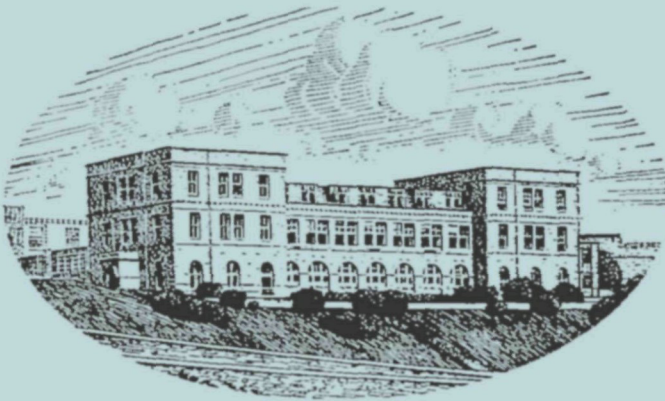


JOURNAL OF THE
MARINE BIOLOGICAL ASSOCIATION
OF THE UNITED KINGDOM



THE PLYMOUTH LABORATORY

VOLUME 51, No. 3
(issued August 1971)

CAMBRIDGE
AT THE UNIVERSITY PRESS
1971

Price £6.00 net

(U.S.A. \$19.00)

Annual Subscription for Volume (of four parts): £22.00 net (U.S.A. \$70.00)

THE 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. L. HODGKIN, Sc.D., P.R.S.

Vice-Presidents

Prof. A. V. HILL, C.H., O.B.E., Sc.D., LL.D., F.R.S.	Prof. Sir ALISTER C. HARDY, Kt., D.Sc., F.R.S.
Sir EDWARD J. SALISBURY, Kt., C.B.E., D.Sc., LL.D., F.R.S.	Sir C. MAURICE YONGE, Kt., C.B.E., D.Sc., F.R.S.
Prof. Sir JAMES GRAY, Kt., C.B.E., M.C., Sc.D., LL.D., F.R.S.	Rear Admiral Sir EDMUND G. IRVING, K.B.E., C.B.
G. M. GRAHAM, C.M.G., O.B.E.	Sir FREDERICK S. RUSSELL, Kt., C.B.E., D.S.C., D.F.C., D.Sc., LL.D., F.R.S.
	Sir EDWARD R. CHADWYCK-HEALEY, Bt., M.C.

Honorary Members

Prof. Sir JAMES GRAY, Kt., C.B.E., M.C., Sc.D., LL.D., F.R.S.	Dr A. G. HUNTSMAN
Prof. Sir ALISTER C. HARDY, Kt., D.Sc., F.R.S.	Miss MARIE V. LEBOUR, D.Sc.
E. H. E. HAVELOCK, C.B., C.B.E.	Dr A. C. REDFIELD
Prof. A. V. HILL, C. H., O.B.E., Sc.D., LL.D., F.R.S.	Sir C. MAURICE YONGE, Kt., C.B.E., D.Sc., F.R.S.

COUNCIL

Elected Members

Prof. H. CHARNOCK	Prof. O. E. LOWENSTEIN, D.Sc., F.R.S.
Prof. D. J. CRISP, Sc.D., F.R.S.	C. E. LUCAS, C.M.G. D.Sc., F.R.S.
R. I. CURRIE	N. B. MARSHALL, Sc.D., F.R.S.
Sir GEORGE DEACON, Kt., C.B.E., D.Sc., F.R.S.	Prof. D. NICHOLS, D.Phil.
M. R. DROOP, D.Sc.	Prof. T. I. SHAW, Ph.D., F.R.S.
J. A. B. GRAY, M.B., Sc.D.	H. G. VEVERS, M.B.E., D.Phil.
Rear Admiral Sir EDMUND G. IRVING, K.B.E., C.B.	Prof. J. Z. YOUNG, D.Sc., F.R.S.

Governors

J. GRAHAM (Ministry of Agriculture, Fisheries and Food)	M. J. WELLS, Sc.D. (Cambridge University)
The Worshipful Company of Fishmongers:	EDWARD HINDLE, Sc.D., F.R.S. (British Association)
Sir EDWARD R. CHADWYCK-HEALEY, Bt., M.C.	Prof. G. P. WELLS, Sc.D., F.R.S. (Zoological Society)
Col. Sir JOHN G. CAREW POLE, Bt., D.S.O., T.D.	Prof. Sir BERNARD KATZ, Kt., M.D., D.Sc., F.R.S. (Royal Society)
The Hon. HUGH WALDORF ASTOR, J.P.	Prof. E. J. DENTON, Sc.D., F.R.S. (Physiological Society)
Prof. J. W. S. PRINGLE, M.B.E., Sc.D., F.R.S. (Oxford University)	

Hon. Treasurer: The Hon. HUGH WALDORF ASTOR, J. P., 14 Culross Street, London, W.1.

