The Journal of Experimental Biology

(Late The British Journal of Experimental Biology)

Edited by J. GRAY

ASSISTED BY

The Hon. Secs. Society for Experimental Biology

Vol. XVI, No. 1 CONTENTS January, 1939

New Experiments on Colour Vision in Bees. (With Two Text-figures.) MATHILDE HERTZ. Studies in Animal Locomotion: VIII. The Kinetics of Locomotion of Nereis diversicolor. (With One Plate and Eight Text-figures.) J. GRAY. Gill Movements of Nymphal Ephemera danica (Ephemeroptera) and the Water Currents caused by them. (With Eight Text-figures.) L. E. S. EASTHAM. The Physiology of Contractile Vacuoles: IV. A Note on the Sources of the Water Evacuated, and on the Function of Contractile Vacuoles in Marine Protozoa. J. A. KITCHING. Acceleration of Haemolysis in Relation to Chemical Structure: I. Benzene Derivatives. (With Four Text-figures.) ERIC PONDER. The Effect of Phlorizin on the Metabolism of Cytolysing Sea-urchin Eggs. (With One Text-figure.) LORD ROTHSCHILD. Colorimetric Method for Estimation of Dissolved Oxygen in the Field. M. L. JOHNSON AND R. J. WHITNEY. Studies on the Growth of Tissues in vitro: VI. The Effects of some Tissue Extracts on the Growth of Periosteal Fibroblasts. (With Six Text-figures.) O. A. TROWELL AND E. N. WILLMER. The Seasonal Variation in Biological Composition of Certain Plankton Samples from the North Sea in Relation to their Content of Vitamin A, Carotenoids, Chlorophyll, and Total Fatty Matter. (With Seven Text-figures.) A. E. GILLAM, M. S. EL RIDI AND R. S. WIMPENNY. The Maintenance of Reproductive Activity in Xenopus laevis for Pregnancy Diagnosis. (With One Text-figure.) F. W. LANDGREBE. Studies on Amphibian Metamorphosis: XVI. The Development of Forelimb Opercular Perforations in Rana temporaria and Bufo bufo. (With Five Plates, containing Figs. 1-50.) O. M. HELFF. Price 15s. net Subscription per volume 42s. net Published for The Company of Biologists Limited by the CAMBRIDGE UNIVERSITY PRESS BENTLEY HOUSE, 200 EUSTON ROAD, N.W.1

https://doi.org/10.1017/S0025315400013898 Published online by Cambridge University Press Journ. of Marine Biol. Assoc., xxIII, 2 (i)

THE

QUARTERLY JOURNAL

OF

MICROSCOPICAL SCIENCE

Editor

EDWIN S. GOODRICH, M.A., LL.D., F.R.S.

With the Co-operation of

E. J. ALLEN, C.B.E., D.Sc., LL.D., F.R.S.

D. M. S. WATSON, M.Sc., F.R.S. C. M. YONGE, D.Sc. E. HINDLE, Sc.D., Ph.D., F.R.S.E. G. P. BIDDER, Sc.D.

CONTENTS OF No. 321-New Series

Volume 81, Part I, December 1938

MEMOIRS:

HAROLD KIRBY, jun. Polymastigote flagellates of the genus Foaina Janicki, and two new genera Crucinymphia and Bullanympha. (With Plates 1 and 2 and 1 Text-figure)

M. L. BHATIA. On the Structure of the Nephridia and 'funnels' of the Indian Leech *Hirudinaria*, with remarks on these organs in *Hirudo*. (With 18 Text-figures)

B. N. SINGH and W. BOYLE. The Vitellogenesis of *Gasterosteus aculeatus* (the stickleback) investigated by the Ultra-centrifuge. (With Plates 3–6 and 1 Text-figure)

HELEN PIXELL GOODRICH. Nina: A Remarkable Gregarine. (With Plate 7) A. E. NEEDHAM. Abdominal appendages in the female and copulatory appendages in the male *Asellus*. (With 9 Text-figures)

