

JOURNAL OF THE
MARINE BIOLOGICAL ASSOCIATION
OF THE UNITED KINGDOM



THE PLYMOUTH LABORATORY

VOLUME 47, No. 2

CAMBRIDGE
AT THE UNIVERSITY PRESS

1967

Price £5 net

(U.S.A. \$16.75)

Annual Subscription for Volume (of three parts); £14 (U.S.A. \$47.00)

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. A. L. HODGKIN, Sc.D., F.R.S.

Vice-Presidents

The Earl of IVEAGH, K.G., C.B., C.M.G., 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.
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 C. HARDY, Kt., D.Sc., F.R.S.
C. M. YONGE, C.B.E., D.Sc., F.R.S.
Rear Admiral Sir EDMUND G. IRVING, K.B.E., C.B.

Honorary Members

Dr H. B. BIGELOW
Prof. Sir JAMES GRAY, Kt., C.B.E., M.C., Sc.D.,
LL.D., F.R.S.
Prof. Sir ALISTER C. HARDY, Kt., D.Sc., F.R.S.
E. H. E. HAVELOCK, C.B., C.B.E.

Dr A. G. HUNTSMAN
Dr A. C. REDFIELD
Prof. G. THORSON, D.Phil.
C. M. YONGE, C.B.E., D.Sc., F.R.S.
Prof. L. A. ZENKEVITCH

COUNCIL

Elected Members

Prof. D. J. CRISP, Ph.D.
G. E. R. DEACON, C.B.E., D.Sc., F.R.S.
Prof. J. M. DODD, Ph.D.
Prof. G. E. FOGG, Ph.D., F.R.S.
F. C. FRASER, C.B.E., D.Sc., F.R.S.
R. S. GLOVER
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.
Prof. E. W. KNIGHT-JONES, Ph.D.
Prof. O. E. LOWENSTEIN, D.Sc., F.R.S.
C. E. LUCAS, C.M.G., D.Sc., F.R.S.
J. W. LUND, D.Sc., F.R.S.
C. M. YONGE, C.B.E., D.Sc., F.R.S.

Governors

W. C. TAME (Ministry of Agriculture, Fisheries
and Food)
The Worshipful Company of Fishmongers:
Sir EDWARD CHADWYCK-HEALEY, Bt., M.C.
Col. Sir JOHN G. CAREW POLE, Bt., D.S.O., T.D.
The Hon. HUGH WALDORF ASTOR, J.P.
Prof. J. W. S. PRINGLE, M.B.E., Sc.D., F.R.S.
(Oxford University)

S. SMITH, Ph.D. (Cambridge University)
EDWARD HINDLE, Sc.D., F.R.S. (British
Association)
Prof. G. P. WELLS, Sc.D., F.R.S. (Zoological
Society)
Prof. B. KATZ, M.D., D.Sc., F.R.S. (Royal Society)
Prof. E. J. DENTON, Sc.D., F.R.S.
(Physiological Society)

Hon. Treasurer: Sir EDWARD CHADWYCK-HEALEY, Bt., M.C., The Mill House,
Hook, Basingstoke, Hants.

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

SCIENTIFIC STAFF

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

D. P. WILSON, D.Sc., F.I.Biol., F.R.P.S. (*Zoologist*)
L. H. N. COOPER, D.Sc., F.R.I.C., F.G.S., F.I.Biol.,
F.R.S. (*Chemist*)
G. M. SPOONER, M.B.E., M.A., F.R.E.S. (*Zoologist*)
MARY W. PARKE, D.Sc., Ph.D., F.L.S., F.I.Biol.
(*Botanist*)
P. G. CORBIN, B.A. (*Zoologist*)
J. A. C. NICOL, D.Sc., M.A., D.Phil. (*Experimental
Zoologist*)
N. A. HOLME, M.A. (*Zoologist*)

G. R. FORSTER, B.Sc. (*Zoologist*)
E. D. S. CORNER, M.Sc., Ph.D. (*Biochemist*)
A. J. SOUTHWARD, D.Sc., Ph.D. (*Zoologist*)
J. V. HOWARTH, B.Sc. (*Physiologist*)
Q. BONE, M.A., D.Phil. (*Zoologist*)
G. T. BOALCH, B.Sc., Ph.D. (*Botanist*)
G. W. BRYAN, B.Sc., Ph.D. (*Zoologist*)
A. G. DAVIES, B.Sc., Ph.D. (*Physical Chemist*)
P. E. GIBBS, B.Sc., M.A. (*Zoologist*)
P. R. DANDO, B.Sc. (*Special appointment, Biochemist*)

J. H. WICKSTEAD, D.Sc., Ph.D., Ministry of Overseas Development (*Zoologist*)

Prof. E. J. DENTON, Sc.D., F.I.Biol., F.R.S. (*Physiologist*),
Royal Society Research Professor of Bristol University

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.