Secretary: J. E. SMITH, Sc.D., F.R.S., The Laboratory, Citadel Hill, Plymouth, Devon

SCIENTIFIC STAFF

Director: J. E. SMITH, Sc.D., D.Sc., F.I.Biol., F.R.S.

L. H. N. COOPER, D.Sc., F.R.I.C., F.G.S., F.I.Biol., F.R.S. (<i>Chemist</i>)	G. T. BOALCH, B.Sc., Ph.D. (<i>Phycologist</i>)
G. M. SPOONER, M.B.E., M.A., F.R.E.S. (<i>Zoologist</i>)	G. W. BRYAN, B.Sc., Ph.D. (<i>Zoologist</i>)
MARY W. PARKE, D.Sc., Ph.D., F.L.S., F.I.Biol. (<i>Phycologist</i>)	A. G. DAVIES, B.Sc., Ph.D. (<i>Physical Chemist</i>)
P. G. CORBIN, B.A. (<i>Zoologist</i>)	P. R. DANDO, B.Sc., Ph.D. (<i>Biochemist</i>)
N. A. HOLME, M.A. (<i>Zoologist</i>)	P. E. GIBBS, B.Sc., M.A., Ph.D. (<i>Zoologist</i>)
G. R. FORSTER, B.Sc. (<i>Zoologist</i>)	B. L. ROBERTS, M.A., Ph.D. (<i>Physiologist</i>)
E. D. S. CORNER, M.Sc., Ph.D. (<i>Biochemist</i>)	J. C. GREEN, Ph.D. (<i>Phycologist</i>)
A. J. SOUTHWARD, D.Sc., Ph.D. (<i>Zoologist</i>)	D. K. GRIFFITHS, M.Sc. (<i>Physical Oceanographer</i>)
J. V. HOWARTH, B.Sc. (<i>Physiologist</i>)	G. W. POTTS, B.Sc., Ph.D. (<i>Zoologist</i>)
Q. BONE, M.A., D.Phil. (<i>Zoologist</i>)	J. B. GILPIN-BROWN, B.Sc., Ph.D. (<i>Zoologist</i>)
	H. MEYER, M.D. (<i>Physiologist</i>)
	M. WHITFIELD, B.Sc., Ph.D. (<i>Physical Chemist</i>)

J. H. WICKSTEAD, D.Sc., Ph.D., F.I.Biol., Foreign and Commonwealth Office (O.D.A.) (*Zoologist*)

Prof. E. J. DENTON, Sc.D., F.I.Biol., F.R.S. (*Physiologist*),

Royal Society Research Professor of Bristol University

MOLLY F. SPOONER, Ph.D. (*Special Appointment: oil pollution*)

JOURNAL OF THE MARINE BIOLOGICAL ASSOCIATION
INSTRUCTIONS FOR THE PREPARATION
OF MANUSCRIPTS

TITLE

The title of the paper should be kept as short as possible.

The name of the author at the beginning of the paper should be followed only by senior qualifications.

TEXT

Manuscripts must be typed (double-spaced) on one side of the paper, leaving ample margins, with the folios numbered. Words to be printed in italic should be underlined. The first mention of Latin names of species should be followed by the authority, except where reference is made to a work in which the authority appears (e.g. *Plymouth Marine Fauna*).

Manuscripts should be as concise as possible. Undue length will undoubtedly lead to delay in publication as the paper will be returned to the author for shortening.

All linear measurements and weights should be in the metric scale.

For symbols and abbreviations, the recommendations of the Royal Society (1951) are followed.

TABLES

Tables should be set out on separate sheets numbered in Arabic numerals, and given a concise heading.

TEXT-FIGURES

Text-figures should be in black ink. It is important to make the lines sufficiently black. Areas to be mechanically stippled should be indicated by light-blue pencil shading.

No drawing should be so large that it must be reduced to less than one-third of its original size. The degree of reduction need not be inserted by the author.

Illustrations requiring lettering should not be drawn on Ethulon.

