley Hall, Swaffham, Norfolk	*Gen.*
1953	Robson P. M., 43, Pettus Road, Norwich	*P.*
1946	Rounce J. N., The Croft, Great Walsingham, Norfolk	*Gen.*
1953	Rowland Miss H. M., 19, Alder Road, Folkestone, Kent	*Birds*
1902	Ruggles-Brise Mrs. C. j., M.B.E., Tilbury Hall, Great Yeldham, Essex	*Gen.*
1906	Rumbelow P. E., 27, Rodney Road, Gt. Yarmouth	*P., F. W. Biol.*
1953	Ruthven D. J., 149, North Walsham Road, Sprowston, Nch.	*Ins.*

S

1948	Sainty J. E., The Hedges, Cromer Rd., West Runton, Nfk.	*Geol.*
1931	*Salisbury Sir Edward, F.L.S., F.R.S., Director, Royal Botanic Gardens, Kew, Surrey	*P.*

Elected		
1952	Sandall M. A., 226, Jex Road, Norwich	*Ins.*
1936	Sargent C. G., Morningthorpe Manor, Long Stratton, Norfolk	*Gen.*
1945	Savory A., Riverdale, Brundall, Norwich	*Mam., Birds*
1937	Sawbridge Admiral, Thrigby Hall, Great Yarmouth	*Gen.*
1951	Scoones Miss C. E., Bank House, Jetty Street, Cromer	*M. Biol.*
1937	Scott Mrs. H. M., 54, The Close, Norwich	*Birds*
1954	Scott R., Field House Farm, Binham, Fakenham, Norfolk	*Gen.*
1953	‡Scott R. R., Rickinghall, nr. Diss, Norfolk	*Birds, P., Ins., Mam.*
1943	Seago M. J., 33, Acacia Road, Thorpe, Norwich	*Birds*
1953	Seaman Miss M. E., 71, Ketts Hill, Norwich	*Birds*
1950	Segger Miss K. E., West View, St. Leonard's Rd., Norwich	*Gen.*
1949	Self K. W., 53, Brian Avenue, Norwich	*Birds*
1951	Sewell R. H., 1, Brickyard, Surlingham, Norfolk	*Gen.*
1922	Shepheard Dr. S., Abbott's Hall, Aylsham, Norfolk	*Mam.*
1946	Silverwood J. H., Garfield, Great Plumstead, Norfolk	*Gen.*
1948	Simon P. H., Benvane, High Kelling, Holt, Norfolk	*P.*
1947	Sistern R. D., Flat 2, 107, Newmarket Road, Norwich	*Birds*
1953	Skinner Miss U., Hazeldene, 4, Christchurch Road, Norwich	*Birds, P.*
1950	Smith C., Attlebridge, Norwich	*Gen.*
1915	Smith Mrs. C., Ellingham Hall, Bungay, Suffolk	*Gen.*
1953	Smith Miss D. E., 377a, Unthank Road, Norwich	*Birds, Mam.*
1953	Smith E. J., Prospect Farm, via Earsham, Bungay, Suffolk	*Gen.*
1950	Smith M. E., Attlebridge, Norwich	*Gen.*
1953	‡Somerville S. E., 69, Charles Ave., Thunder Lane, Norwich	*Birds*
1953	Spinks Miss W., 38, Newtown, Thetford	*Ins., Birds, Mam.*
1923	Spurrell Miss M., The Bath House, Ditchingham, Norfolk	*Birds*
1923	Spurrell Miss P., The Manor House, Newton St. Faiths, Nch.	*Gen.*
1935	Squirrell Monsignor Canon H. S., The Lodge, Poringland, Norwich	*Gen.*
1943	Steele H. C., " Everglade," Strumpshaw, Norfolk	*Gen.*
1925	Steers Prof. J. A., M.A., Department of Geography, Downing Place, Cambridge	*Geol.*
1947	Steward D., The Grange, New Buckenham, Norfolk	*Gen.*
1921	Stimpson E., Sall Moor Hall, Reepham, Norfolk	*Gen.*
1946	Stuart A., The Red House, Stoke Holy Cross, Norwich	*Gen.*
1896	Sutton W. Lincoln, Framingham Pigot, Norwich	*Gen.*
1938	Swann E. L., 282, Wootton Road, King's Lynn	*P.*

