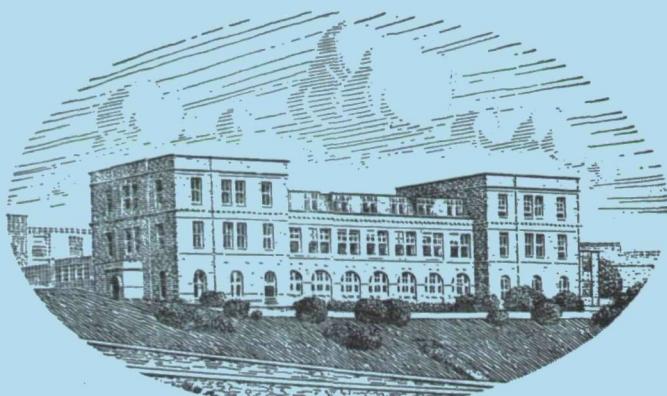


JOURNAL OF THE  
MARINE BIOLOGICAL ASSOCIATION  
OF THE UNITED KINGDOM



THE PLYMOUTH LABORATORY

VOLUME 42, No. 3

(issued October 1962)

CAMBRIDGE  
AT THE UNIVERSITY PRESS  
1962

*Price Seventy-six shillings net*

(U.S.A. \$13.00)

# 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. C. F. A. PANTIN, Sc.D., D.Sc., Dr Univ., F.R.S.

### Vice-Presidents

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

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

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

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

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

Major E. G. CHRISTIE-MILLER

MORLEY H. NEALE, C.B.E.

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.

Prof. Sir ALISTER HARDY, Kt., D.Sc., F.R.S.

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

### Honorary Members

Dr H. B. BIGELOW

Dr A. G. HUNTSMAN

Dr R. DOHRN

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

Prof. LOUIS FAGE

Dr A. C. REDFIELD

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

## COUNCIL

### Elected Members

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

Prof. B. KATZ, M.D., D.Sc., F.R.S.

F. C. FRASER, D.Sc.

R. D. KEYNES, Ph.D., F.R.S.

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

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

Prof. R. J. HARRISON, D.Sc., M.D., M.R.C.S.,  
L.R.C.P.

J. W. G. LUND, D.Sc., Ph.D.

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

Prof. Sir JOHN T. RANDALL, D.Sc., F.R.S.

M. N. HILL, Ph.D., F.R.S.

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

O. D. HUNT, F.R.S.E.

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

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

### Governors

H. GARDNER, C.B.E. (Ministry of Agriculture,  
Fisheries and Food)

S. SMITH, Ph.D. (Cambridge University)  
EDWARD HINDLE, Sc.D., F.R.S. (British  
Association)

The Worshipful Company of Fishmongers:

Prof. G. P. WELLS, Sc.D., F.R.S. (Zoological  
Society)

The Prime Warden

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

Major E. G. CHRISTIE-MILLER

HARRISON S. EDWARDS

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

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

*Secretary:* F. S. RUSSELL, C.B.E., D.S.C., D.F.C., D.Sc., 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., D.Sc., LL.D., F.R.S.

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

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

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

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

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

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

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

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

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

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

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

G. T. BOALCH, B.Sc., Ph.D. (*Botanist*)

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

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

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

A. G. DAVIES, B.Sc., Ph.D. (*Special Appointment:  
Physical Chemist*)

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

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

October 1962