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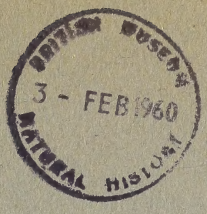

PROCEEDINGS

OF THE

Bournemouth Natural Science Society

VOL. XLIX

SESSION 1958-59

Price - Five Shillings

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VOL. XLIX.

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PUBLISHED BY THE SOCIETY AT ITS HOUSE,
39 CHRISTCHURCH ROAD, BOURNEMOUTH, 1959

Contents

Introductory Note

The objects of the Society are declared in the second of its Rules to be "the promotion of the study of Science in all its branches, and of Public Education, by means of Lectures, Field Meetings, the reading and discussion of Papers, and in any way that the Council of the Society shall deem advisable."

The branches of Science at present represented are as follows:—**Archaeology and History, Astronomy, Botany, Entomology, Geography, Geology, Microscopy, Photography, Physics and Chemistry, and Zoology.**

During the **Winter Session,** from October to April, frequent meetings are held, comprising Lectures on subjects of scientific interest, illustrated by lantern slides, films, epidiascope, diagrams, specimens, and experiments.

Throughout the **Summer Session,** Field Meetings on an average of two or three a week, are held in suitable places in the neighbourhood of the town, or Coach and Train Tours are arranged to districts of scientific interest at a distance.

The management of the Society is vested in a Council, which is elected at the Annual General Meeting.

The Society possesses a Library available for the use of members. Books may be borrowed by members, and there is a Reading Room in which works of reference may be consulted. The Museum contains many valuable scientific collections and specimens. The Library and the Museum serve to illustrate and illuminate the ten Sections of the Society. There is a well-equipped Dark Room for the use of members interested in Photography. The house stands in a pleasant garden of over an acre.

Members are elected by the Council, and pay an annual subscription of £1 10s. 0d. for full membership, or £15 for Life Membership. An Entrance Fee of 5/- is payable upon nomination for election. The Family Subscription (for members of a family living in the same house) is as follows:—First Adult Member, £1 10s. 0d.; Second Adult Member, £1; each additional Adult Member, 10/-; Children between 12 and 18 years, 10/- (Associate Members). Members living six miles or more from 39 Christchurch Road pay half the above rates. Renewable monthly membership, 5/-, is available.

A bi-monthly Programme, giving full details of all meetings, is posted to every member, and a Volume of Proceedings is published annually, of which adult members receive a copy.

Application Forms for Membership and further particulars may be obtained from the Honorary Assistant Secretary,

T. H. BICKEL,
10 Ormonde Road,
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Bournemouth Natural Science Society

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Bournemouth Natural Science Society

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Revised to 2nd November, 1959

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lLIFE MEMBER
aASSOCIATE MEMBER

The year of election is given before the name of each member

1952	Adam, Miss A. Irvine	17 Linwood Road
1955	Adams, Mrs. K. L.	Lyngen, Pinewood Road, Branksome Park
1958	Agar, R.	84 Howard Road
1946	Allan, Miss M. W.	Perak, 70 Lansdowne Road
1958	Allen, Mrs. F. C.	8 Twynham Road, Southbourne
1956	Ambler, Lieut. Col. M. J.	Min's Cottage, 5a Branksome Wood Road
1955	Ambler, Mrs. A.	,, ,,
1958	Andrews, Dr. G. F., M.R.C.S., L.R.C.P., D.P.M.	Winster, 20 Elgin Road
1957	Arnold, L.	11 Danecourt Road, Parkstone, Poole
1957	Arnold, Mrs. E. L.	,, ,,
1952	lAtkinson, Mrs. A., S.R.N.	40 Palmer Road, Oakdale, Poole
1948	Austin, Mrs. G.	33 Muncaster Gate, Malton Road, York
1950	Bailey, J. H.	39 Strouden Avenue
1950	Bailey, Mrs. A. A.	,,
1955	Bailey, Miss F. E. L.	57 St. Catherine's Road, Southbourne
1955	Bailey, Miss G. L.	,, ,,
1955	Balch, Miss M. M., M.B.E., B.A.	42 Saxonbury Road, Southbourne
1957	Baly, Miss O. M.	70 Brackendale Road
1956	Bamber, Mrs. C. T.	Walhampton Cottage, Lymington
1936	*Banham, Miss E.	"Redlands", Mornish Road, Branksome Park, Bournemouth West
1951	Barker, W., B.SC.	21b Upton Way, Broadstone
1951	Barker, Mrs. E.	,, ,,
1957	Barton-Bullock, Mrs. L.	2 Ravenscourt Road, Southbourne
1956	Bartrop, W. T. C., B.COMM.(LOND.), J.P.	11 Penrith Road, Boscombe
1956	Bartrop, Mrs. M. L.	,, ,,
1944	Bell, T. M., B.A., M.B., B.CH., M.R.C.S., L.R.C.P.	255 Belle Vue Road, Southbourne
1941	Bell, Mrs. R. M.	,, ,,
1942	Bennett, Miss D.	Caradon, Canford Cliffs Avenue, Parkstone, Poole
1942	Bennett, Miss M.	,, ,,
1943	Bentley, Mrs. E. P.	71 Gopeng Road, Ipoh, Perak, Malaya
1959	Bentley, Rev. H. B., M.A.	75 Lansdowne Road
1947	Berrill, Miss M. E.	Russell Court Hotel, Bath Road
1942	Bickel, T. H.	10 Ormonde Road, Branksome Park
1951	wBlack, Mrs. E.	69 Grosvenor Street, London, W.1
1946	Blackmore, H. C., L.D.S., R.C.S.	15 Keswick Road, Boscombe
1946	Blackmore, Mrs. E. E.	,, ,,
1948	Blake, Mrs. N. D.	The Elms, Wheelers Lane, Knighton, Wimborne
1950	Bland, Mrs. S.	Kingston, Central Avenue, Corfe Mullen

1955	Blicq, Miss G.	Merlyn, Marine Drive, Barton-on-Sea, Hants
1954	Boggust, A. E. V.	307 Iford Lane
1950	Bone, Miss M. R. M.	6 Groveley Road, Westbourne
1957	Booth, Mrs. L.	41 Cedar Avenue, Christchurch, Hants
1951	Borrough, W.	9 Florence Road, Boscombe
1956	Boulton, Miss L.	2a Stour Road, Queen's Park
1948	Bowley, J. P.	28 York Road
1956	Brain, Miss C. M.	16 Knole Road
1948	Brett, Mrs. A.	41 Knyveton Road
1954	Brooksbank, Mrs. A.	48 Twemlow Avenue, Parkstone, Dorset
1958	Broome, Mrs. H.	2 Brookside Way, Hinton Wood Avenue, Highcliffe-on-Sea, Hants.
1957	Brown, S. C. S., L.D.S., R.C.S., H.D.D.	142 Richmond Park Road
1959	Bruford, Mrs. E.	113 Alumhurst Road, Westbourne
1920	Brumell, Miss M.	7 Windermere Road
1951	wBull, A. W. M., C.B.	Broom House, Chiltern Road, Hitchin
1958	Bullock, Miss S.	22a Forest Road, Branksome Park
1957	Burgis, Mrs. E.	No. 7, Block A, 20 St. Stephen's Road
1937	Burrow, Mrs. D. M., PH.D., B.SC.	107 Alumhurst Road
1922	Burton, E. St. J., F.G.S., F.R.S.A.	St. Anne's, Seaward Avenue, Barton-on-Sea
1930	Bury, Miss G. J.	Flat 4, Berne Court, Gervis Road
1946	Busby, Miss G.	4 Harbour Close, Haven Road, Canford Cliffs
1959	Bushnell, Miss D. G., M.A., J.P.	189b Richmond Park Road
1952	Butcher, A. J., F.R.I.B.A.	Boldre, Golf Links Road, Ferndown
1957	Butler, G. W.	Old Park Farm, Lytchett Matravers, Dorset
1947	Butterworth, J. F.	2 Forest Road, Branksome Park
1954	Byrt, A. H., C.B.E.	14 St. Winifred's Road
1954	Bywater, F. J., C.B.E., M.C.	Summerhill, Hightown, Ringwood, Hants
1954	Bywater, Mrs. H. E.	„ „
1953	Cadwell, W. H., M.I.C.E.	238 Higher Blandford Road, Broadstone, Dorset
1953	Cadwell, Mrs. D. A.	„ „
1928	lCalkin, J. B., M.A., F.S.A.	Virginia House, Langton Matravers
1934	*†vCameron, Prof. J., M.D., D.SC.	63 Grove Road
1958	Capstick, F., F.I.A.C.	7 Viking Way, Southbourne
1958	Capstick, Mrs. W.	„ „
1959	Carter, Mrs. K. N.	90 Manor Road, New Milton, Hants.
1955	Caswell, G. E., M.B.E., M.C.	67 Chatsworth Road
1955	Caswell, Mrs. K.	„
1943	†vChambers, Ernest, F.L.S.	39 Christchurch Road
1950	Chambers, Mrs. E.	„ „
1955	Chambers, Miss H. M.	Stratton Audley, 2 Tower Road, Bournemouth West
1959	Charter, A.	Flat 3, 1 Cavendish Place
1959	Charter, Mrs. E. E.	„ „
1945	Cheesman, Mrs. A.	The Ken, Walkford, Christchurch
1945	Child, Miss L. M.	37 Sunnyhill Road, West Southbourne
1912	*Chilver, Miss K. M.	2 Shaftesbury Road
1951	Chomé, E. E. P.	6 Alyth Road
1942	Chomé, Mrs. W.	„
1950	Churches, Mrs. E. W., M.B., CH.B.	The White House, Colebrook Street, Winchester
1958	Clark, Mrs. F.	Weston Hall Hotel, West Cliff Road
1958	Clarke, Miss A., B.A.	"Green Leas", Langton Matravers, Swanage

1945	†vClarke, H. E., M.A., B.SC., F.R.I.C.	64b Surrey Road
1945	Clarke, Mrs. M.	,,
1927	*Clay, R. C. C., M.D., F.S.A.	The Manor House, Fovant, Wilts
1958	Cocke, M. H.	18a Penn Hill Avenue, Parkstone, Dorset
1946	Cohen, E., F.Z.S., M.B.O.U.	Hazelhurst, Sway
1951	Coleman, F., M.C., M.R.C.S., F.D.S.	Empress Hotel, Exeter Road
1926	*Cooper, H. A.	White Lodge, 8 Oban Road
1941	LCooper, Mrs. E. M.	,, ,,
1951	LCooper, Miss R. I.	,, ,,
1945	Cooper-Hunt, Major C. L., M.A., R.A.CH.D. (Retd.)	19 Marine Drive East, Barton-on-Sea
1945	Cooper-Hunt, Mrs. E. G.	,, ,,
1957	Corby, J. W.	BM/FFQP, London, W.C.1
1952	Corser, Miss G. M.	8 Redhill Crescent, Moordown
1956	Cox, Miss M. G. E.	Chantelle, 10 Dulsie Road, Talbot Woods
1948	Cox, W. S. I., F.R.E.S.	248 Castle Lane
1948	Cox, Mrs.	,,
1956	Crawshaw, Mrs. M.	2 Spring Slade, Cliff Drive, Canford Cliffs
1959	Creber, Mrs. M. S.	Flat 5, 19 St. Winifred's Road
1957	Cressell, Mrs. A.	38 Horsa Road, Southbourne
1903	*oCurtis, W. Parkinson, F.R.E.S.	Ladywell Cottage, Tower Road, Branksome Park
1959	Cuthbertson, Miss E.	179a Richmond Park Road
1959	Cutland, W.	South Riding, Honey Lane, Burley, Hants.
1959	Cutland, Mrs. H. M.	,, ,,
1959	Danne, Miss E. M. M.	Flat 5, 12a Branksome Wood Road
1950	Davidson, Miss M. S., M.A., B.SC.	Bournemouth School for Girls, Gervis Road
1951	Davis, Miss G. H.	Moorlands, The Grove, Ferndown
1956	Davis, H. M., A.C.A.	Needleswood, Lindsay Road, Branksome Park, Bournemouth
1958	Davis, Mrs. G. M.	,, ,, ,,
1952	Day, Mrs. E. T.	10 Barton Gardens, Dawlish, Devon
1930	*de Castro, H.	Yarlington, Springdale Avenue, Broadstone
1955	Deakin, R. H., M.SC.	Coppins, Harvey Lane, Canford Magna, Wimborne
1957	Dear, Miss D.	23 Burnham Drive
1935	Derry, Mrs. H. E.	Charnwood, 146 Belle Vue Road, Southbourne
1947	Dewdney, H., F.R.C.O., L.R.A.M.	15 Wellington Road
1949	Dixon, Miss H.	62 Christchurch Road
1958	Domney, Miss M.	Bibury, Wilderton Road, Branksome Park, Bournemouth
1953	Dudley, D. J.	17 Widdicombe Avenue, Parkstone, Poole
1955	Dudley, Mrs. I.	,, ,, ,,
1953	Eaton, Mrs. V. W.	33 Branksome Wood Road, Bournemouth West
1956	Edmonds, Miss K. E.	74 Namu Road, Winton
1959	Elburn, F. H. J., M.B.E.	1 Egerton Road
1946	Ellison, Prof. F. O'B., M.D., F.R.A.S.	Pine Apple Cottage, Burton
1959	Entrop, Miss E. V.	8 Dorwin Court, Poole Road, Poole
1950	Evans, Mrs. E. M., B.A.	113 Western Avenue, Ensbury Park
1954	Evans, W. J., B.A., B.SC., F.R.G.S.	19 Kingsway, Ferndown, Wimborne, Dorset
1955	Exton, Miss F. M., B.A.	39 Branksome Wood Road