T

1953	Taylor Mrs. A. W., 1, Trinity Street, Norwich	*Gen.*
1935	Taylor G. B., 7, Candover Close, Harmondsworth, West Drayton, Middlesex	*Ins.*
1938	Taylor R. Sunderland, Culpho End, nr. Ipswich	*Gen.*
1938	Taylor Mrs. R. Sunderland, Culpho End, nr. Ipswich	*Gen.*
1945	Templewood The Rt. Hon. The Viscount, Templewood House, Cromer	*Birds*
935	Thomas J. M. Ridley, 3, Christchurch Road, Norwich	*Gen.*
954	Thorn Miss A. J., 63, Greenway, Fakenham, Norfolk	*P.*
953	Thurrell R. G., The Firs, Hempnall, Norfolk	*Geol.*
951	Ticehurst Dr. R. G., " Pevensey," The Buttlands, Wells, Nfk.	*Birds*
954	Timbers J. E., 56, Sherbourne Place, King Street, Norwich	*Gen.*
933	Tindall Miss E., Woodlands, Thorpe, Norwich	*Gen.*
946	Todd R. G., Wells, Norfolk	*Gen.*
953	Tracey Miss J., 50, Cotman Road, Norwich	*P.*
954	Trafford Mrs. S. W., Wroxham Hall, Norwich	*Gen.*
948	Trichett J. S., 7, Bluebell Road, Eaton, Norwich	*Gen.*
942	*Turner A. H., F.R.E.S., F.R.MET. SOC., Forest Drove, Bickenhall, Hatch Beauchamp, Taunton, Somerset	*Ins.*

Elected		
1950	Turner R. W., 13, Church Street, Barford, Norfolk	*Gen.*
1947	Tusting Miss J. M., Home Close, Cringleford, Norwich	*Gen.*
1946	Tydeman Miss M., Dial Farm, Coddenham, Ipswich, Suffolk	*Gen.*

U

1951	Unthank Miss M. B., Mill House, Mundham, Loddon, Nch.	*Birds, P.*
1921	Upcher Sir Henry, Sheringham Hall, Norfolk	*Gen.*
1945	Uridge H., "Carlekempe," East Parade, Bexhill-on-Sea, Sussex	*Birds*
1945	Uridge Mrs. H., "Carlekempe," East Parade, Bexhill-on-Sea, Sussex	*Birds*

V

1949	Vaughan J., Woodlands, Holt, Norfolk	*Gen.*

W

1936	Wade Miss O. M., Maid's Head, Yoxford, Saxmundham, Suffolk	*P.*
1923	Walter Mrs. O. T., Tacolneston Hall, Norfolk	*Birds, P., Ins., Mam.*
1949	Wanstall Mrs. P. J., Dytchleys, Coxtie Green, Brentwood, Essex	*Ins.*
1947	Warburg J. W., The Old Rectory, Edingthorpe, N. Walsham	
1954	Ward C. W., 3, Buxton Villas, North Walsham, Norfolk	*P.*
1948	Ward Miss F. O., 13, Ipswich Road, Norwich	*Ins., Birds*
1946	Warren A. J., 175, Colman Road, Norwich	*Ins.*
1923	Waterfield Mrs. W., Snape, Saxmundham, Suffolk	*Ins., P.*
1953	Watling D., 270, Bluebell Road, Norwich	*P.*
1947	Watson C. H., Quartley House, Holt, Norfolk	*Gen.*
1947	Watt K., Burnley Hall, Somerton, Great Yarmouth	*Gen.*
1947	Watt Mrs. K., Burnley Hall, Somerton, Great Yarmouth	*Gen.*
1932	Watt Mrs. N. M., The Gables, South Wootton, King's Lynn	*P., Birds*
1932	Wayne Mrs. E., Colkirk House, Fakenham, Norfolk	*Birds*
1953	Webb Miss M., 2, Josephine Close, Norwich	*P.*
1949	Weston Miss B. M., Uplands, Framingham Pigot, Norwich	*Gen.*
1946	Weston Miss F. M., 1, Muriel Road, Christchurch Rd., Nch.	*Gen.*
1952	Wheeler Miss J. P., 41b, All Saints Green, Norwich	*P., Birds*
1932	‡Wheeler E. G. Capt. S. G., R.N., The Pheasanteries, Edingthorpe, North Walsham, Norfolk	*Birds*
1936	Whitaker S., M.B.O.U., 36, Belper Road, Derby	*Birds*
1937	Whitehead Dr. F. E., C.B.E., M.R.C.S., "The Elms," 112, Victoria Road, Oulton Broad, Lowestoft	*Gen.*
1947	Whittaker Dr. E. M., 159, Christchurch Road, Norwich	*Birds*
1954	Wilde A. J., "Rodney," Broomhill, Downham Market, Nfk.	*Birds*
1947	Wiles Miss W. P., Brook House, Stratton Strawless, Norwich	*Gen., Geol.*
1945	*Wilson Capt. C. B., Irstead Lodge, Neatishead, Norfolk	*Gen.*
1954	Wilson Miss M. E., The Carpenter's Shop, Somerleyton, Suffolk	*P.*
1944	*Wiltshire E. P., B.A., F.R.E.S., c/o Foreign Office, London, S.W.2.	*Ins.*
1945	Winter J. W., Thorpe Cottage, Hemingford Grey, Huntingdonshire	*Birds*
1952	Woolley Miss S. M., 12, Patricia Road, Norwich	*P., F. W. Biol.*
1922	Wortley F., Half Year, West Runton, Norfolk	*Gen.*
1951	Wyatt T. C., 22, Chaucer Road, Cambridge	*Birds*