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.

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. Where several photographs make up a single plate, they are numbered 'Fig. 1', etc.

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.

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 to the full extent of the excess.

The Journal of General Microbiology

Editors: B. C. J. G. KNIGHT and A. F. B. STANDFAST

Contents of Volume 47, No. 1, April 1967

- A. H. Reisner and H. Macindoe.** Incorporation of amino acid into protein by utilizing a cell-free system from *Paramecium*.
- M. Hutchinson, K. I. Johnstone and D. White.** Taxonomy of anaerobic thiobacilli.
- M. Felton, Jr., J. J. Cooney and W. G. Moore.** A quantitative study of the bacteria of a temporary pond.
- B. Jarvis.** Resistance to nisin and production of nisin-inactivating enzymes by several *Bacillus* species.
- J. D. Anderson and G. T. Crouch.** A new principle for the determination of total bacterial numbers in populations recovered from aerosols.
- P. N. Hobson and R. Summers.** The continuous culture of anaerobic bacteria.
- S. G. Wilkinson.** The sensitivity of pseudomonads to ethylene-diaminetetra-acetic acid.
- P. Weglenski.** The mechanism of action of proline suppressors in *Aspergillus nidulans*.
- W. J. Brammar, P. H. Clarke and A. J. Skinner.** Biochemical and genetic studies with regulator mutants of the *Pseudomonas aeruginosa* amidase system.
- A. Afshar.** The growth of *Mycoplasma bovis* in cell cultures.
- A. B. Harris.** Inhibition of growth and nucleic acid synthesis in iron-deficient *Mycobacterium smegmatis*.
- W. A. Hamilton and J. M. Stubbs.** Comparison of the germination and outgrowth of spores of *Bacillus cereus* and *Bacillus polymyxa*.
- J. T. Smith.** Production of thymineless mutants in Gram-negative bacteria (*Aerobacter Proteus*).
- H. U. Joshi, A. J. H. Carr and D. G. Jones.** Effect of clover phyllody virus on nodulation of white clover (*Trifolium repens*) by *Rhizobium trifolii*.
- H. Williams Smith and S. Halls.** The transmissible nature of the genetic factor in *Escherichia coli* that controls haemolysin production.

The subscription price is £5 net per volume of 3 parts, single parts 45s. each, plus postage. Four volumes will be issued each year. Orders should be sent to

CAMBRIDGE UNIVERSITY PRESS

BENTLEY HOUSE, 200 EUSTON ROAD, LONDON, N.W. 1

THE JOURNAL OF ECOLOGY

EDITOR: P. GREIG-SMITH

VOL. 55, No. 1

MARCH 1967

- J. H. Sparling.** The occurrence of *Schoenus nigricans* L. in blanket bogs. I. Environmental conditions affecting the growth of *S. nigricans* in blanket bog. II. Experiments on the growth of *S. nigricans* under controlled conditions.
- P. J. Grubb and T. C. Whitmore.** A comparison of montane and lowland forest in Ecuador. III. The light reaching the ground vegetation.
- P. B. Cavers and J. L. Harper.** Studies in the dynamics of plant populations. I. The fate of seed and transplants introduced into various habitats.
- P. B. Cavers and J. L. Harper.** The comparative biology of closely related species living in the same area. IX. *Rumex*: the nature of adaptation to a sea-shore habitat.
- T. C. E. Wells.** Changes in a population of *Spiranthes spiralis* (L.) Chevall at Knock Hoe National Nature Reserve, Bedfordshire. 1962-65.
- W. Armstrong and D. J. Boatman.** Some field observations relating the growth of bog plants to conditions of soil aeration.
- D. T. Clarkson.** Phosphorus supply and growth rate in species of *Agrostis* L.
- M. C. F. Proctor.** The distribution of British liverworts: a statistical analysis.
- P. S. Lloyd and C. D. Pigott.** The influence of soil conditions on the course of succession on the chalk of Southern England.
- D. H. N. Spence.** Factors controlling the distribution of freshwater macrophytes with particular reference to the lochs of Scotland.
- L. J. Webb, J. G. Tracey, W. T. Williams and G. N. Lance.** Studies in the numerical analysis of complex rain-forest communities. I. A comparison of methods applicable to site/species data.
- L. Orlocci.** An agglomerative method for classification of plant communities.

