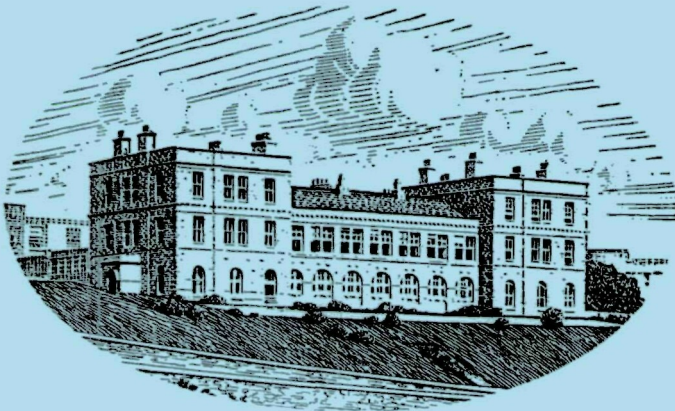


**JOURNAL OF THE
MARINE BIOLOGICAL ASSOCIATION
OF THE UNITED KINGDOM**



THE PLYMOUTH LABORATORY

VOLUME 38, No. 2
(issued June 1959)

CAMBRIDGE
AT THE UNIVERSITY PRESS
1959

Price Forty-six shillings net
(U.S.A. \$7.75)

MARINE BIOLOGICAL ASSOCIATION
OF THE UNITED KINGDOM

PATRON

H.R.H. THE PRINCE PHILIP, DUKE OF EDINBURGH, F.R.S.

OFFICERS AND COUNCIL

President: Prof. A. V. HILL, C.H., O.B.E., Sc.D., LL.D., F.R.S.

Vice-Presidents

The Earl of IVREACH, K.G., C.B., C.M.G.

Sir NICHOLAS R. WATERHOUSE, K.B.E.

Col. Sir EDWARD T. PEEL, K.B.E., D.S.O., M.C.

Vice-Admiral Sir JOHN A. EDGEHILL, K.B.E., C.B.,
F.R.S.

Sir EDWARD J. SALISBURY, Kt., C.B.E., D.Sc., LL.D.,
F.R.S.

A. T. A. DOBSON, C.B., C.V.O., C.B.E.

Major E. G. CHRISTIE-MILLER

MORLEY H. NEALE, C.B.E.

The Earl of VERULAM

Prof. Sir JAMES GRAY, Kt., C.B.E., M.C., Sc.D.,
LL.D., F.R.S.

G. M. GRAHAM, C.M.G., O.B.E.

Honorary Members

Dr H. B. BIGLOW

Dr R. DOHRN

Prof. LOUIS FAGB

E. H. E. HAVELOCK, C.B., C.B.E.

Dr A. G. HUNTSMAN

Prof. HANS PETTERSSON, For. Mem. R.S.

Dr A. C. REDFIELD

COUNCIL

Elected Members

Prof. E. BALDWIN, Ph.D.

H. A. COLE, D.Sc.

G. E. R. DEACON, C.B.E., D.Sc., F.R.S.

G. E. FOGG, Ph.D.

Prof. J. E. HARRIS, Ph.D., F.R.S.

M. N. HILL, Ph.D.

O. D. HUNT

C. E. LUCAS, C.M.G., D.Sc.

C. H. MORTIMER, Dr.phil., D.Sc., F.R.S.

Prof. R. J. PUMPHREY, Sc.D., F.R.S.

Prof. J. E. SMITH, Sc.D., F.R.S.

S. SMITH, Ph.D.

Prof. G. P. WELLS, Sc.D., F.R.S.

H. G. VEVERS, M.B.E., D.Phil.

Prof. C. M. YONGE, C.B.E., D.Sc., F.R.S.

Governors

R. G. R. WALL (Ministry of Agriculture, Fisheries and
Food)

The Worshipful Company of Fishmongers:

The Prime Warden

Major E. G. CHRISTIE-MILLER

HARRISON S. EDWARDS

Prof. Sir ALISTER C. HARDY, Kt., D.Sc., F.R.S. (Oxford
University)

C.F.A. PANTIN, Sc.D., F.R.S. (Cambridge University)

EDWARD HINDLE, Sc.D., F.R.S. (British Association)

N. B. MARSHALL (Zoological Society)

Prof. Sir JAMES GRAY, Kt., C.B.E., M.C., Sc.D.,
LL.D., F.R.S. (Royal Society)

Hon. Treasurer: HARRISON S. EDWARDS, Westhumble Lacey, Nr. Dorking, Surrey

Secretary: F. S. RUSSELL, C.B.E., D.S.C., D.F.C., LL.D., F.R.S., The Laboratory, Citadel Hill, Plymouth, Devon

SCIENTIFIC STAFF

Director: F. S. RUSSELL, C.B.E., D.S.C., D.F.C., LL.D., F.R.S.

D. P. WILSON, D.Sc., F.R.P.S. (*Zoologist*)

L. H. N. COOPER, D.Sc., F.R.L.C. (*Chemist*)

G. M. SPOONER, M.B.E., M.A., F.R.E.S. (*Zoologist*)

MARY W. PARKER, D.Sc., Ph.D. (*Botanist*)

P. G. CORBIN, B.A. (*Zoologist*)

J. A. C. NICOL, B.Sc., M.A., D.Phil. (*Experimental
Zoologist*)

E. J. DENTON, B.A., B.Sc., Ph.D. (*Physiologist*)

D. B. CARLISLE, M.A., D.Phil. (*Bursar and Endo-
crinologist*)

N. A. HOLME, M.A. (*Zoologist*)

G. R. FORSTER, B.Sc. (*Zoologist*)

F. A. J. ARMSTRONG, A.R.I.C. (*Chemist*)

E. D. S. CORNER, M.Sc., Ph.D. (*Biochemist*)

A. J. SOUTHWARD, B.Sc., Ph.D. (*Zoologist*)

T. I. SHAW, M.A., Ph.D. (*Physiologist*)

J. V. HOWARTH, B. Sc. (*Physiologist*)

Q. BONE, M.A. (*Zoologist*)

G. W. BRYAN, B.Sc. (*Special Appointment: Zoologist*)