The size of the printed area of the *Journal* page is 18 × 12 cm. The maximum size for a full-page figure (with legend) is 19½ × 13½ cm.

Lettering, numerals, etc., should be marked clearly in blue pencil and indicating the position in which they are to be inserted by an arrow in blue pencil. This should be kept to a workable minimum, all details being included in the legend.

Authors are requested to see that their manuscripts are in finished form and completely ready for publication so that corrections may be reduced to a minimum, and these are confined as far as possible to the first proof. If the cost for corrections exceeds a reasonable figure, the author is liable to be charged the full extent of the excess.

Axes and graduation marks on graphs must be inked in. The lines on graph paper are not normally reproduced, and should be blue or faint grey.

Legends for figures must be typed all together on a separate sheet, and not inserted on the actual illustrations.

Text-figures are numbered in arabic numerals, and referred to in the text as 'Fig. 1', etc. Where there is a plate containing several figures, the text-figures are referred to as 'Text-fig. 1', etc.

All line-drawings are printed as text-figures, as well as photographs for which fine detail is not required.

PLATES

Photographs should be on smooth-surfaced paper, semi-matt or glossy. The edges of the photograph must be trimmed square. It is important that the background in the photograph be of a uniform tone and free from blemishes.

Divisions of plates, or separate figures on one plate, are indicated by capital letters.

SUMMARY

Each paper must be accompanied by an informative Summary, giving the main results of the work published.

REFERENCES

References are listed alphabetically at the end of the paper. The full title of the paper must be given. Titles of papers, but not of books, are decapitalized. Titles of Journals are abbreviated as in the *World List of Scientific Publications* (4th ed., 1963 on). Volume (Vol.), Band (Bd.), or Tome (T.) numbers are in Arabic numerals. Where a volume appears in parts the part need only be specified where each has separate pagination. References to books should include the publisher. Citations in text to be given by author's name followed by date in brackets.

Examples:

MARSHALL, S. M., NICHOLLS, A. G. & ORR, A. P., 1939. On the growth and feeding of young herring in the Clyde. *J. mar. biol. Ass. U.K.*, Vol. 23, pp. 427-55.

RUSSELL, F. S. & YONGE, C. M., 1928. *The Seas*. 379 pp. London: Frederick Warne.

SUBSCRIPTIONS

Journal of the Marine Biological Association of the United Kingdom is published quarterly. Single parts cost £6.00 net (\$19.00 in the U.S.A.) plus postage.

Four parts form a volume. The subscription price of a volume (which includes postage) is £22.00 net (\$70.00 in the U.S.A.).

Second class postage paid at New York, N.Y.

PROCEEDINGS OF THE
MALACOLOGICAL SOCIETY
OF LONDON

Vol. 39, Part 4, April 1971

£2.00 net, or \$6.50 U.S.

Presidential Address. R. D. Purchon. Digestion in filter-feeding bivalves—a new concept

D. S. Brown. Ecology Gastropoda in a South African mangrove swamp

Margaret C. Pilkington. The veliger stage of *Hydrobia ulvae* (Pennant)

Brian Morton. Studies on the biology of *Dreissena polymorpha* (Pal). V. Some aspects of filter-feeding, and the effect of micro-organisms upon the rate of filtration

S. G. Pal. The fine structure of the digestive tubules of *Mya arenaria* L. I. Basiphil cell

R. A. D. Cameron and M. A. Palles-Clark. *Arianta arbustorum* (L.) on chalk downs in southern England

Yoram Yom-Tov. Body temperature and light reflectance in two desert snails

Notes

Annual subscription (three parts) £5.00 (\$17.00) post free.

BLACKWELL SCIENTIFIC PUBLICATIONS LTD

5 Alfred St, Oxford

THE JOURNAL OF ANIMAL ECOLOGY

EDITORS: H. N. SOUTHERN and E. BROADHEAD

VOL. 40, No. 2

JUNE 1971

R. L. Kitching. An ecological study of water-filled tree-holes and their position in the woodland ecosystem.

Walter D. Edgar. The life-cycle, abundance and seasonal movement of the wolf spider, *Lycosa (Pardosa) lugubris*, in central Scotland.

P. R. Grant. Experimental studies of competitive interaction in a two-species system. III. *Microtus* and *Peromyscus* species in enclosures.

R. A. Avery. Estimates of food consumption by the lizard *Lacerta vivipara* Jacquin.

Adam Watson and G. R. Miller. Territory size and aggression in a fluctuating red grouse population.