BIOLOGICAL FLORA OF THE BRITISH ISLES

J. K. Marshall. *Corynephorus canescens* (L.) Beauv.

L. A. Boorman. *Limonium vulgare* Mill. and *L. humile* Mill.

Reviews.

Subscription price £9. 9s. per volume of three parts (single parts 70s. each)

BLACKWELL SCIENTIFIC PUBLICATIONS LTD.

5 ALFRED STREET • OXFORD

THE JOURNAL OF ANIMAL ECOLOGY

EDITORS: O. W. RICHARDS and K. H. MANN

VOL. 36, No. 2

JUNE 1967

- Malcolm Luxton.** The ecology of saltmarsh Acarina.
- Brian Mitchell.** Growth layers in dental cement for determining the age of red deer (*Cervus elaphus* L.).
- R. N. Gibson.** The use of the anaesthetic quinaldine in fish ecology.
- M. B. Hill.** The life cycles and salinity tolerance of the serpulids *Mercierella enigmatica* Fauvel and *Hydroides uncinata* (Philippi).
- William Block.** Recovery of mites from peat and mineral soils using a new flotation method.
- D. J. Crisp.** Chemical factors inducing settlement in *Crasostrea virginica* (Gmelin).
- M. V. Brian, G. Elmes and A. F. Kelly.** Populations of the ant *Tetramorium caespitum* Latreille.
- J. M. Elliott.** The life histories and drifting of the Plecoptera and Ephemeroptera in a Dartmoor stream.
- P. Merrett.** The phenology of spiders on heathland in Dorset. I. Families Atypidae, Dysderidae, Gnaphosidae, Clubionidae, Thomisidae and Salticidae.
- J. H. Frank.** The insect predators of the pupal stage of the winter moth, *Operophtera brumata* (L.) (Lepidoptera: Hydrimenidae).
- Craig B. Kensler.** Desiccation resistance of intertidal crevice species as a factor in their zonation.
- Brian Stott.** The movements and population densities of roach (*Rutilus rutilus* (L.)) and gudgeon (*Gobio gobio* (L.)) in the River Mole.
- I. N. Healey.** An ecological study of temperatures in a Welsh moorland soil, 1962-63.
- R. A. Beaver.** The regulation of population density in the bark beetle *Scolytus scolytus* (F.).
- Christine A. Batten and R. J. Berry.** Prenatal mortality in wild-caught house mice.

Subscription price £8 per volume of three parts (single parts 60s. each)

BLACKWELL SCIENTIFIC PUBLICATIONS LTD.

5 ALFRED STREET • OXFORD

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON

Vol. 37, Part 4, April 1967

£1. 5s. net, or \$4 U.S.

- W. J. Rees.** A brief survey of the symbiotic associations of Cnidaria with Mollusca.
- Kenneth R. H. Read.** Thermal tolerance of the bivalve mollusc *Lima scabra* Born, in relation to environmental temperature.
- R. M. Carter.** On the nature and definition of the lunule, escutcheon and corcelet in the Bivalvia.
- R. M. Carter.** On Lison's model of bivalve shell form, and its biological interpretation.
- Barry R. Wilson.** A new generic name for three recent and one fossil species of Mytilidae (Mollusca: Bivalvia) in southern Australasia, with redescriptions of the species.
- F. E. Eames.** The arcid species *sulcicosta* Nyst, 1843.
- F. E. Eames.** A new arcid species from Holland.
- F. E. Eames.** Notes on some *Anadara*.

Annual subscription (three parts) 60s. (\$10) post free.

BLACKWELL SCIENTIFIC PUBLICATIONS LTD.