1959	Falvury, P.	Alpine, Warren Road, Bournemouth W.
1919	Farmar, Mrs. K. A.	Whitton Lodge, Stevenson Crescent, Parkstone, Poole
1922	Farmar, Miss E. A.	" " "
1956	Farquhar, H.	The Bassetts, Knyveton Road
1953	Farwell, Mrs. S. M. A.	Latch Farm, Fairmile, Christchurch
1956	Fergusson, Mrs. C.	708 Christchurch Road, Boscombe
1957	Fiddes, Mrs. I. A.	Tetherdown, Cull Lane, New Milton, Hants.
1955	Finch, Miss D. A., B.SC.	4 Deanscroft Road, Redhill
1934	Finnis, Miss F. M.	27 Julian's Road, Wimborne
1951	wFisher, J.	The Old Rectory, Ashton, Northampton
1957	Fishlock, H. W., B.SC.	319 Belle Vue Road, Southbourne
1957	Fishlock, Mrs. F.	" "
1959	Fleming, Mrs. M. W.	9a Wimborne Road
1950	Fletcher, Mrs. V.	Teelings Cottage, South Baddesley, Lymington
1954	Follett, Mrs. V.	Windward, Stevenson Crescent, Parkstone, Poole
1942	Ford, Miss C.	13 Beaufort Road, West Southbourne
1945	Foyle, A. A.	24 R. L. Stevenson Avenue
1959	Francis, E. C.	18 Solent Road, Southbourne
1948	Francis, Miss E.	Beverley, Barton Lane, Barton-on-Sea
1957	Francis, Miss E. G.	" "
1953	Fraser, Miss M. H., B.A.	2 Ken Road, Southbourne
1956	Gandy, Mrs. L.	11 Cranleigh Gardens, Southbourne
1955	Gardiner, P. C., F.R.I.C., M.I.CHEM.E., M.INST.GAS.E.	61 Orphir Road
1958	Geer, Miss M. L.	35 Boscombe Spa Road, Boscombe
1952	Genge, G. F. S., M.B., B.S., M.R.C.S., L.R.C.P.	11 Westbourne Park Road
1951	Goddard, Miss E. F.	215 Holdenhurst Road
1959	Gompel, M. E.	12 Chigwell Road
1937	Gompel, Mrs. M.	" "
1949	Goodhart, Mrs. M.	West Thorpe, Lymington
1956	Goodman, Miss J. R.	Kenora, 4 Pine Wood Road, Branksome Park
1942	Gorringe, Miss K.	11 Branksome Dene Road, Westbourne
1959	Goss, Mrs. M.	33 Carbery Avenue, Southbourne
1956	Graham-Vine, Mrs. F. E.	Tower Cliff Hotel, Cliff Cottage Road, West Cliff
1953	Gray, Miss E.	44 Edmondsham House, Terrace Road
1956	Green, Miss G.	17 Clifton Road, Parkstone, Poole
1944	Greg, Mrs. F.	9 Hengist Road, Boscombe
1955	Gregory, Mrs. L. G.	Flat 2, 4 Manor Road
1956	Gregson, Miss D. L.	14 Oban Road
1957	Griffin, Miss M. J. E.	19 Corhampton Road, Boscombee
1941	Gwyther, W. T.	12 Foxholes Road, Southbourne
1956	Habershon, Miss E. M.	Leas Court, Cliff Drive, Canford Cliffs
1959	Haines, Miss D. K.	14 Orchard Avenue, Parkstone, Dorset
1931	Haines, Mrs. E. M.	Appleslade, Linwood, Ringwood, Hants
1951	Haines, Miss G. M.	" "
1951	Haines, Miss R. M.	" "
1957	Halliday, Mrs. M. S.	20 Meyrick Park Crescent
1951	Hanbury, Miss O. T.	Moorlands, The Grove, Ferndown, Dorset
1953	Hancock, Mrs. C. E.	912 Castle Lane East, Iford
1959	Hankin, Mrs. M. D.	11a Moorland Road
1959	Hannam, B.	Windyridge, Bashley, New Milton, Hants.
1955	Hannam, Mrs. W.	"
1959	Hards, Mrs. D. K.	Parade Court, Southcliff Road
1951	Harlock, Miss M. L.	44 Heather View Road, Branksome

1953	Harris, Lady A. S.	Lockner Holt, Chilworth, Surrey
1955	Harris, H. V.	Monterey, Lone Pine Drive, Ferndown, Dorset
1958	Harris, Mrs. W. I.	" " "
1958	Hart, Miss C. L., S.R.N., C.M.B.	The Thatched Cottage East, Godwin's Croft, Bransgore, Hants
1959	Harvey, Miss G. E. J.	50 Alum Chine Road
1932	*Hatton, Mrs.	Dutch House, Cliff Road, Barton-on-Sea
1951	Hawker, Mrs. E.	64 Alumhurst Road
1955	Hawkins, Miss M. K.	Moor House, Beaufoys Avenue, Ferndown, Dorset
1955	Hawkins, Miss P. M.	" " "
1949	Hayley, Miss V. G.	Sandykeld Hall, Manor Road
1951	Hayman, Miss M. S.	39 Queen's Park South Drive
1956	Hayward, H. A., O.B.E., F.G.S.	Saxholm, Seacroft Avenue, Barton-on-Sea, Hants
1956	Heath, Mrs. C.	2 Richmond Court, Hawkwood Road, Boscombe
1951	Henderson, J. G.	Beacon Royal Hotel, West Cliff
1954	Henderson, Miss V.	19 Ashmore Avenue, Hamworthy, Poole, Dorset
1954	Hermon, J. A.	43 Stourcliffe Avenue, Southbourne
1959	Hewitt, B. A., B.SC., F.G.S.	71 Newstead Road, Southbourne
1959	Hewitt, Mrs. W. S.	" "
1952	Hilton, Mrs. D.	East Dyke, Higher Clovelly, Bideford
1956	Hinton, Miss E. M.	1 Lonsdale Road
1952	Holroyd, G.	4 Beechey Road
1959	Hounsell, Miss H. M.	54 Edmonsham House, Orchard Street
1957	Hunt, W. H.	36a Studland Road, Westbourne
1954	Hunt, Mrs. A. K., B.SC.	" "
1930	Hurt, Miss C. E. C. J.	Flat 31, Ingleby, 6 Wimborne Road
1952	Imlach, Mrs. M. G., B.A.	Crofton Redcotts, Wimborne, Dorset
1954	Irwin, J. V.	16 Duncliff Road, Southbourne
1954	Irwin, Mrs. B. C.	" "
1959	Jackson, Miss M.	1360 Christchurch Road
1933	James, Mrs. M. G.	70 St. Alban's Avenue
1945	Jenkins, Miss P.	Hawkhurst Court, Wisborough Green, Sussex
1957	Jenoure, Miss	Eagle Crest, Belle Vue Road, Parkstone, Poole
1957	Jenoure, Miss D.	" " "
1958	Johnson, E. G.	26 Western Avenue, Ensbury Park
1958	Johnson, Mrs. N. F.	" "
1958	Johnson, H. N.	30 Canford Cliffs Road, Parkstone
1959	Jones, J. L.	10 Wildown Road, Southbourne
1959	Jones, Mrs. E. L.	" "
1930	Jubb, Miss O.	12 Oban Road
1956	Kay, Mrs. M. C. R.	1 Rose Avenue, Irlam, Lancs.
1956	Keith-Walker, S.	Hawkley, Lower Pennington Lane, Lymington
1956	Kelliher, Miss F. I.	80 West Cliff Road, Westbourne
1928	Kendall, Miss G. J., A.R.C.M.	20 Serpentine Road, Poole
1946	King, Miss A.	6 Weston Drive, Gervis Road
1959	King, Mrs. M.	Towercliff Hotel, Cliff Cottage Road
1944	Kirke, Miss M.	11 Radcliffe Court, 51 Manor Road
1948	Knight, Miss A.	9 Fairview Road, Broadstone
1959	Knight, Miss J.	106 Petersfield Road
1956	Knight, Miss M. E.	24 Lansdowne Road

1952	Lacey, Miss M. A.	10a Wimborne Road
1959	Lake, Miss M., B.A.	43 Stirling Road, Winton
1958	Lane, Mrs. C. M., M.A.	1 Southlea Avenue
1950	Lanning, J. P.	830 32nd Avenue, Apt. 1, San Francisco 21, California, U.S.A.
1950	Lanning, Mrs. C. M.	„ „ „
1956	Lavender, J. H., B.SC., A.R.C.S.	Heather Lodge, Bransgore, Christchurch, Hants
1959	Lawes, A. V.	48 Seafield Road, Southbourne
1959	Lawes, Mrs. K. M.	„ „
1947	†vLegat, A. W., M.INST.C.E.	40 Littledown Avenue
1951	Legat, Mrs. H. A.	„
1958	Leeland, Mrs. F.	34 Noel Road, Wallisdown
1948	Leonard, Mrs. N.	1 Neville Court, Derby Road
1957	Le Roy, Miss E. S. H.	Forest Mead, Tyrell's Ride, Burley, Hants
1957	Le Roy, Miss M. C. G.	„ „ „
1958	Le Sueur, Mrs. D. G.	49 Wellington Road
1951	Lloyd, G. B., B.A.	58 Glenferness Avenue
1950	Locke, G. S.	85 Seafield Road, Southbourne
1950	Locke, Mrs. J. B. E., B.A.	„ „
1947	Logan, Miss A.	157 Southcote Road
1952	Logie, Mrs. G.	179a Richmond Park Road
1939	Lowde, Miss E., B.A.	83 York Road, Broadstone
1955	Lowe, H. M., M.SC., F.R.I.C.	40 Oak Avenue, Christchurch, Hants
1955	Lowe, Mrs. J. M.	„ „
1951	wLowe, Mrs. D. M.	43 Marryat Road, Wimbledon, London, S.W.19
1934	Lowther, Miss D. M., B.SC.	Lonsdale, 15 Mayfield Avenue, Parkstone, Poole
1951	wLyver, Mrs. D. J.	Grove Lodge, Burgess Hill, Sussex
1956	Maddox, Mrs. L. M.	31 Egerton Road, Queen's Park
1951	Magee, Mrs. M. L.	Stourwood Nursing Home, Clifton Road, Southbourne
1959	Mariette, Miss G. A.	Greenway Court, Birchwood Road, Parkstone
1956	Marks, Miss K. M.	11 Ennerdale Road, Kew Gardens, Richmond, Surrey
1948	Markwick, Miss D.	67 Norton Road, Winton
1951	Marsh, Mrs. V. W.	39 Harbour Road, Southbourne
1946	Marshall, Miss D.	76 Palace View, Bromley, Kent
1954	Marshallsay, Miss E. N.	6 Overcliff Mansions, 1 Manor Road
1954	Marshallsay, Miss L. E.	„ „
1959	Martin, Mrs. A. B.	14 St. Luke's Road, Bournemouth
1958	Mate, Mrs. F.	8 Clifton Road, Parkstone, Poole
1957	Mathews, Miss G. B.	25 Wingfield Court, Manor Road
1950	Mayo, H. C.	18a Elgin Road
1950	Mayo, Mrs. S. E.	„
1956	McClay, H.	64 Blake Dene Road, Lilliput, Poole
1956	McClay, Mrs. A. E.	„ „
1953	McKeown, Miss K. E.	15 Ravine Road
1950	Meggett, Lt. Col. E. E., V.D.	14 Southlea Avenue, Southbourne
1950	Meggett, Mrs. K. M., M.B.E.	„ „
1929	Meyrick, Sir George, BART.	Hinton Admiral, Christchurch
1956	Middlemast, A. H.	86 Hengistbury Road, Southbourne
1956	Middlemast, Mrs. M.	„ „
1958	Middleton, Mrs. J. M., B.SC.	Horn Cottage, N. Bockhampton, Christchurch
1958	Miller, Mrs. R. V.	Giddy Green, Durlston Road, Lower Parkstone, Poole, Dorset
1956	Mills, Miss N.	34 Elms Avenue, Parkstone, Dorset
1959	Mitchell, Miss D. C.	20 Marlborough Road

