

JOURNAL OF THE  
MARINE BIOLOGICAL ASSOCIATION  
OF THE UNITED KINGDOM



THE PLYMOUTH LABORATORY

VOLUME XXXI, No. 1  
*(issued June 1952)*

CAMBRIDGE  
AT THE UNIVERSITY PRESS  
1952

*Price Thirty-six Shillings net*

# MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM

## OFFICERS AND COUNCIL

*President:* Prof. J. GRAY, C.B.E., M.C., Sc.D., LL.D., F.R.S.

### *Vice-Presidents*

The Earl of IVEAGH, C.B., C.M.G.

Viscount ASTOR

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

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

G. P. BIDDER, Sc.D.

W. T. CALMAN, C.B., D.Sc., F.R.S.

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

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

E. S. RUSSELL, O.B.E., D.Sc.

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

Admiral Sir AUBREY C. H. SMITH, K.B.E., C.B.,  
M.V.O.

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

Major E. G. CHRISTIE-MILLER

MORLEY H. NEALE, C.B.E.

### *Honorary Members*

Dr G. P. BIDDER

Dr H. B. BIGELOW

Dr R. DOHRN

Prof. HANS PETTERSSON

Prof. H. U. SVERDRUP

## COUNCIL

### **Elected Members**

J. S. COLMAN

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

E. FORD

F. C. FRASER, D.Sc.

H. CARY GILSON

MICHAEL GRAHAM, O.B.E.

Prof. ALASTAIR GRAHAM, D.Sc.

Prof. J. E. HARRIS, Ph.D.

C. E. LUCAS, D.Sc.

N. A. MACKINTOSH, C.B.E., D.Sc.

L. HARRISON MATTHEWS, Sc.D.

J. D. H. WISEMAN, Ph.D.

Prof. V. C. WYNNE-EDWARDS

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

Prof. J. Z. YOUNG, F.R.S.

### **Governors**

G. P. BIDDER, Sc.D.

H. J. JOHNS, C.B., M.B.E. (Ministry of Agriculture  
and Fisheries)

The Worshipful Company of Fishmongers:

The Prime Warden

Major E. G. CHRISTIE-MILLER

HARRISON S. EDWARDS

Prof. A. C. HARDY, 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)

H. W. PARKER, D.Sc. (Zoological Society)

Prof. A. V. HILL, C.H., O.B.E., Sc.D., F.R.S. (Royal  
Society)

*Hon. Treasurer:* Major E. G. CHRISTIE-MILLER, 38 Hyde Park Street, London, W. 2

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

## SCIENTIFIC STAFF

*Director:* F. S. RUSSELL, D.S.C., D.F.C., B.A., F.R.S.

*Head of Department of General Physiology:* W. R. G. ATKINS, C.B.E., Sc.D., F.R.I.C., F.Inst.P., F.R.S.

H. W. HARVEY, M.A., Sc.D., F.R.S. (*Hydrologist*)

G. A. STEVEN, B.Sc., F.R.S.E. (*Zoologist*)

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

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

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

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

J. S. ALEXANDROWICZ, Ph.D., M.D. (Jena) (*Histologist*)

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

H. G. VEVERS, M.B.E., M.A., D.Phil., F.Z.S. (*Bursar  
and Zoologist*)

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

J. LOWY, B.A., Ph.D. (*Experimental Zoologist*)

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

D. B. CARLISLE, B.A. (*Endocrinologist*)

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