5 Alfred St., Oxford

Journal of CELL SCIENCE

Formerly The Quarterly Journal of Microscopical Science

The *Journal of Cell Science* is devoted to all aspects of the study of cells. The scope of the journal is wide, and papers dealing with the entire range of investigations of cell organization, including accounts of advances in the relevant techniques, will be acceptable. Thus, in addition to studies of the structure and functions of plant and animal cells and their extracellular products (for example, cell walls, cuticles), papers will be published on such topics as cell growth and division, cell movements and interactions, and cell genetics. Contributions concerned with aspects of morphogenesis at the cellular and subcellular levels will also be acceptable. Studies of the organization of micro-organisms will be welcomed, as will papers dealing with the study of viruses, in so far as they are relevant to an understanding of cell organization (for example, those dealing with cell virus interactions). Cytochemical papers will be acceptable, but histochemical work, in which the emphasis is on the localization of substances at the tissue level, will not ordinarily be included. Occasional review articles will be published.

Subscriptions: £8 per volume of 4 parts, post free; single parts 50s. postage extra. Copies may be ordered from your bookseller, or direct from the publishers:

CAMBRIDGE UNIVERSITY PRESS, Bentley House, 200 Euston Road, London, N.W.1

THE JOURNAL OF EXPERIMENTAL BIOLOGY

Edited by SIR VINCENT WIGGLESWORTH and J. A. RAMSAY

Vol. 46, No. 2

April 1967

- Johansen, Kjell and Hanson, David. Hepatic vein sphincters in elasmobranchs and their significance in controlling hepatic blood flow.
- Johansen, Kjell and Lenfant, Claude. Respiratory function in the South American lungfish, *Lepidosiren paradoxa* (Fitz).
- Pennycoick, C. J. The strength of the pigeon's wing bones in relation to their function.
- Harvey, W. R., Haskell, J. A. and Zerahn, K. Active transport of potassium and oxygen consumption in the isolated midgut of *Hyalophora cecropia*.
- Atwood, H. L. and Wiersma, C. A. G. Command interneurons in the crayfish central nervous system.
- Del Castillo, J., De Mello, W. C. and Morales, T. The initiation of action potentials in the somatic musculature of *Ascaris lumbricoides*.
- Bryan, G. W. Zinc regulation in the freshwater crayfish (including some comparative copper analyses).
- Holeton, G. F. and Randall, D. J. Changes in blood pressure in the rainbow trout during hypoxia.
- Stevens, E. Don and Randall, D. J. Changes in blood pressure, heart rate and breathing rate during moderate swimming activity in rainbow trout.
- Holeton, G. F. and Randall, D. J. The effect of hypoxia upon the partial pressure of gases in the blood and water afferent and efferent to the gills of rainbow trout.
- Stevens, E. Don and Randall, D. J. Changes of gas concentrations in blood and water during moderate swimming activity in rainbow trout.
- Randall, D. J., Holeton, G. F. and Stevens, E. Don. The exchange of oxygen and carbon dioxide across the gills of rainbow trout.
- Miller, P. L. The derivation of the motor command to the spiracles of the locust.
- Satchell, G. H. and Jones, M. P. The function of the conus arteriosus in the Port Jackson shark, *Heterodontus portusjacksoni*.
- Vogel, Steven. Flight in *Drosophila*. II. Variations in stroke parameters and wing contour.

Subscription for 1967, 80s. per volume of 3 parts, 2 volumes a year. Single parts 30s. net

Orders may be placed through your bookseller or direct with the

Cambridge University Press, Bentley House, 200 Euston Road, London, N.W. 1

FULL PARTICULARS OF THE

JOURNALS

PUBLISHED BY THE

CAMBRIDGE

UNIVERSITY PRESS

MAY BE HAD FROM

THE MANAGER

CAMBRIDGE UNIVERSITY PRESS

BENTLEY HOUSE

200 EUSTON ROAD

LONDON, N.W.1

FIELD STUDIES COUNCIL

THE DALE FORT
MARINE FAUNA

2nd Edtn. 1966

Ed. J. H. Crothers, M.A.

This book lists over 1300 animals and is the only comparable list of its sort for Wales.

The price is 21s. (postage paid) obtainable from:

THE WARDEN
DALE FORT FIELD CENTRE
HAVERFORDWEST
PEMBS.