1959	Mitford, B., B.A.	"Runway", Mudeford, Christchurch
1959	AMitford, Miss S.	" "
1959	Mitton, J. C., A.C.A.	3 Gainsborough Road
1949	Moir, Mrs. F.	3 God's House, Lower High Street, Southampton
1957	Moore, W.	139 Alder Road, Parkstone, Poole
1959	Morgan, Commander S. T., O.B.E., R.N. (RETD.)	Bracken Cottage, Blissford, Fordingbridge, Hants.
1959	Morgan, Mrs. V.	" "
1955	Moss, C. A.	Flat E41, San Remo Towers, Boscombe
1959	Mullens, Mrs. S.	41 Grand Avenue, Southbourne
1951	wMundy, Miss M. E.	56 Lancaster Gate, London, W.2.
1935	Muspratt, Mrs.	25 East Avenue
1959	Neave, Commander G. H., M.B.E., R.N. (RETD.)	5 Grange Court, Gervis Road
1959	Neave, Mrs. E. L.	" "
1939	Newsome, S. H.	184 Belle Vue Road, Southbourne
1939	Newsome, Mrs. E. C.	" "
1954	Newton, Mrs. K. F.	2 Montagu Road, Boscombe
1943	LNicholls, Miss G.	17 Waltham Road
1953	Northover, Miss W., B.SC. (London)	Bournemouth School for Girls, Gervis Road
1929	Ogden, Miss E.	1 Rossini Cottage, Hedgemead, Bath
1948	Ogden, F.	30 Grosvenor Court, Vale Road
1948	Ogden, Mrs. G.	" "
1950	Ogle, Miss U.	2 Frankland Crescent, Parkstone
1959	Oldroyd, G. H.	"Brandon", St. Peter's Road
1959	Oppé, E. F.	"Peakey", Worth Matravers, Swanage, Dorset
1948	Osborne, Mrs. B. E.	B6, San Remo Towers, Boscombe
1950	Owen, J. S.	2 Rotherfield Road, Boscombe
1944	Owen, Mrs. E.	" "
1958	Page, W. E., M.A. (Cantab.)	53 Petersfield Road
1945	Paris, Lt.-Col. A., R.E. (ret'd)	11 Stourwood Road, Southbourne
1956	Paris, Mrs. G.	" "
1959	Paul, Dr. H., M.D., D.P.H.	18 Alyth Road
1959	Paul, Mrs. N.	"
1945	Penny, Miss A.	Linkfield Court Hotel, Knyveton Road
1916	*LPenrose, Miss F.	Little Picket, Hightown, Ringwood
1916	*LVPenrose, Miss M., B.SC.	" "
1948	Perceval, Mrs. W.	7 Benellen Avenue
1959	Perry, Mrs. K. E.	7a Elms Avenue, Parkstone, Dorset
1950	†Peters, Sir R. A., M.C., M.A., M.D., F.R.S.	3 Newham Walk, Cambridge
1954	Pettifer, F., M.P.S.	48 Twemlow Avenue, Parkstone, Dorset
1953	Pickering, V. T.	Francesca, Hightown, Ringwood, Hants
1953	Pickering, Mrs. C. G.	" "
1959	Pierce, Mrs. E. K.	Greenway Court, Birchwood Road, Parkstone, Dorset
1956	Piggin, Mrs. K. I.	Oaklands, Burley, Hants
1959	Piper, P. J., F.R.I.C.S.	8 Leigham Vale Road, Southbourne
1959	Piper, Mrs. M. G.	" "
1957	Powis, Mrs. M. E.	37 Wheaton Road, Pokesdown
1946	Prideaux, Mrs. A.	Upmoor, Ravine Road, Canford Cliffs
1946	Prideaux, Miss C.	" "
1958	Prince, Mrs. D. E.	56 Alyth Road, Talbot Woods
1951	wQuillet, L. A.	"Sevenoaks", Springfield, Chelmsford
1956	Rawlings, Miss M.	5 Hampton Court, Branksome Wood Road
1953	Rayment, Miss S. M.	A7, San Remo Towers, Sea Road, Boscombe
1951	Rayson, Mrs. M. C. J.	5 Marston Road, New Milton, Hants

1945	†vRead, W. J., M.SC., F.R.I.C.	15 Carbery Avenue, Southbourne
1957	Reakes, Rev. G. S., B.A.	48 R. L. Stevenson Avenue, Westbourne
1957	Reakes, Mrs. K. A.	" "
1956	Reynolds, C. R.	14 Foxholes Road, Southbourne
1945	Richards, Miss E., B.SC.	8 Overcliff Mansions, Manor Road
1942	Richards, Miss M.	Stour Lodge, 11 Julian's Road, Wimborne
1954	Richardson, Mrs. L.	48 Twemlow Avenue, Parkstone, Poole, Dorset
1958	Ridsdale, Mrs. M.	14 Erinbank Mansions, Manor Road
1926	Rix, Miss M. E. de B.	5 Stourcliffe Avenue, Southbourne
1949	Robertson, Mrs. M.	41 Christchurch Road
1954	Robertson, Miss V. L.	2 Berry Court, St. Peter's Road
1949	Robertson, Mrs. W.	50 Alum Chine Road, Westbourne
1953	Robins, F. W., F.S.A., F.R.G.S.	4 Harewood Avenue, Boscombe
1923	Roden, Miss E. M.	12 Walpole Road, Boscombe
1947	Rooke, Dr. K. B., M.B., B.CH., M.B.O.U.	Cranbourne, Wimborne
1959	Rowe, Miss F.	23 Stourcliffe Avenue, Southbourne
1935	Rush, Miss C. J.	9 East Avenue
1959	Rushton, Mrs. E.	113 Alumhurst Road, Westbourne
1951	wSalisbury, Sir E., D.SC., F.R.S., F.L.S.	Croindene, Strandway, Felpham, Bognor Regis, Sussex
1954	Saunders, Miss W. A.	11 Portman Crescent, Boscombe
1938	Seare, Mrs. H.	Almer, Blandford
1957	Searle, Mrs. K.	Berkeley Hall Hotel, Cliff Cottage Road
1951	wSecretan, S. D.	Swaines, Rudgwick, Sussex
1950	Sedgewick, Mrs. G.	46 West Cliff Road
1951	Sewell, Mrs. I.	4 Maundeville Crescent, Christchurch, Hants
1941	Sexton, Miss F.	60 Uplands Road
1933	Sheffield, Miss I. E.	6 Lonsdale Road
1950	Shillidy, G. A., C.I.E.	Flat No. 10, 31 St. Peter's Crescent
1944	lShorthouse, B.	Brookside Cottage, Exeter Lane
1937	Simmons, Mrs. I. M.	73 Spur Hill Avenue, Parkstone, Poole
1920	Simpson, N. Douglas, M.A., F.L.S., F.R.M.S.	3 Cavendish Road
1956	Skeggs, Mrs. E. J., B.A., LL.B.	Queen Anne Cottage, Little Canford, near Wimborne
1959	Skitt, S.	44 Browning Avenue, Boscombe
1959	Skitt, Mrs. A.	" "
1959	Slater, G. A.	8 Rotherfield Road, Boscombe
1959	Slater, Mrs. E. M.	" " "
1959	Slicker, Miss H. R. M.	133 Seafield Road, Southbourne
1959	Smart, W. W., C.I.E.	Flat 12, 31 St. Peter's Crescent
1955	Smith, Miss M. D., L.L.A.	4 Deanscroft Road, Redhill
1947	Smythe, Mrs. M.	Sherwood, 2 Irving Road, Southbourne
1940	Somerville, Mrs. S.	Rumah Kechil, Pinewood Road, Ferndown
1949	Stanton, H. K.	1097 Christchurch Road
1953	Stinton, W. A.	Penton House, Talbot Drive, Bournemouth
1954	Stinton, Mrs. D. B.	" " "
1956	Stray, J. F.	Browngates, Barton Lane, Barton-on-Sea, Hants
1957	Stray, Mrs. S. V. M.	" " "
1947	Stuart-Harris, Miss M., B.SC.	Woodways, Merley Lane, Wimborne, Dorset
1946	Stuart-Harris, Miss W., B.SC.	" "
1950	Sworder, Miss R.	c/o Barclay's Bank Ltd., 659 Christchurch Road, Boscombe
1955	Taylor, Mrs. B.	164 Belle Vue Road, Southbourne

1958	Thistleton, F. W.	43 Burnham Drive, Queen's Park
1959	Thomas, J. W., B.SC., L.L.B., M.I.E.E., BAR.-AT-LAW	4 Albemarle Court, Manor Road
1951	wTierney, Dr. C.	Netherton, Coulsdon, Surrey
1951	wTierney, Mrs.	„ „
1951	wTilling, W. G.	20 Streathbourne Road, Upper Tooting, London, S.W.17
1958	Titmas, Miss A. E.	51 Beaufort Road, West Southbourne
1958	Torrens, H. S.	West Close, Wick, Bournemouth
1956	Trail, Miss L. M.	c/o Westminster Bank Ltd., Norwood, London, S.E.19
1957	Trotman, H. L.	16 Mountbatten Road, Branksome Park
1955	Tucker, H. W. H.	8 Connaught Crescent, Parkstone, Poole, Dorset
1949	*Turner, G. A.	Winchester House, Fir Vale Road
1958	Vardy, C. R.	46 Rushington Lane, Totton, Hants
1950	Venning, Brig. F. E. W., C.B., C.B.E., D.S.O., M.B.O.U.	Pinewood, Butts Ash, Hythe
1950	Venning, Mrs. E. L.	„ „
1950	Venning, Miss E. J. L.	„ „
1955	Walker, Mrs. L. W.	14 Alyth Road
1951	wWard, W. S.	44 Lesser Avenue, Clapham Common, London, S.W.4
1952	Warden, Miss F., M.C.S.P.	Flat 3, 69a Seamoor Road, Westbourne
1941	Watson, Miss G. V.	Manor Lodge, 20 Manor Road
1959	Watson, Mrs. L. F.	Flat 1a, 12 Chine Crescent Road
1941	†LwvWatt, Mrs. W. Boyd, F.Z.S., M.B.O.U.	52 Wimborne Road
1946	Watts, Miss N. E.	3 Dunbar Road
1936	Weekes, Mrs. M.	3 Rotherfield Road, Boscombe
1947	West, Miss G. M.	The Knapp, Studland, Dorset
1958	West, I. M.	30 Wildown Road, Southbourne
1957	Westwood, Miss J.	18a Portarlington Road
1958	Wheeler, C. A. P.	21 Burnham Drive
1958	Whimster, Miss L.	Cumberland Court, West Cliff Gardens
1924	Whitaker, Miss E. M.	22 Somerset Road, Boscombe
1924	Whitaker, S. E., P.A.S.I.	22 Selwood Road, Addiscombe, Croydon
1951	wWhite, Miss C.	33 Manor Road, Bexhill-on-Sea
1931	AWhite, S. J.	7 Gilbert Road
1955	Whittle, W. L., M.I.M.E., M.I.F., F.G.S., F.R.A.S.	31 Elgin Road, Parkstone, Dorset
1955	Whittle, Mrs. L.	„ „ „
1959	Wigley, Mrs. D. M.	"Highridge", Burley Road, Bransgore, Christchurch
1958	Wilkinson, S.	Flat 2, 7 The Avenue, Branksome Park
1958	Williams, Mrs. A. E.	110 Leybourne Avenue
1955	Williams, Mrs. G. E.	2 Belmont, De Maulley Road, Canford Cliffs
1957	Williams, W. R.	13 Strouden Avenue
1957	Williams, Mrs. A. J. B.	„
1942*	†vWilliamson, F., F.R.HIST.S.	24a Rushton Crescent
1958	Winckworth, Miss E. M. C., M.C.S.P.	18 Drummond Road, Boscombe
1950	Winter, W. P., B.SC.	27 Horsa Road
1951	Winter, Mrs. W. P.	„ „
1956	Wise, Mrs. B.	55 Namu Road, Winton
1950	Wiseman, Capt. L. G., O.B.E.	Avon Hotel, 3 Chine Crescent Road
1959	Witherby, H. L.	9 Commercial Road, Parkstone
1956	Witherby, R. B.	„ „
1948	AWood, Miss E. B., B.SC.	4 New Park Road, West Southbourne
1958	Wood, F. J.	17 Montagu Road

1951	wWood, Mrs. L.	The Oaks, Sawbridgeworth, Herts.
1950	Wood, Miss L.	3 Lonsdale Road
1956	Wood, T. E., M.A., LL.B.	12 Chine Crescent Road
1957	Woodger, Miss M. J.	70 Brackendale Road
1903	*†ovWoodhouse, W. J., A.C.P., M.I.H.	29 Twynham Road, Southbourne
1957	Woodhouse, Mrs. D.	„ „
1953	Wootton, Miss E. M.	22 Elgin Road
1949	†vWray, D. A., M.SC., PH.D., F.G.S.	42 Canford Cliffs Road
1949	Wray, Mrs. A.	„ „
1956	Wray, Miss J., S.R.N.	„ „
1958	Wright, S.	1 Richmond Chambers, The Square
1946	Wycherley, Mrs. L.	2 Gainslea Court, Derby Road
1958	Yule, Mrs. M. P.	29 Montague Road