J. H. Lawton. Ecological energetics studies on larvae of the damselfly *Pyrrosoma nymphula* (Sulzer) (Odonata: Zygoptera).

J. B. Whittaker. Population changes in *Neophilaenus lineatus* (L.) (Homoptera: Cercopidae) in different parts of its range.

Malcolm Hadley. Aspects of the larval ecology and population dynamics of *Molophilus ater* Meigen (Diptera: Tipulidae) on Pennine moorland.

Valerio Scali. Imaginal diapause and gonodal maturation of *Maniola jurtina* (Lepidoptera: Satyridae) from Tuscany.

M. P. Hassell. Mutual interference between searching insect parasites.

D. Michael Stoddart. Breeding and survival in a population of water voles.

G. W. Elmes. An experimental study on the distribution of heathland ants.

J. P. Spradbery. Seasonal changes in the population structure of wasp colonies (Hymenoptera: Vespidae).

N. Gilbert and R. D. Hughes. A model of an aphid population – three adventures.

Subscription price £14.00 per volume of three parts (single parts £5.25 each)

BLACKWELL SCIENTIFIC PUBLICATIONS LTD

5 ALFRED STREET · OXFORD

THE JOURNAL OF ECOLOGY

EDITORS: G. F. ASPREY and A. J. WILLIS

VOL. 59, No. 2

JULY 1971

- A. J. Breerton.** The structure of the species populations in the initial stages of salt-marsh succession.
- J. Bottomley.** Some statistical problems arising from the use of the information statistic in numerical classification.
- Laszlo Orloci.** An information theory model for pattern analysis.
- Erhart O. Hellmuth.** Eco-physiological studies on plants in arid and semi-arid regions in Western Australia. IV. Comparison of the field physiology of the host, *Acacia grasbyi* and its hemiparasite, *Amyema nector* under optimal and stress conditions.
- Erhart O. Hellmuth.** Eco-physiological studies on plants in arid and semi-arid regions in Western Australia. V. Heat resistance limits of photosynthetic organs of different seasons, their relation to water deficits and cell sap properties and the regeneration ability.
- John Procter and Stanley R. J. Woodell.** The plant ecology of serpentine. I. Serpentine vegetation of England and Scotland.
- John Procter.** The plant ecology of serpentine. II. Plant response to serpentine soils.
- Roberto Goodland.** A physiognomic analysis of the 'cerrado' vegetation of Central Brasil.
- G. L. Lyon, P. J. Peterson, R. R. Brooks and G. W. Butler.** Calcium, magnesium and trace elements in a New Zealand serpentine flora.
- Graham P. Harris.** The ecology of corticolous lichens. I. The zonation on oak and birch in south Devon.
- Graham P. Harris.** The ecology of corticolous lichens. II. The relationship between physiology and the environment.
- G. I. Forrest.** Structure and production of North Pennine blanket bog vegetation.
- D. F. Grigal and R. A. Goldstein.** An integrated ordination-classification analysis of an intensively sampled oak-hickory forest.
- A. W. Davidson.** The ecology of *Hordeum murinum* L. II. The ruderal habit.
- Joan M. Hett and Orle L. Loucks.** Sugar maple (*Acer saccharum* Marsh.) mortality.
- J. W. G. Lund.** An artificial alteration of the seasonal cycle of the plankton diatom *Melosira italica* subsp. *subarctica* in an English Lake.
- Lesley D. Clarke and Nola J. Hannon.** The mangrove swamp and salt marsh communities of the Sydney district. IV. The significance of species interaction.
- Derek J. Anderson.** Pattern in desert perennials.
- Ruth M. Tittensor and R. C. Steele.** Plant communities of the Loch Lomond oak-woods.
- Helen E. Jones.** Comparative studies of plant growth and distribution in relation to waterlogging. III. The response of *Erica cinerea* L. to waterlogging in peat soils of differing iron content.
- J. G. Jones.** Studies on freshwater bacteria: factors which influence the population and its activity.
- L. P. White.** Vegetation stripes on sheet wash surfaces.

BIOLOGICAL FLORA OF THE BRITISH ISLES

Q. O. N. Kay. *Anthemis cotula* L.

Q. O. N. Kay. *Anthemis arvensis* L.

Subscription price £14.00 per volume of three parts (single parts £5.25 each)

BLACKWELL SCIENTIFIC PUBLICATIONS LTD
5 ALFRED STREET · OXFORD