Affiliated Organisations and Schools :

Elected

1952	The Blyth School, St. Clement's Hill, Norwich
1938	The British Empire Naturalists' Association, c/o Reculvers, Nelson Road, Sheringham
1952	City of Norwich School, Eaton Road, Norwich
1918	Gresham's School, Holt, Norfolk
1953	The Norwich Paramoudra Club *Hon. Secretary :* A. Martin, 73, Brian Avenue, Norwich
1915	The Public Library, Norwich
1915	The Public Library, Yarmouth
1926	Norfolk and Norwich Library
1953	The Norwich School, The Close, Norwich
1952	Notre Dame High School, Surrey Street, Norwich
1953	Rockland St. Mary's School, Norfolk
1952	Town Close Preparatory School, Ipswich Road, Norwich
1953	County Primary School, Watton, Norfolk

Deaths during the year (on information received) :

1946	Brooks A. B., Haynes Green, Layer Mainey, Essex	April, 1954
1924	Chittock Mr. & Mrs. A. T., 12, Chapel Field North, Norwich	December, 1953
1945	Coke Mrs. R. R., Oaklands, North Street, Sheringham	August, 1952
1906	*Hamond Major P., D.S.O., Morston, Holt, Norfolk	August, 1953
1949	Lund Dr. K., Cowper Cottage, Mundesley, Norfolk	1953
1908	†Riviere B. B., Salhouse Lodge, Norwich	December, 1953

Total 6

Resignations and Lapsed Membership :

Total 15

New Members During 1953 :

Total 52

Total Membership (counting all affiliated organisations as 1 member each) :

Norwich	221
Outer Norfolk	154
Ex-County	86
Total	461

Publications received from other Societies and Institutions.

Belgium : Le Gerfaut.

Birmingham : Natural History & Philosophical Society.

British Association for the Advancement of Science.

Canada : Nova Scotian Institute of Science.

Cambridge Bird Club.

Cambridge Philosophical Society (Biological Reviews).

Croydon Natural History & Scientific Society.

Denmark : Skallig-Laboratoriet.

Edinburgh : Botanical Society.
Geological Society.
Royal Society.

Essex Field Club.

Freshwater Biological Association.

Glasgow & Andersonian Natural History & Microscopical Soc.

Gresham's School Natural History Society.

Hertfordshire Natural History Society & Field Club.

Holland : Archives Néerlandaises de Zoologie.

Linnean Society of London (Proceedings).

London Natural History Society.

Manchester Literary & Philosophical Society.

Marine Biological Association.

New Zealand : Royal Society.

North Staffs Field Club.

Northumberland, Durham and Newcastle N.H.S.

Royal Institution of Great Britain.

Royal Microscopical Society.

Suffolk Naturalists' Society.

Sweden : Acta Phytogeographica Suecica.

Sweden : Royal Physiographic Society at Lund.

U.S.A. : California University (Zoology).
Connecticut Academy of Arts & Sciences.
Harvard College (Zoology)
New York Academy of Sciences.
Philadelphia Academy of Natural Sciences.
Wisconsin Academy of Sciences, Arts & Letters.

The Society also subscribes for the Entomologist's Monthly Magazine.

Enquiries concerning journals should be sent to Miss D. M. Easter, 99, City Road, Norwich.

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