BOURNEMOUTH NATURAL SCIENCE SOCIETY

Summary of the Accounts for the year ending 30th September 1959

1958			Receipts.	£	s.	d.	£	s.	d.
485	*6*	*0*	Subs. to Sept. 30th, 1959	532	0	0			
17	*5*	*0*	Subs. to Sept. 30th, 1960	103	5	0			
—			Covenant Tax Refund ...	50	7	0			
							685	12	0
			Rents, etc.						
181	*5*	*0*	Royal Commonwealth Society	200	0	0			
64	*0*	*0*	Camera Club	75	0	0			
35	*0*	*0*	Other accommodation ...	3	0	0			
10	*19*	*0*	Hire of Hall, Lawn, etc.	9	18	0			
11	*7*	*10*	Royal Commonwealth Society Gas Refund ...	7	16	0			
—			Mr. Legat, Gas Refund...	2	2	6			
8	*19*	*10*	Telephone	8	11	0			
—			Projector Fees	2	10	0			
							308	17	6
33	*11*	*1*	Field Meetings (refund) ...	5	0	0			
33	*18*	*7*	Garden Party	43	2	11			
8	*11*	*7*	New Year Party	10	6	3			
27	*6*	*10*	Teas (net)	29	1	11			
							87	11	1
1	*0*	*0*	Donations				33	5	0

1958			Payments.	£	s.	d.	£	s.	d.
123	*2*	*10*	Caretaker, Wages and Insurance	125	12	8			
35	*3*	*9*	Insurance	35	3	9			
144	*2*	*6½*	Maintenance	99	18	3½			
189	*1*	*4*	Rates	200	14	5			
							461	9	1½
83	*11*	*10*	Electricity	57	1	2			
141	*6*	*11*	Gas	117	10	10			
4	*11*	*6*	Water	7	6	3			
							181	18	3
37	*16*	*8½*	Postage	46	2	7			
80	*9*	*6*	Printing and Stationery ...	95	9	0			
68	*7*	*3*	Proceedings	69	6	3			
23	*18*	*2*	Telephone	27	9	10			
							238	7	8
—			Field Meetings	5	0	0			
35	*0*	*0*	Garden	55	0	0			
11	*10*	*11*	Library	8	15	4			
1	*18*	*0*	Museum		15	1			
							69	10	5
10	*6*	*0*	Subs. to other Societies...	12	4	0			
—			Hospitality for S.E. and S.W. Union of Scientific Societies	4	13	9			
12	*4*	*7*	Sundries	24	15	4½			
							41	13	1½
			Total of Ordinary Payments				992	18	7

110	*3*	*11*	Interest on Investments...	110	16	0			
10	*1*	*10*	Interest (Income Tax Refund to March, 1959)	22	6	9			
							133	2	9

Receipts other than Ordinary

—Nil.

100	*9*	*6*	Balance at Bank, 30.9.58	122	4	6			
3	*10*	*9*	Cash in hand	21	13	3			
							143	17	9
							£1392	6	1

Payments other than Ordinary

—Nil.

122	*4*	*6*	Balance at Bank, 30.9.59	348	7	6			
21	*13*	*3*	Cash in hand (cheque £50)	51	9	4			
				399	16	10			
			Less due to Hon. Treas.		9	4			
							399	7	6
							£1392	6	1

I have examined the above accounts with the Books of the Society, and the Vouchers for payment, and certify the same to be correct.

Bournemouth, 20th October, 1959.

F. OGDEN, Hon. Auditor.

F. J. WOOD, Hon. Treasurer.

BUILDING FUND—Special Reserve

	£	s.	d.		£	s.	d.
Balance, 30.9.58	150	0	0	Balance on Deposit at Bank, 30.9.59	150	0	0
	£150	0	0		£150	0	0

DEPOSIT ACCOUNT

	£	s.	d.		£	s.	d.
Balance at Bank, 30.9.58	230	4	4	Transferred to Building Fund Deposit Account ...	150	0	0
Interest, 30.9.59	10	0	8	Balance at Bank, 30.9.59	90	5	0
	£240	5	0		£240	5	0

CINE ACCOUNT

	£	s.	d.		£	s.	d.
Balance at Bank, 30.9.58	29	18	6	Hire of Films	22	1	3
Subscriptions to Cine Film Programmes	42	1	6	Projector Equipment	9	18	2
Donation	1	0	0	Postage, Telephone and Stationery	1	4	6
Projector Hiring Fees	1	15	0	Balance at Bank, 30.9.59	41	11	1
	£74	15	0		£74	15	0

LIBRARY ACCOUNT

	£ s. d.		£ s. d.
Balance at Bank and in hand, 30.9.58	21 9 10	Librarian's Expenses	7 2 9
From Hon. Treasurer	8 15 4	Library Maintenance	13 18 0
Sale of Books and Periodicals	2 13 0	Balance at Bank and in hand, 30.9.59	12 17 5
Donation	1 0 0		
	£33 18 2		£33 18 2

FIELD MEETINGS ACCOUNT

	£ s. d.		£ s. d.
Cash in hand, 30.9.58	4 7 4	Expenses Field Meetings	8 9 9
Surplus from Coaches	20 13 0	Transferred to General Account	5 0 0
Petty Cash from Treasurer	5 0 0	Cash in hand, 30.9.59	16 10 7
	£30 0 4		£30 0 4

INVESTMENTS

	Cost £ s. d.	Approximate Value 30th Sept., 1959 £ s. d.
£1000 3% British Transport Stock, 1978/88	775 4 0	661 0 0
£1000 4¼% British Electricity Stock, 1974/79	992 1 6	877 0 0
£ 500 4¾% County Borough of Bournemouth Mortgage Loan	500 0 0	500 0 0
£ 500 5¾% County Borough of Bournemouth Mortgage Loan	500 0 0	500 0 0
£ 200 6% County Borough of Bournemouth Mortgage Loan	200 0 0	200 0 0
	£2967 5 6	£2738 0 0

Council's Report for year ending September 30th, 1959

The membership of the Society on September 30th, 1959, was 442, an increase of 10 during the year. The number of new members elected during the year was 70; terminations of membership from various causes were 50. In addition the Council reports with deep regret the loss by death of the following 10 members: — Mr. W. H. Bates, M.I.E., Lt.-Col. C. B. d'Aguilar, Mr. B. C. Cundall, Mr. J. Day, Mrs. McDougall, Mr. H. F. Harding, Miss E. I. V. Norman, B.A., Mrs. Read, F.Z.S., Mr. G. H. Terrel and Mrs. F. A. Thistleton.

Mrs. Read's work for the Society is gratefully remembered, especially her contributions on social occasions of games and competitions. Her artistic work in painting posters for lectures was admired and appreciated.

Mr. B. C. Cundall rendered valuable assistance to the Society as an Honorary Auditor.

The President for 1958-59, Miss M. A. M. Penrose, B.SC., delivered her Presidential Address, "Some Aspects of the New Forest", on the 25th October, 1958, to a large audience by whom it was greatly appreciated. The address was illustrated with colour slides of great interest and was printed in the Proceedings for 1957-58.

The main activities of the Society as set out in the bi-monthly programmes were: — 57 lectures (11 of which were open to the public free of charge), 51 field meetings, 12 club days and 7 cine film subscription programmes. The field meetings included nine coach excursions, one of which was a three day tour to South-East England. Train journeys were sometimes a feature and included a visit to the London Planetarium. More detailed reports are given under separate headings by the Chairmen of Sections.

The Joint Conference of the South-Western Naturalists' Union and the South-Eastern Union of Scientific Societies was held in Bournemouth at the invitation of the B.N.S.S., who were the hosts. The programme included lectures by members of our Society and by distinguished outside lecturers. A detailed report is given under a separate heading, but the valuable work of Mr. H. V. Harris deserves special mention.

The Society has had a successful year, which is the result of much hard work and co-operation by all who have taken part in the various activities. They include the Officers of the Society, Members of the Council, the Chairmen of Sections, the Leaders of Field Meetings and Excursions, Lecturers and Projectionists; and also the various Committees, including F. & G.P., Library, Museum, Editorial, Garden, Tea and Entertainments. The names of the members concerned are printed under the appropriate headings in the Proceedings. The Council wishes to express their

thanks to Mrs. Cox and Mrs. Brett for their valuable work of addressing envelopes and sending out the Society's programmes and circulars; the work has been done with unfailing regularity and efficiency.

During the year much valuable work has been done for the Society by the Honorary Solicitor, Mr. G. A. Turner, and Council is particularly grateful as the work was again considerable.

The Honorary Architect, Mr. A. J. Butcher, has devoted much time to safeguarding the interests of the Society in all matters concerning the structural maintenance and care of the building. The Society is fortunate in having the advantage of his expert knowledge and Council wishes to record its thanks.

The following changes of duties took place during the year. Mr. H. C. Mayo has resigned the office of Hon. Treasurer and our thanks are due to him for his long and loyal service in that capacity. He has agreed to take over the duties of an Honorary Auditor to fill the vacancy created by the death of Mr. Cundall. Mr. F. J. Wood has undertaken the office of Hon. Treasurer. Mr. E. V. Pierce has resigned the office of Hon. Assistant Treasurer, in which he has given valuable service, and has been succeeded by Mr. W. H. Hunt, who has resigned from the office of Hon. Assistant Secretary. Mr. G. A. Shillidy has taken over the duties of Hon. Assistant Secretary. Council is grateful for the valuable service of the retiring officers and of those elected to replace them.

We can look back on another year of progress and continued pleasure in the Society's varied activities, made possible by united effort.

Reports of Sections for the year ending September 30th, 1959

Library

Our thanks are due to Mrs. K. L. Adams, Mrs. E. T. Day, Miss A. K. Harding, Mrs. M. Smythe, Mrs. W. Boyd Watt, Miss M. Wetherell, Mr. S. C. S. Brown and Mr. H. V. Dacombe, who together have presented over one hundred books during the past year. Miss Wetherell gave sixty-seven, of which fifty were retained in the Library and the remainder put on sale to members, and Mrs. Day gave fourteen, mostly on advanced subjects of Botany, published in the United States.

The Society is also grateful to Miss M. Penrose, Dr. E. D. Fountain, Mr. W. J. Read and Mr. W. L. Whittle for continuing to present periodicals as in previous years. Mr. Read is also now giving an additional monthly scientific magazine, "Discovery."

The sum of £1 has been received from an anonymous donor towards the purchase of books.

Six modern books have been purchased, including "The Geology of the Country round Bridport and Yeovil" (Ordnance Survey) and four local Ordnance Survey one inch maps.

At a Club Day in May, 1959, the Librarian gave a talk describing the lay-out of the Library and dealt particularly with a number of books of unique interest.

It is hoped that members will avail themselves of the facilities provided by the Library. From the General Section two books may be borrowed for a month, and in the Reference Section members may consult the books at any time when the premises are open.

As an example of the selection, there are over one hundred books dealing with birds.

A. A. Foyle.

Museum

Various additions have been made to the Museum collections, some by members and some by non-members, who have no doubt heard of the Society as a repository of natural history specimens.

In the order in which they were received are the following:—an old English coin-balance from Mrs. Locke; three sets of antelope horns from Miss Aston; a small collection of British marine shells from Mr. F. P. Dolamore; fossil plant remains from beneath sands at Bournemouth, given by Mr. H. P. Chaplain; a Badger and a Short-eared Owl from Miss Ellis; two specimens of Purbeck Marble from the Portland quarries given by Mrs. Boyd Watt; and a giant Tortoise from a Galapagos Islands given by Miss Fish.

Thirty-five lantern slides of botanical subjects were given by Mr. Lucas.

A talk on the history and contents of the Museum was given to members at a Club Day on October 8th, 1958, by the Hon. Curator.

Several members have assisted in the Museum during the year, and their help has been much appreciated.

F. WILLIAMSON.

Garden

The hot and dry summer which has been so much enjoyed by holiday-makers has proved unkind to gardens, which have suffered accordingly. The hose presented by Mr. and Mrs. H. E. Clarke has proved very useful and we are duly grateful for it. To increase our difficulties we did not have the services of a professional gardener between February 18th and May 15th. The valuable help given by members of the Garden Committee, especially Mrs. N. Leonard, and also by Miss D. A. Porter and Mrs. L. Wycherley are much appreciated.

Our thanks are due to Miss D. M. Lowther, Mrs. W. Boyd Watt, Mr. and Mrs. J. H. Bailey, Mr. W. L. Whittle, Mr. and Mrs. H. C. Mayo, Miss A. I. Logan and other members for the gift of shrubs and plants; to Mrs. B. E. Osborne for the gift of a saw; and to Mr. E. Chambers for other garden tools.

The Chairman will be pleased to hear from any member who would be willing to give some assistance in the garden.

W. CHOMÉ.

Archaeology and History

The lecture season was opened by Mr. F. W. Robins on October 22nd, 1958, when he described for us "Some old German Cities." Later in the month there followed a lecture by Professor W. F. Grimes, Director of the University of London Institute of Archæology, who gave an interesting and authoritative account of "Roman London," a result of having been in charge of the official excavations on bombed sites undertaken since the end of the war. Other lectures were:—"More about Art and Artists" by Miss M. R. M. Bone; "Glimpses of Avignon and District" by Mrs. J. B. E. Locke; "The Dwellings of Stone Age Man" by Mr. T. H. Bickel; "The Story of English Surnames" by Mr. F. Williamson; "A late Stone Age site on Hengistbury Head" by Mr. J. H. Lavender, which was of particular interest as being an account of the first Mesolithic site to be discovered in our district; and "Some Ancient Dorset Churches" by Mr. C. H. Stickland, illustrated by a series of beautiful colour slides prepared by the lecturer. "Some Cathedrals I have visited" by Mr. S. E. Whitaker, illustrated by excellent slides from his own photographs, ended the lecture season.

Field meetings by this section were not so numerous as in previous years, but the Chairman attended several meetings of other sections and described some of the archæological places that were visited, among them being Rempstone Stone Circle,

Bokerley Dyke, Knowlton Rings, and many other more distant places seen during the three-day tour of South-East England arranged by Miss F. M. Exton.

As part of the programme of the Joint Conference at Whitsuntide, a visit was paid to the Saxon Church at Breamore and to Salisbury under the leadership of the Chairman of this section.

All meetings of the section have been well attended, and sincere thanks are extended to all who have helped to make the meetings interesting and enjoyable.

The Wessex Division of the Council for British Archæology has become active during the year and three meetings have been held at Salisbury, which were attended by Messrs. W. Moore, F. W. Robins and F. Williamson. Members who would like to attend any future meeting can obtain information from the undersigned.

F. WILLIAMSON.

Astronomy

The session was opened in October by Professor J. O'B. Ellison, M.D., F.R.A.S., who spoke both as a yachtsman and an astronomer and described the principles and practice of Nautical Astronomy, both by using Meridian observations and by the use of the Sumner line.

The Chairman gave two lectures:—the first in December on "The Co-operation of Astronomy and Seismology" with particular reference to the work of the International Geophysical Year and the interior of the earth; his second lecture was given in January on "Time and Tide," dealing with the methods in use for measurement of rise and fall at Wirral and with Tide Prediction.

In February, Mr. W. H. Day, F.R.A.S., spoke of the leading features of the "Northern Constellations" and of the appropriate times for observation. Mr. A. C. Curtis, of the Southampton Astronomical Society, lectured in March on "Astronomical Photography" and described the photographic work of his private observatory and exhibited a number of slides of great interest and high quality.

By the courtesy of Mr. Whittle, the April Club Day was allotted to this section and the Chairman described the principles of the London Planetarium, which a party of members visited in the following week.

W. P. WINTER.

Botany

During the year six lectures were given under this section, five during the winter session and one in June; the latter was given by the Chairman on "Field Meetings Recalled," which was illustrated by colour transparencies and slides from the Society's collection. There were two visiting lecturers: Miss P. M. Wickham, who gave a delightful talk on the "Herbal Value and Folk-lore of Wild Flowers," which was illustrated by pictures and drawings; and Mr. J. H. Hemsley, B.Sc. (of the Furzebrook Research

The above is a reproduction of a Photograph of the Joint Conference Party of the So[illegible]stern Un[illegible] was taken in the garden of the Bournemouth Natural Science Society, where the Party was e[illegible]ed on S[illegible]

Photo by Graham, Bournemouth.

Estern Union of Scientific Societies and the South-Western Naturalists' Union, which
ai d on Saturday, May 16th, 1959.

Station), who spoke on "Nature Conservation and its Problems" and illustrated his subject by colour slides. Mrs. N. Goodhart, who is a member though rarely able to attend, again delighted her audience with her colour transparencies of wild flowers, which she described in detail; Mr. E. Chambers, F.L.S., contributed a lecture on "The Evolution of Sex in Plants" to a series of lectures to commemorate the Darwin centenary, and illustrated it by epidiascope and lantern slides; the Chairman gave a lecture on "With the Botanical Society in Eire" and described her tour of Eire with illustrations by epidiascope and colour slides.

Field Meetings followed their usual pattern and more support was given to the coach outings than was the case last year. We are greatly indebted to Mrs. Simmonds, of the Reading Natural History Society, for meeting us at Strathfield Saye to show us the fritillaries, which were at their best; unfortunately the Lodden lily was not so obliging, as one site had been cleared and the few remaining plants were hardly out. Miss Ogle introduced a delightful innovation by inviting a party to tea at her cottage in the Purbecks. Transport was arranged by private cars and the party was delighted to find that Dorset rarity, the early Spider Orchid, on the downs near Dancing Ledge. We are most grateful to Miss Ogle and to Mr. and Mrs. Dudley for arranging this meeting and for their hospitality.

Our thanks are due to all the leaders and lecturers who have so generously given their time in the service of the Society and also to Miss Exton for her hospitality on the occasion of the visit to the Bourne Valley.

We heard with regret that Miss E. Ogden was leaving the district; she has been an able and painstaking leader in the past and we should like to take this opportunity of thanking her for all she has done and to wish her a happy time in her new environment.

Mrs. V. Follett reported the closing of the footpath near Bloxworth, and this enchanting springtime route may have to be abandoned in future.

This section provided one coach for an excursion to the New Forest during the Joint Conference of the South Western Naturalists' Union and the South Eastern Union of Scientific Societies held in Bournemouth at Whitsuntide.

Early in the year a notice was received from Miss W. M. A. Brooke, of Haslemere, announcing a scheme whereby Societies in Britain would "adopt" similar organisations abroad, in order to supply them with specimens of British plants for their Herbaria. Our Society has adopted McGill University, Montreal, and a consignment of dried specimens will be forwarded shortly. Further collections will be made next year and all members are urged to help in this work. Any further information can be obtained from the Chairman of the section.

A. K. Harding.

Entomology

As a result of the warm summer of 1959, insects of the *Diptera* order have been more abundant than usual. In addition to the House Fly and Blow Fly, there have been numerous blood-sucking Midges and Mosquitoes. The latter are sometimes referred to as Ichneumon Flies, but as these belong to the order *Hymenoptera* and have four wings they are readily distinguished from Mosquitoes which have only two. The appearance of the commoner Butterflies has been somewhat erratic this year. The warm evenings have caused many Moths to be attracted to artificial light.

During the day the Vapourer Moth, *Orgyia Antiqua*, which favours "built-up" areas, has been more in evidence than usual. This applies to the male, as the female cannot fly.

During the winter, lectures were given by Mr. S. C. S. Brown, L.D.S., on "Wild Life on our Southern Heaths," by Miss N. Harland on the "Keeping of Bees," and by Mr. W. L. Whittle, M.I.M.E., on the "Wonders of Life."

W. S. I. Cox.

Geography

During the year eight lectures have been given and there have been six field meetings, including three organised for the Joint Conference of the South Western Naturalists' Union and the South Eastern Union of Scientific Societies, and a three-day excursion for our own members. Miss D. M. Lowther, B.Sc., gave a lecture on Pembrokeshire with special reference to the development of the Oil Port of Milford Haven; Mr. W. A. Stinton illustrated his description of the Tamar Valley with many of his own colour slides; Mr. F. W. Thistleton, also using his own colour slides, described his visit to the U.S.A.; and Mrs. K. F. Newton gave an account of the recent agricultural and industrial progress in the new China. As usual, Mr. E. Chambers, F.L.S., made an instructive contribution to our programme with his lecture on "Seeking the World, the Golden Age of Discovery." The Chairman gave two talks—one on Eire and the other on "Holland in Tulip Time," a geographical study of the Netherlands.

During the summer, members enjoyed a walk up the Bourne Valley and explored the Upper Gardens, one of the most beautiful parts of our lovely town, and, in conjunction with the Archæological Section, travelled by coach and spent a lovely summer day on Cranborne Chase.

In August the Chairman gave a talk on South-East England, and in September twenty-eight members spent three days exploring this part of the country, travelling by coach and spending two nights at Tunbridge Wells.

The processes of modern surveying and map-making were shown, by kind permission of the Director General, at the Ordnance Survey Record Office at Chessington. The party then visited the very interesting region outside Maidstone, where Kit Coty's House, the Carmelite Priory of Aylesford and the historical Castle of

Allington are situated. At Canterbury the Cathedral, the Weavers' Cottages, St. Thomas's Hospital and the ancient Church of St. Martin proved of great interest. Our road then passed through the former Cinque Ports of Hythe and Romney and crossed Romney Marsh to the hill settlements of Rye and Winchelsea and back to Tunbridge Wells.

The homeward journey was by the South Downs, visiting Alfriston with its half-timbered cottages, Clergy House and noble Church, and studying the finely developed meanders of the Cuckmere valley. From the Devil's Dyke on the escarpment of the Downs there was an extensive view of the Weald and the road at the scarp foot joining the spring line villages was followed to Pulborough. The wonderful excavations at the Roman Governor's villa at Bignor and the Petworth hammer ponds, a centre of the Wealden iron industry, showed very different aspects of life in this corner of England.

During the visit of the Joint Conference at Whitsuntide a walk was organised to Hengistbury Head and a coach excursion went up the Tarrant Valley to Stourhead with its beautiful gardens, and visited Pitt-Rivers Museum on the return journey. The Isle of Purbeck, with its wealth of scientific interest, proved a popular excursion, which was shared with the Geology Section.

F. M. Exton.

Geology

In the past year there were two lectures devoted in the main to geology. An instructive talk on the "Drifting of the Continents" was given by Mr. R. R. Walls, whose extended researches in South America and Africa enabled him to give us some interesting details bearing on this fascinating problem.

In February the Chairman of the section, in an illustrated lecture on "Geology and Geologists," traced the many and varied developments that had taken place in recent years.

Four field meetings were held in the past session and were all well supported. In March we visited the Agglestone Rock and Rempstone Stone Circle and in May the cliffs at Barton-on-Sea. The latter occasion was a field meeting organised by the London Natural History Society, who had kindly invited us to join them. We were here privileged to have as our guide Mr. D. Curry, M.A., F.G.S., Vice President of the Geologists' Association, who is a leading authority on the geology of this region.

In June we travelled by coach to Tollard Royal, Shaftesbury, Gillingham and Mere. At Gillingham a visit was made to the newly-opened local museum, where we were welcomed by Col. Wallis (Chairman of the Museum Committee) and Mr. Slade, who kindly described to us some of the more remarkable local exhibits. Mr. Pickering kindly assisted in the arrangements for this meeting.

In July, the Isle of Portland, Chesil Beach and Chickerell were visited. At Portland, representatives of the Bath and Portland Stone Firms Ltd. conducted us round their large quarries which have supplied stone to many of London's most famous

public buildings. A brief visit was also made to their extensive work-yards and sheds, and also to the interesting Fossil Garden they have established. The visits to the Agglestone Rock and to Portland proved of particular interest and attracted attendances of over sixty members.

During the Joint Conference at Whitsuntide a coach excursion was arranged in conjunction with the Geography Section and proved both instructive and enjoyable.

D. A. WRAY.

Microscopy

Mr. Clarke kindly presented a collection of microscope slides dealing with Dental Surgery. The Society owns several microscopes and a very large collection of slides dealing with practically all Natural Science subjects.

If any member requires advice in the use of the microscope the Chairman will be pleased to assist.

W. L. WHITTLE.

Photography

A wide variety of subjects was illustrated in the lectures given during the session. In every case the slides were produced by the lecturer and were of the usual high standard of photographic art aimed at by this section. Unless otherwise stated the slides were in colour. Good attendances were maintained throughout.

The lectures comprised:—"The Scottish Scene" by Mr. A. W. Legat, M.I.C.E., M.I.S.E.; "Here and There with a Colour Camera" by Major C. L. Cooper-Hunt, M.A.; "The Dorset Countryside" by Mr. Ernest Bristowe (monochrome slides); "Holiday in Australia and New Zealand" by Mr. W. T. C. Bartrop; "The Magic of Lakeland" by Mr. D. J. Dudley, with a commentary recorded on 'tapes' with appropriate musical effects; "Natural History Photography" by Mr. A. E. McR. Pearce (monochrome slides), which illustrated how to set about photographing the bird, animal and reptile life of the British Isles; and "Welcome to Poole" by Mr. W. A. Stinton, illustrated by the lecturer's own colour slides produced in the potteries and the factories of Messrs. Carter Ltd., with special permission of the management.

The grateful thanks of the Society are tendered to the lecturers for their time and trouble and also to the members of the Projection Panel.

URSULA M. OGLE.

Physics and Chemistry

Just a hundred years ago one of the greatest scientific classics of all time, "The Origin of Species," was published by Charles Darwin. In 1859, no biologist (and least of all, I would say, Charles Darwin) had imagined that a chemical and physical basis for evolution, and indeed for life itself, would emerge as a product of work in organic chemistry. But as mentioned last year (B.N.S.S. Proceedings, Vol. 48, page 32) this development has in fact taken

place and the synthesis of "living" units is well within the accepted prospects of biochemistry today. It was accordingly considered fitting that in planning a short series of lectures to commemorate this centenary and do honour to Darwin one contribution should come from the Section of Physics and Chemistry. The essential place filled by the proteins and nucleic acids as pre-requisites for life and reproduction is now well established and the writer showed that much is being achieved in the study of the relations between chemistry and heredity, variation and cell growth and multiplication.

We have had during this Session a number of distinguished visiting contributors to this section. Prof. P. M. S. Blackett, M.A., F.R.S., of London University, honoured us by lecturing on Lord Rutherford and the Cambridge Cavendish Laboratory team of physicists, of which Prof. Blackett was himself a member and thus eminently qualified to describe what at their advent were exciting revolutionary hypotheses of nuclear physics, but which have become elementary text book principles today. We were also privileged to welcome Dr. J. N. Friend, D.Sc., Ph.D., F.R.I.C., who for several years directed the Chemistry Division of the Birmingham Technical College and has done much for the training in Natural Science of Army groups in the Middle East. He is an expert in chemical mineralogy and lectured delightfully to us on "Stones, Precious and Otherwise." Another welcome visitor was Mr. G. J. Chamberlin, Managing Director of Tintometer Ltd., who illustrated an interesting lecture on the meaning and measurement of Colour with a wealth of experiments.

A very welcome return visit was that of our fellow member Mr. J. F. Stray. He spoke in an address about a century of submarine cable, of the recently established Atlantic telephone service, the underlying principles and operation of which he described in a most able manner. Mr. W. L. Whittle, M.I.M.E., F.R.A.S., not only shared in the Darwin centenary lectures, but opened the lecture season for the Society with an address to this Section on the construction and application of Barometers. The remarkable summer enjoyed by Britain in 1959 has awakened interest in meteorology, and Mr. Whittle can be congratulated on selecting for an October lecture a subject which was to become of topical interest later. Some of the day-to-day applications of Chemistry were described by Mr. H. M. Lowe, M.Sc., F.R.I.C., in his vivid and admirable style. He spoke of soaps and detergents in an address chiefly devoted to laundry technique, which has been revolutionised by new materials in recent years.

Largely as a result of Mr. J. H. Bailey's initiative the section has enjoyed the educational stimulus of two films. The showing of each of these was preceded by an introductory talk given by the writer. They were "The Conquest of the Atom," which was an appropriate sequel to Prof. Blackett's address, and "Mirror in the Sky," which contained fundamental information about the ionised layers of the Upper Atmosphere, a department of Physics now receiving very close investigation.

All the meetings of the Section have attracted larger audiences than in previous years; interest has been especially manifested by recently elected members, a most gratifying fact to report. The writer is convinced that there are in the Society many members well qualified to place their knowledge and experience at the service of fellow members. An appeal is now made to any who could serve this Section with lectures, or in any other way, to come forward with a view to participation in the activities of the 1959-1960 Session.

HERBERT E. CLARKE.

Zoology

The programme of organised Field Meetings covering the whole year has been the main feature. During the winter season we were again favoured by Mr. W. S. I. Cox, F.R.E.S., with an interesting and well illustrated lecture on "Wild Nature Reserves." In addition, the film programmes arranged by Mr. J. H. Bailey included some of exceptional interest to bird watchers and a delight to other members; outstanding perhaps were "Edge of Britain," "Woodpeckers" and "Emperor Penguins."

The attendance at Field Meetings varied between twenty-three and a minimum of four enthusiasts who, undaunted by a cold fog at Poole Harbour and a bitter wind with showers on Stanpit, were rewarded by seeing something unusual. The aggregate attendance showed some increase on the previous year.

Among many interesting birds seen were Red-breasted Merganser, Bewick's Swan, Marsh-Harrier, Buzzard, Grey Plover, Turnstone (flock), Stock-Dove, Sanderling, Wheatear, Redstart (with nestlings), Red-backed Shrike (feeding young), Redshank and Sheld Duck with young families, and the usual variety of cliff-nesting sea-birds. Of more outstanding interest were two Grey Phalaropes (Stanpit, Oct. 10th), two Spoonbills (Stanpit, Oct. 28th), a flock of Golden Plover feeding in the Avon Valley (Feb. 5th); and on March 19th, a Gannet, apparently quite uninjured, grounded near the Hengistbury shore of the harbour, and this bird members were able to inspect from a distance of a few feet. This Gannet had apparently been nursed for a fortnight further east while in poor condition and then released, but when seen by members it was again temporarily unable to rise. The local Warden and the R.S.P.C.A. were informed, but next morning the bird had again taken off. In destructive contrast, one of the Phalaropes fell a victim to a youth's catapult; complete loss however was avoided as the skin was preserved.

This year, in one of the writer's garden nestboxes, a Blue Tit achieved a clutch of fifteen eggs. From these fourteen young Tits flew and the remaining egg was found to be infertile. This is recorded here as, so far, nothing in excess of this has come to my knowledge.

H. V. HARRIS.

Commemorative Lectures

To mark the centenary of the publication of Charles Darwin's "The Origin of Species," the following relevant Lectures were given by members of the Society, and were open to the public free of charge:—

"From the Non-Living to the Living"—H. E. Clarke, M.A., B.Sc., F.R.I.C.

"The Evolution of Animals"—W. L. Whittle, M.I.M.E., F.R.A.S., F.G.S.

"The Evolution of Sex in Plants"—Ernest Chambers, F.L.S.

"From Nebula to Man"—W. L. Whittle, M.I.M.E., F.R.A.S., F.G.S

Covering very wide fields of research and knowledge, not only were these lectures notably informative, but they were also profusely and attractively illustrated by the speakers' diagrams, coloured drawings and slides.

H.V.H.

Cine Film Subscription Progammes

The interest of members in these programmes was well maintained and the last winter season was very successful. The attendance varied from 97 to 151, the average being 128. The Season Subscription was paid by 52 members.

Seven programmes were given during the season and 29 films were shown, the average screening time ranging from 10 to 65 minutes each. The subjects were kept well within the range of the Society's activities. An innovation in April was the showing of only one film in a programme; it was "Edge of Britain," a colour film dealing mainly with the Bird Life of the Shetland Islands and including the following birds: Cormorant, Guillemot, Kittiwake, Common Gull, Hooded Crow, Snipe, Eider Duck, Red Necked Phalarope, Arctic Tern, Red Throated Diver, Shearwater, Fulmar Petrel, Arctic Skua, Puffin and Great Skua; it also included interesting close-ups of a Grey Seal. It attracted an audience of 119 members, whose applause indicated their appreciation of the film. Two films were obtained during the year for the illustration of lectures by the Chairman of the Physics and Chemistry Section.

During the five years the programmes have been in operation the Society has been helped financially by the payment of £65. 5s. 0d. from our funds for the maintenance and improvement of the projection apparatus.

Our thanks are due to the Cine Projection Panel led by Mr. H. K. Stanton for their efficient service. We are also grateful to Mrs. W. Boyd Watt for kindly supplying the Programme of Films shown by the British Association for the Advancement of Science at their Annual Meeting in York in September. It was interesting to note that one of the films (Bread from Wheat) included therein was shown in our programme last December.

Suggestions of films suitable for our programmes will be welcomed if accompanied by particulars as to where they can be obtained on hire.

J. H. Bailey.

Club Days

The Club Days again proved to be popular and the attendance varied from 40 to 70. Visits to our Museum, Library and Gardens at No. 39 were conducted by Mr. Williamson, Mr. Foyle, Miss Harding and Mr. Chambers.

Mr. Holroyd exhibited and demonstrated the various projection lanterns on one Club Day. Other subjects included: — What do you know?, The Seven Wonders of the World, Natural History Subjects, Members' thoughts on Evolution, The London Planetarium, East Parley and Parley Green, Members' Observations on Natural History, and Mendel in the Garden. Thanks are due to the Chairmen of Sections for introducing the discussions.

Any suggestions from members of subjects for discussion are very welcome.

W. L. WHITTLE.

Joint Conference

In August, 1958, the Society was approached by the South Western Naturalists' Union with the proposal that, together with the South Eastern Union of Scientific Societies, a Joint Conference should be held at Bournemouth in 1959. After representing the Society at a preliminary meeting with officers of the other two organisations and reporting back, Mr. H. V. Harris was asked by Council to take charge of the Joint Conference to be held from May 15th to the 21st, 1959.

With the co-operation of the President and the Chairmen of the Botany, Geography, Geology and History Sections of the Society, a very full and interesting Programme of Excursions, together with preparatory illustrated lectures, was arranged to cover the six days of the Conference. Within the limits of the time available these covered a wide and varied selection of the outstanding features of interest in the surrounding region. The Excursions were admirably led by Miss M. A. M. Penrose, B.Sc., Miss A. K. Harding, B.Sc., Miss F. M. Exton, B.A., D. A. Wray, Ph.D., M.Sc., F.G.S, and Mr. F. Williamson, F.R.Hist.S., while Mr. C. H. Stickland conducted the Conference party round Christchurch Priory.

In addition, a Young Naturalists' Meeting was arranged for the evening of the opening day, when questions from representative groups from local schools (11 to 18 years) were dealt with by a panel consisting of Edwin Cohen, F.Z.S., M.B.O.U., Miss A. K. Harding, B.Sc., and Dr. H. G. Stubbings, M.A., Ph.D., led by Maxwell Knight, O.B.E., F.L.S.

By invitation of the President and Council of the Society, the Conference members spent Saturday afternoon at the Headquarters in Christchurch Road, Bournemouth, where, before and after one of the illustrated lectures, they were free to examine the numerous and valuable collections of Natural Science specimens. Tea was admirably served on the lawns in warm, spring sunshine in surroundings which evoked many appreciative comments; for this, congratulations are due to Miss A. King and her helpers.

The success of an important part of the Conference was due to the hospitality so freely offered by the Bournemouth Municipal Authority. The proceedings opened with a most appropriate Speech of Welcome by His Worship the Mayor, Councillor Henry Brown, J.P., and on all necessary occasions the Assembly Hall, rooms for business meetings, and the Lounge for morning coffee were made available, appropriately furnished. In addition, accommodation for the Young Naturalists' Meeting was provided in Bournemouth Girls' School. To our thanks for this valuable assistance must be added appreciation of the willing help given by Corporation officials.

Judged by the many favourable comments by Conference members during the week, the programme arranged and conducted by the Society proved most successful, and can be remembered with satisfaction for the pleasure it gave.

H.V.H.

A Photograph of the Conference Party is reproduced on the centre pages of this volume through the generosity of Mrs. Boyd Watt, who has defrayed the cost, and to whom our thanks are due.

Presidential Address

Twentieth Century Genetics

BY MISS D. M. LOWTHER, B.A.

(Delivered before the Society on the 24th October, 1959)

The study of Genetics is a comparatively modern science linked very closely with Cytology (the science of cells). It is of great importance to the human race both economically in producing better crops and herds and in the prevention of certain diseases in Man himself in indicating the direction of inheritance. Universities are spending more and more time in their botanical and zoological departments in trying to unravel the complexities of inheritance. For the more advanced work a considerable knowledge of Mathematics is necessary as in other fields of science. Bertrand Russell has said that Mathematics is the key to the Universe. So let no one underrate its value. In Physics, Chemistry, Engineering and Astronomy its application has long been known; but who would have thought that, when the wonderful laws of inheritance were discovered, they, too, would be shown to depend on mathematics for their complete understanding and tabulation?

Genetics covers a wide range: its laws are beautiful in pattern, varying little throughout the Animal and Vegetable Kingdoms. In Calculus, Man is amazed at the infinitesimal, so also in Genetics we are dealing with genes which are so small that they have not yet been seen even through the electronic microscope and yet obey the laws of probability. How wonderful is the Universe in which we live, where the planets move in ellipses; how this fact astonished me when I was first conversant with the equation of the ellipse; and how wonderful that what Man is, in all his complexity, depends on factors so small that they cannot be seen under a microscope!

The father of modern Genetics was the Abbe Gregor Johann Mendel (1822-1884), who gave his name to the laws known as Mendelism. He was the son of a peasant and had been early engaged in assisting his father on the land during his spare time. Later he lived in the Monastery at Altbrünn in Austria, where he had new opportunities for the study of Natural Science, and began experimenting on sweet peas to find new coloured flowers. He was very observant and noticed (as many a scientist before and since has done) what others might have completely overlooked, i.e. "the remarkable regularity with which the same hybrid forms recurred when fertilisation took place between the same species." He tabulated his discoveries, a mixture of Mathematics and Botany, and his work was published in "The Proceedings of the Brünn Society for the Study of Natural Science." Would that one of our Members could make a contribution to the "B.N.S.S. Proceedings" which should be of such inestimable importance! He was an unacknowledged scientist of great eminence, not only interesting himself in plants and bees but also in meteorology.

Mendel's Laws, which are now so well known, form the basis of all work in Genetics but they were not seriously considered until the beginning of the 20th Century although formulated as early as 1865.

The Mendelian Laws:—

(a) The inherited characteristics are produced by genes (called by Mendel, factors) which are passed along unchanged from one generation to another.

(b) In each individual these genes are found in pairs and, where the two genes in a pair are different in their effects, one gene dominates the other so that it might be referred to as a "dominant" and the other as a "recessive."

(c) When seeds are formed in any individual, members of each pair of genes segregate out independently of the other pairs with just one of every two mated genes going from each parent to each offspring.

If an individual has a dominant gene and a recessive one, the chances of passing on a dominant or recessive gene to the offspring is one in two, and the greater the number of offspring the more accurate this ratio will be. Thus, when two individuals have each one like gene (e.g. red hair) the chance of these two genes coming together is one in four. This is not of importance for red hair; but it may happen that two recessive genes for blindness are passed on, causing the disease in the offspring although the parents have good sight. In marriages between first cousins, this chance is 1 in 4, a far greater probability than between two unrelated persons —so it is not wise for first cousins to marry. This fact has long been acknowledged by some religious bodies although the reason was not known.

In order to understand inheritance, there are several words which must be clearly defined. I will refresh your memories. A chromosome is so called because in order to make it visible under the microscope it must be stained. The word means a colour body. In every ordinary or somatic cell in the human body there exist 23 pairs of chromosomes and each pair is a pair of like chromosomes except one, and it only differs in the male sex. The pair is commonly known as XX in women and XY in men; so Y is the odd chromosome.

In the germ cells as distinct from the ordinary or somatic cells, only one of each pair of chromosomes is found, so that, in the fertilized embryo, we again have a pair of chromosomes, each parent having given one chromosome to each pair. If we consider the XX pair, the mother can only give X to her offspring; the father may give X or Y. In the case of X from both parents we have XX a daughter, but X from the mother and Y from the father gives XY a son, so that the chromosome contributed by the father determines the sex of the child.

The chromosomes contain genes in large numbers. They are in pairs sometimes alike and sometimes unlike, homozygous and heterozygous respectively. Genes which are situated on the same chromosomes are said to be linked; those in the sex chromosomes are termed sex-linked. There are many genes on the sex chromosomes which are not related to sex, e.g. colour blindness.

So we have the chromosomes in the nuclei of the cells and the genes on chains along the chromosomes. The position of a gene on the chromosome is termed locus and each gene has its position on the chain of the chromosome.

In birds the male has two sex chromosomes XX and the female XY—also moths, butterflies, reptiles and some fish and amphibia. This is the opposite to Man. Dioecious plants have XY male and XX female, the same as Man. Melandrium (a pink) has XY male and XX female. So we see that all genes of inheritance except those situated on the Y chromosome are the same in Men and Women. Any such genes cannot be necessary to life as women do not possess them. One or two have been found, one for black ear-tufts and another for webbed toes but they are certainly not genes that any woman would envy. Only part of the Y chromosome differs from the X and not many genes are thought to be on it.

Chromosomes exist in pairs in all normal plants and animals but the numbers differ. The number of pairs in a species is usually denoted by *n*. Thus in man *n* equals 23 as there are 46 chromosomes. (It was originally thought that there were 48 chromosomes). There are exceptions to this pair rule which I shall discuss later.

Haploid is the term for the number of chromosomes in the germ cells. *Diploid* is the number in the ordinary somatic cells.

The number of chromosomes is in

Round Worm	2	Drosophila melanogaster	
Garden Pea	14	(Fruit Fly)	8
Red Clover	14	Maize	20
House Mouse	40	Fox	34
Man	46	Rat	42
Silkworm	56	Potato	48

The number of chromosomes has nothing to do with how far up or down the evolutionary scale the species happens to be. Incidentally, neither has the size of the chromosome.

Mitosis. "Somatic nuclear division" is known as **Mitosis.** "Each chromosome duplicates itself and the duplicates are separated from each other at cell division, one going into the nucleus of one daughter-cell and its twin into the other." Thus all cells have the same chromosomes.

Meiosis. This is the process by which the germ cells are formed, each having one member of each pair of chromosomes —not two as in the ordinary or somatic cells of the body. There are two divisions before this takes place.

Sometimes the chromosomes do not divide when the germ cells are formed but are passed on just as they are. This occurs far more often in plants than in mammals and man as far as is known.

Sometimes there is a different number of chromosomes in the same genus—Wheat for example. In Einkorn "the chromosome number in the nuclei of somatic cells is found to be 14, whereas

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durum has 28 and Common Wheat 42." You will notice that all these are divisible by 7 so that *n* equals 7 is probably the original pair number.

In Oats the numbers are similar, 14, 28 and 42. Chrysanthemums 18, 36, 54, 72 and 90, so *n* equals 9.

Polyploidy. Any chromosome number which is "more than one pair of each type" is called polyploid. The somatic number is Diploid equals $2n$, Triploid equals $3n$, Tetraploid equals $4n$, etc. If in the Diploid the chromosome division does not take place at meiosis, $2n$ chromosomes will be present in the germ cells instead of n. If fertilization takes place between this cell and a normal one which has n chromosomes, the result is $3n$—a triploid. A plant with $3n$ pairs of chromosomes will usually be sterile as $3n$ cannot divide up equally at meiosis, but if we have $4n$ this need not be sterile as it can divide as $2n$ and $2n$.

Another variation in chromosome numbers is that if an odd number appears in the offspring there may be one chromosome too many or too few. It has recently been discovered that Mongoloids, who were once thought to be eastern in origin, have an extra chromosome from the mother and only one from the father. Mongoloids are born to one woman in fifty in middle life and to 1 in 2,000 in younger women. It has long been known that they were more commonly born to older women but the failure of the chromosome division was not known.

By counting the number of chromosomes in plants which looked unusual, it was found that the differences were due to variations in the chromosomes. Such plants are often sterile but may be reproduced vegetatively by cuttings or runners. They then have the same genetic inheritance as the parent.

Reduplication of the pairs of chromosomes is much the less serious of these variations as, the number being divisible by two, the plants are not often sterile. Chromosomes may also fragment. This is more serious as some genes are missing and sterility nearly always follows; it is known as deletion and is often lethal.

Most bananas wth which we are familiar are of the variety called Gros Michel. This has no seeds as you have probably noticed. The ordinary species has 22 chromosomes but Gros Michel has 33. This number is not divisible by 2, so this type is sterile and is propagated by other methods. It is a triploid, probably formed by one normal germ cell with 11 chromosomes and one which is the result of unreduced germ cells, the 22 chromosomes being passed on.

The mule is a cross between two species, the ass and the horse, and is sterile owing to the difference in chromosome number. The mule is strong as are most hybrids.

When some crosses are made the first generation is usually sterile because, through difference in the chromosomes, pairing partners are lacking. However, sometimes the unreduced number of chromosomes is passed on to the germ cells and when this takes place we have a new variety having a chromosome number which

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is an aggregate of the chromosomes of each parent. For example, if we cross two species having 4 chromosome pairs each, viz: WW, XX, YY, ZZ and OO, PP. QQ, RR, the hybrid will be sterile as it has odd chromosomes W, X, Y. Z, O, P, Q, R. If in the original cross the chromosomes of each parent failed to divide at meiosis a fertile hybrid would be bred and this does occur. It would have eight pairs of chromosomes WW, XX, YY, ZZ, OO, PP, QQ, RR, and this would be fertile.

An interesting case of variation in chromosome number is the Spartina townsendii, which was first found in England in 1870. It spread rapidly along the South Coast and in Europe. It seems to be a hybrid between Spartina stricta—a European species and Spartina alterniflora which may be of American origin. Spartina townsendii has 63 pairs of chromosomes; S. alterniflora has 35 pairs and S. stricta has 28 pairs. 28 plus 35 equals 63—a total of the two species. So this is an example of how a new species could appear.

Polyploids have certain advantages occasionally over the original genus from which they are formed. A composite found in the "Mount Hamilton Range in California" lives in a climate which is hot and dry in summer and mild in winter. It seems to be formed from two diploid parents, one of which favours a dry cold climate and the second mild humidity.

Mutations. Mutation is a word with which the general public is familiar but few know its exact meaning. Women are proud of their mutated mink coats; they know that the colour is different from the ordinary mink and they know that the pelts are rare. A mutation is a change in a gene, the minute factor of inheritance. How important a mutation may be we shall see later.

An eminent scientist who was recently asked on what he would spend a large sum of money if he had it, replied, "Research on chromosomes and mutations." Why should a physicist consider a biological subject so important? The answer is the weapons of war which have been produced since the splitting of the atom. When the first atomic bombs were dropped and further experiments in atomic weapons made, the biologists rushed into print, stating that if further tests were carried out damage would be done to the cells of human beings which would be irreparable and that generations yet unborn would suffer. On what did they base these statements?

Successful experiments have been made in trying to produce mutations artificially mainly in the Fruit Fly (*Drosophila melanogaster*) and in mice. It is thought that the following induce mutations or increase their rate:—

(1) X-Ray or ionizing radiation. The atomic bomb would produce this type of radiation.
(2) Ultra violet light.
(3) Chemical agents, e.g. Mustard Gas.
(4) Extreme temperatures.

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It has been found that the amount of radiation and the rate of induced mutation is of the simplest kind, being one of direct proportion, so that, if the amount of radiation is increased, so is the mutation. Why is this so important? Mutations are generally disadvantageous.

Spontaneous Mutations. Mutations may occur under natural conditions. Their cause is unknown but those produced artificially are often similar. It is believed that the average mutation rate is the same throughout the Animal and Vegetable Kingdoms, but we have to take the rate per generation and not per annum.

Mutations are not common. The haemophilic gene in Man was studied in detail by Haldane in 1935 and he showed the rate of mutation to be 1 in 50,000. Haemophilia is what is known as a sex-linked disease (I shall discuss sex-linked conditions later) caused by a mutated or mutant gene. It is carried by females in one X chromosome and passed on to the sons in the ratio 50—50. Females do not show the disease as they have a "good" gene in the other X chromosome, but 50% of the males inherit the mutant gene in their only X chromosome and so are haemophilic; 50% of the sons have a "good" gene in their X chromosome and are free and so are all their descendants. When the sons are "bleeders" as in the Spanish Royal Family the mutant gene would soon die out by selection but, the mutation rate being 1 in 50,000, it crops up again in the population. So that, with many diseases, it is thought that they cannot be wiped out very effectively except by the immediate descendants of the sufferers abstaining from marriage.

I have said that mutations are usually disadvantageous but this is not always so. Whether one is so or not depends on environment. Thus, if a cow is born without horns in a wild state, it would be at a great disadvantage and its offspring would soon die out, but in a domesticated herd it would be an asset and the farmer would no doubt breed from it and try to produce a polled herd.

The mutated fox or mink showing a different coloured fur from the normal is a great advantage commercially—sometimes because of the rare and beautiful pelt but sometimes because of woman's vanity in wanting something different from everyone else.

The next thing to be noted about mutations is that they are passed on to future generations once they occur. The mutant gene passes from generation to generation. Thus we often have a new type which will survive by selection if it has advantage over the original gene known as the wild type. The two genes in a pair are known as alleles from "allelos—one in place of the other." Two alleles must be 1 mutant gene and 1 wild type.

Reversibility of Mutations. Mutations may be reversible. For instance, a mutant gene can mutate back to the wild type; but the rate is generally different from that to a mutant gene; the mutation rate is generally greater.

Lethal Genes. A lethal gene, as its name implies, causes death but not always at the same age. There is a mutant gene for

platinum colour in foxes which, when it occurs in both genes, causes death at birth or soon after. However, if the fox has only one of these genes, it will survive and be platinum colour. Huntington's Chorea in Man produces the lethal effect later in life.

Some of the first experiments on genetics were carried out on the Fruit Fly (*Drosophila melanogaster*) and the same species is still used by students. As I have previously stated, the laws of genetics are found to be very similar throughout the Animal and Vegetable Kingdoms. The advantage in using the Fruit Fly is the large number of generations which can be bred in a short time—and it is generations which matter in genetics. In higher animals a much longer period would be necessary to produce as many generations. The number of chromosomes is 8, thus n equals 4. One pair is different in the male and female XY and XX as in Man.

Strains of bacteria have been found which are resistant to the antibiotics penicillin, aureomycin, streptomycin and the sulfa drugs. Originally it was thought that "some groups of bacteria would be always sensitive to these drugs." It is now believed that the resistance of these bacteria may be due to mutations. When the original strain is successfully reduced by antibiotics, the mutated bacteria have more chance to multiply. "A high degree of resistance to streptomycin can be acquired in a single mutational step," but to penicillin a "cumulative result" is necessary. In the case of penicillin therefore, if sufficiently high concentrations of the antibiotic are given, so as to "eliminate first-step mutants" resistant strains can be avoided. This would not be the case with streptomycin, so that the latter should not be used if other antibiotics are effective. Experiments for finding mutants are not difficult. Bacteria are grown in Petri dishes with penicillin of sufficient strength to kill them. Any which survive will be mutants. Strains of Meningococcus have actually been found which need the antibiotic instead of being sensitive to it.

I have mentioned that X-Rays cause mutations. A mould has been produced from spores which were X Rayed, yielding nearly twice as much penicillin as before. Other experiments on this mould with ultra-violet light gave more penicillin still.

Effects of Radiation. Copy of a letter from
Prof. H. W. B. Skinner,
Nuclear Physics Research Laboratory,
University of Liverpool.

To the "Sunday Times."

Sir,

Why are some geneticists like Dr. Auerbach, who wrote last Sunday, so dogmatic about the genetic effects of radiation in the very small doses associated with nuclear bomb testing?

There is no experimental evidence at such small doses and it is extremely difficult to see how this could be obtained

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because any effects would certainly be statistically unmeasurable.

Apart from theoretical considerations, therefore, there is no evidence that very low doses do any harm at all—they may or may not. Theoretical considerations about the effects of radiation on the extremely complex molecules composing the gene are certainly unreliable.

Dr. Russell's experiments (mentioned by Dr. Auerbach) show that the picture is not simple. The genetic damage is not proportionate to the total dose of radiation but depends on the time-scale over which it is applied. Since these experiments were conducted at dosages very high compared with the bomb test doses, they certainly leave open the possibility that at very low doses there may be no damage at all

Letter from Mr. Richard Pilkington, M.P.
(Member for Poole).

To the "Sunday Times."

Sir,

A letter appeared last Sunday written with the authority of a "geneticist with much experience in radiation work" and stating that the "bomb tests carried out so far have doomed many unborn children to genetical death or disability."

Bomb tests account for only 1 to 2 units of radiation. Natural sources account on average for about 100 units. A family which went to live in certain parts of the U.K. would experience a far greater increase in radiation than from 1 to 2 units derived from nuclear fall-out.

Why are these facts so often ignored by the nuclear campaigners and others when they write on the subject?

Report in the "Sunday Times" of Meeting of the United Nations Educational, Social and Cultural Organization and the United Nations Atomic Energy Agency in Venice attended by scientists from 26 countries.

" The subject of the Meeting was the effects produced by very low levels of radiation such as are encountered by the general population.

Dr. W. L. Russell, United States, reported experiments in which he used one million mice. These experiments showed that genetic damage—the changes that affect future generations from continuous very low levels of radiation—is only one-third as severe as that from an equal dose received in one exposure over a short period.

All assessments of radiation hazards were based on the latter figures but since the risk for the population is, in general, due to frequent small exposures, it is now clear that the harmful effects have been over-estimated. Also reassuring is the report that the great radio-sensitivity of embryos which has given some cause for concern is confined to single doses and continuous irradiation at a low level is apparently almost harmless.

It seems that the estimate of the radiation danger made both by the Medical Research Council and the special United Nations Committee erred on the side of safety, since they assumed that the danger from continuous irradiation was the same as that from isolated exposures to relatively high doses for a short time.

In 1954 about 100 South Sea Islanders received a relatively large dose of radiation from the fall-out of a hydrogen bomb test. The medical history of these people has been carefully followed by American Navy doctors, and it seems from the facts presented to the Conference that there has been a complete recovery from the initial ill effects. The islanders have returned to their own island of Rongelap in the Marshall Islands, which is now quite safe. The only restriction is that they must not eat a particular type of crab as it concentrates radioactive strontium within itself and therefore contains a much higher level of activity than the surroundings."

Another quotation from the "Sunday Times" which should be of special interest to us is a report on the pipe-line from the Atomic Energy Research Station at Winfrith, Dorset.

"Lobsters, like crabs and other Crustaceans, take up radio-active substances at a higher rate than other sea creatures, and this enables them to be used as reliable guides to the amount of radio-activity present in the waters they inhabit.

At the level of radio-activity which will be allowed in the Winfrith effluent (2,500 curies per day) a man could, I am told, eat a lobster a day without ill effects."

The catch of the local fishermen will be closely watched so those of you who wish to obtain lobsters locally need have no fear.

Blood Groups. No lecture on genetics would be complete without some mention of the main types. The chief group is the ABO system and two others which are used are the MN group and the Rhesus factor. The ABO Group. People who have the same antigen in the blood cells and the same antibodies in the serum of the blood are in the same group.

Thus:—	Antigen A	Blood Group A
	„ B	„ „ B
	No antigen	„ „ O

These blood groups are inherited by genes, one from each parent. There are 4 Groups, AB, A, B, O. The parents contribute either A, B, or O antigen.

If two A's	the blood group is A
„ „ B's	„ „ „ „ B
„ A and B	„ „ „ „ A B
„ A „ O	„ „ „ „ A
„ B „ O	„ „ „ „ B
„ O „ O	„ „ „ „ O

The blood of the different groups will not mingle except O which can be transfused into any of the others and is known as universal.

In conjunction with these we have to consider the rhesus factor which has been found to be of considerable importance in dealing with jaundice in new-born babies. Rhesus +ve and rhesus —ve are the names of the two groups and the former is much the more common.

If blood of Group A is transfused into a person of Blood Group B there are present in the serum of the blood antibodies to Group B; these react and cause clotting and death results. You may have seen the recent report of a case in a hospital where, through an error, this actually happened and the patient died.

It has been found that stomach cancer is more common in one blood group and duodenal ulcer is another. I shall not name these in case any of you should become a little nervous if you know your own blood group.

If a transfusion be given to a Rhesus —ve individual containing rhesus antigens, rhesus antibodies will be formed and remain in the blood. In the same way a Rhesus —ve woman may have a Rhesus +ve child and the rhesus antigen will pass from the child's blood to the mother's forming antibodies which remain in her blood. The first child will not be affected by these antibodies but successive children may be and they will then die of jaundice due to the incompatibility of the mother's and child's blood. Although this was not known until 1939, rhesus testing is carried out in all pre-natal clinics as the child can be saved if it is known beforehand that the mother is —ve.

Rhesus Factor in Animals. It has been found that a similar condition to the rhesus factor in humans takes place in mares but with a slightly different result. A mare may have difficulty in bringing up its fourth and subsequent foals. The foal would be born and seem fit, but after about 96 hours would die of jaundice. It was discovered that if the foal was suckled by a different mare it would be quite healthy. This led to the realisation that the trouble came from the mother's milk and was due to incompatibility of the mare and sire. If the foal grew up, no effect was seen on its offspring, which is the case with the rhesus factor in humans. Similar conditions have been found in "chickens, dogs, cats, mice and guinea pigs."

There is a milk factor in mice which differs from that in the case of the mare. The mare's is probably due to the forming of antibodies in the blood as in human beings. Baby mice removed from their mother and suckled by foster mothers of a high incidence of mammary cancer developed the disease although coming from parents who had "low incidence" of the ailment. So mice can transmit through milk, something which causes cancer in young they have suckled; but this is not true inheritance; it is a congenital disease not carried in the germ cells or by gene inheritance.

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"Congenital" means showing at birth. Some genes do not show until late in life, e.g. Huntington's chorea, diabetes and rare diseases of old age. A mother may transmit a condition which is manifest at birth but it does not mean that the condition is hereditary. Infection such as malaria and leprosy are in this category.

German measles causes blindness or deafness in a child when the mother has suffered the disease during the beginning of pregnancy.

Mothers bear children of similar weights and those born to sisters are also related in weight. Also "a child's physique depends on the physiological state of the mother at its birth." The birth of binovular twins and malformation of various types increases as the mother ages.

Human Genetics cannot be studied in the same way as the Fruit Fly. Work has to be done backwards by studying family trees. Diseases or conditions which are easily noticed can be traced in families. Examples are haemophilia, colour blindness, ectrodactyly (deformed feet and hands), polydactyly, red hair and many others. Some of these are sex-linked, some due to dominant genes and many caused by recessive genes. Probably most people have some deleterious recessive gene which is quite harmless unless it joins up with the same mutant gene and, as I have already stated, this may easily happen when first cousins marry. The gene may have been passed down from generation to generation and no member of the family is aware that he is carrying it. In every marriage there is a chance, although not a very great one, that two recessive genes for the same condition may come together. Hare lip and cleft palate are often due to inter-marriage. Amaurotic idiocy, albinism and Friedrich's ataxia are others.

Phenylketonuria. It has recently been discovered that 1% of mental deficiency cases are due to what is known as phenylketonuria caused by a recessive gene. Too much phenylalanine in the blood stream causes mental deficiency. If the condition is found immediately after birth it may be remedied by appropriate nutrition and the child does not grown up a mental case.

Red Hair. The colour is due to a recessive gene which is very common in the population, about one in seven persons carrying it. In cousin-marriages the chance of red hair is only a little greater. Curly and straight hair are also due to genes.

Dominant Genes. Polydactyly may be either dominant or recessive. You may have come across people with more than five fingers. A friend tells me that her milkman has six, but I have never seen a case myself. The story is told of a 6-fingered man with an unusual surname, who visited Australia and saw his name on a shop window. He entered the shop and found that the owner also had six fingers; so the gene would probably be dominant.

Ectrodactyly is a deformity of the hands and feet known as

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lobster claw. It turns up in every generation and was once thought to be dominant but may not be completely so. A character which is produced by a dominant gene is the ability to taste a low concentration of phenylthiourea. Tasting is dominant and non-tasting is recessive. The rates seem to be two-thirds tasters to one-third non-tasters where tests have been made. Chimpanzees, apes and orang-outans have been found to be tasters and non-tasters in the same proportions. It was discovered in 1939 that more non-tasters are found among those who have nodular goitre, so it seems that those with the non-tasting gene are more likely to develop this disease.

Sickle-cell Anaemia. There are populations who have a gene for what is known as sickle-cell anaemia. Persons who have a pair of genes for the disease die before reaching adulthood. Those who have only one gene have what is known as the "sickling trait." It was wondered how this gene survived as it seems always to be a disadvantage, but it has now been discovered that the possession of the gene assists the resistance to subtertian malaria. Where the sickling gene is common so, too, is subtertian malaria. I pointed out to you in my opening remarks that a gene may be an advantage in one environment and not in another. This, then, is an example. It is found in "large Negro populations in Africa and North America and some non-negro groups, but is declining in North America in comparison with Africa because there is no subtertian malaria" and therefore no advantage.

Sex Linkage. Many interesting results arise from sex-linked genes. Amongst these are colour in animals and chickens and, curiously enough, colour vision in humans. In cats, the female has XX chromosomes and the male XY. If the colour genes for black and yellow respectively are in the 2 X-chromosomes, a female could have both the black and yellow chromosomes and would be tortoise-shell; but the male, having only one X-chromosome, could either be black or yellow but not tortoise-shell and so the latter is always female. Sex linkage has long been extensively used in the rearing of chickens. Birds are different from cats in having females XY and males XX. The Light Sussex breed (with some black feathers) carry a gene in the X-chromosome which stops the formation of yellow in the feathers. If we cross a Light Sussex hen with a Rhode Island Red cock, the cockerels inherit this gene and so are white in colour but the pullets, who have not the extra X-chromosome are yellow, as their colour is inherited from the Rhode Island Red male. Hence the chickens can be sorted out at birth, which is very useful. Alas! Some day-old male chicks are fed to the reptiles at Bristol Zoo.

Colour Blindness is inability to see the difference between red and green. This gene is situated in the X chromosome. Women are only colour-blind when they carry the gene in each X chromosome, which is unusual. In this particular case, every one of her sons would be colour-blind. Very many more men than women are colour-blind as, having only one X chromosome, their chances are much greater.

Baldness is thought to be caused by a sex-limited gene. It is due to a gene in conjunction with another factor so that all men carrying the gene are not necessarily bald.

Effect of Environment or Food even in the Presence of Genes. Rabbits have yellow fat if they possess two genes for the condition; but if they have a dominant gene for white fat, this produces an enzyme which destroys the yellow pigment formed by eating green food. However, if the rabbits have no green food, they will have white fat even in the presence of these two genes.

Diphtheria in Man is slightly dependent on heredity; if a person is not exposed to infection, even if his resistance is less, he does not contract it, but a person with greater resistance may develop it, so environment in this case is greater than heredity. We have not nearly enough knowledge at present to be able to state which is the greater, environment or heredity, in many diseases. Naturally, nutrition does play a very big part and the stresses and strains of life.

Multiple Genes. I have discussed diseases and conditions due to single genes or a pair of alleles. Now I want to mention multiple genes.

Why should children be so much taller than their parents and grand-parents? Human height is controlled by many genes. Some genes act only in the presence of others and are called "modifying factors." So we see how complex is the working of the genes and how much remains to be studied.

It has been found that some species are more likely to develop malignant diseases than others. The rate is higher in domestic fowls (9%) than in cattle (0.2%). About 80% of grey horses show malignant conditions of the skin in advancing years. This is much higher than the frequency in horses of other colours, where it is only 5%.

Rickets is thought to be dependent on a gene but does not show itself when sufficient Vitamin D is obtained in the diet. This is analogous to the case of yellow fat in rabbits.

Summing up: a great deal of information has been added to our knowledge of heredity since 1900 when Mendel's work first came into its own. An enormous amount of work still needs to be done.

Genetics is of use:—

(1) In producing better flocks and herds and more grain per acre, thus helping to feed man in a world with ever-increasing population.
(2) In blood transfusions after loss of blood due to accidents, wounds and operations.
(3) In saving babies born to Rhesus —ve mothers.
(4) In Eugenics by pointing to the inadvisability of cousin marriages, or those with a serious dominant condition abstaining from marriage.

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(5) People of certain blood groups with stomach trouble may be suspected of having duodenal condition or carcinoma and the condition detected much earlier.

(6) In the study of Evolution.

(7) In understanding the results of nuclear fall-out.

(8) In producing sex-linked chickens where pullets may be identified at birth.

Thus, I hope that I have been able to show that the study of Genetics is not only interesting in itself, but that it is a modern science of prior importance to all Mankind.

BOOKS CONSULTED

"Essays in Popular Science" by J. HUXLEY.
"General Genetics" by ADRIAN SRB AND RAY D. OWEN.
"Genetics for Medical Students" by E. B. FORD.
"Man, Time and Fossils" by RUTH MOORE.
"Natural Selection and Heredity" by P. M. SHEPPARD.
"Variation and Heredity" by H. KALMUS.
"You and Heredity" by AMRAM SCHEINFELD.