G. L. PURSER. Reproduction in *Lebistes reticulatus*. (With Plate 8 and 3 Text-figures)

Subscription Price per Volume £3. 3s. net Single Parts £1. 1s. net

OXFORD UNIVERSITY PRESS AMEN HOUSE, LONDON, E.C.4

CONTENTS

| C. B. Goodhart. Notes on the bionomics of the tube-building amphipod, Leptocheirus pilosus Zaddach (Text-figs. 1-3) A. G. Nicholls. Some new sand-dwelling copepods (Text-figs. 1-7) W. J. Rees. The hydroid of the medusa Dipurena halterata (Forbes) (Text-figs. 1-3) F. S. Russell. On the nematocysts of Hydromedusae. II. (Text-figs. 1-4) Douglas P. Wilson. Seasonal variations in the fat content of the flounder, Pleuronectes flesus L. (Text-figs. 1-5) F. S. Russell. On the seasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3) L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light Colin B. Rees. The plankton in the upper reaches of the Bristol Channel (Text-figs. 1-13) S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus Bathyporeia (Text-figs. 1, 2). E. Emrys Watkin. The pelagic phase in the life history of the amphipod genus Bathyporeia (Text-figs. 1, 2). J. B. Cragg. The physiology of maturation and fertilization in Pomatoceros triqueter (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4). | bbbr) (Isopoda, Valvifera) from New England Creek, south-east 279 cotes on the bionomics of the tube-building amphipod, Lepto- 311 once new sand-dwelling copepods (Text-figs. 1-7) 327 droid of the medusa Dipurena halterata (Forbes) (Text-figs. 1-3) 343 the nematocysts of Hydromedusae. II. (Text-figs. 1-4) 347 a. Seasonal variations in the fat content of the flounder, Pleuro- 361 ext-figs. 1-5) 361 the seasonal abundance of young fish. VI. The year 1938 (Text- the seasonal abundance of young fish. VI. The year 1938 (Text- the seasonal abundance of young fish. VI. The year 1938 (Text- phosphorus, nitrogen, iron and manganese in marine zooplankton 387 nd A. Milne. The ecology of the Tamar Estuary. V. Under- n. Revision of data for red light | | FAGE |
|---|---|---|------|
| cheirus pilosus Zaddach (Text-figs. 1-3) A. G. Nicholls. Some new sand-dwelling copepods (Text-figs. 1-7) W. J. Rees. The hydroid of the medusa Dipurena halterata (Forbes) (Text-figs. 1-3) F. S. Russell. On the nematocysts of Hydromedusae. II. (Text-figs. 1-4) Douglas P. Wilson. Seasonal variations in the fat content of the flounder, Pleuronectet flesus L. (Text-figs. 1-5) F. S. Russell. On the scasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3) F. S. Russell. On the scasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3) L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light Colin B. Rees. The plankton in the upper reaches of the Bristol Channel (Text-figs. 1-13) S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus Bathyporeia (Text-figs. 1, 2) J. B. Cragg. The physiology of maturation and fertilization in Pomatoceros triqueter (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | idach (Text-figs. 1-3) . <td>Idotea viridis (Slabber) (Isopoda, Valvifera) from New England Creek, south-east</td> <td>279</td> | Idotea viridis (Slabber) (Isopoda, Valvifera) from New England Creek, south-east | 279 |
| cheirus pilosus Zaddach (Text-figs. 1-3) A. G. Nicholls. Some new sand-dwelling copepods (Text-figs. 1-7) W. J. Rees. The hydroid of the medusa Dipurena halterata (Forbes) (Text-figs. 1-3) F. S. Russell. On the nematocysts of Hydromedusae. II. (Text-figs. 1-4) Douglas P. Wilson. Seasonal variations in the fat content of the flounder, Pleuronectet flesus L. (Text-figs. 1-5) F. S. Russell. On the scasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3) F. S. Russell. On the scasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3) L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light Colin B. Rees. The plankton in the upper reaches of the Bristol Channel (Text-figs. 1-13) S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus Bathyporeia (Text-figs. 1, 2) J. B. Cragg. The physiology of maturation and fertilization in Pomatoceros triqueter (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | idach (Text-figs. 1-3) . <td>C B Goodbart Notes on the bionomics of the tube-building amphinod Letter</td> <td></td> | C B Goodbart Notes on the bionomics of the tube-building amphinod Letter | |
| W. J. Rees. The hydroid of the medusa Dipurena halterata (Forbes) (Text-figs. 1-3) F. S. Russell. On the nematocysts of Hydromedusae. II. (Text-figs. 1-4) Douglas P. Wilson. Seasonal variations in the fat content of the flounder, Pleuronecter flesus L. (Text-figs. 1-5) F. S. Russell. On the seasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3) L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light Colin B. Rees. The plankton in the upper reaches of the Bristol Channel (Text-figs. 1-13) S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the aniphipod genus Bathyporeia (Text-figs. 1, 2). J. B. Cragg. The playsiology of maturation and fertilization in Pomatoceros triqueter (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | droid of the medusa Dipurena halterata (Forbes) (Text-figs. 1-3) 343 the nematocysts of Hydromedusae. II. (Text-figs. 1-4) | | 311 |
| F. S. Russell. On the nematocysts of Hydromedusae. II. (Text-figs. 1-4) | the nematocysts of Hydromedusae. II. (Text-figs. 1-4) | A. G. Nicholls. Some new sand-dwelling copepods (Text-figs. 1-7) | 327 |
| Douglas P. Wilson. Seasonal variations in the fat content of the flounder, <i>Pleuronectes flesus</i> L. (Text-figs. 1-5). F. S. Russell. On the seasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3). L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light. Colin B. Rees. The plankton in the upper reaches of the Bristol Channel (Text-figs. 1-13). S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12). E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus <i>Bathyporeia</i> (Text-figs. 1, 2). J. B. Cragg. The physiology of maturation and fertilization in <i>Pomatoceros triqueter</i> (L.) 1. The nature of the material (Text-figs. 1-5). H. W. Harvey. Substances controlling the growth of a diatom. Hilary B. Moore and J. A. Kitching. The biology of <i>Chthamalus stellatus</i> (Poli) (Text-figs. 1-4). | a. Seasonal variations in the fat content of the flounder, Pleuro- ext-figs. 1-5) 361 the seasonal abundance of young fish. VI. The year 1938 (Text- 381 381 Phosphorus, nitrogen, iron and manganese in marine zooplankton 387 nd A. Milne. The ecology of the Tamar Estuary. V. Under- n. Revision of data for red light 391 he plankton in the upper reaches of the Bristol Channel (Text- 397 397 . G. Nicholls and A. P. Orr. On the growth and feeding of the Clyde (Text-figs. 1-12) 427 . The swimming and burrowing habits of some species of the Bathyporeia (Text-figs. 1, 2) 457 . The pelagic phase in the life history of the amphipod genus at figs. 1, 2) 467 . Hysiology of maturation and fertilization in Pomatoceros triqueter re of the material (Text-figs. 1-5) 483 . Stances controlling the growth of a diatom 499 and J. A. Kitching. The biology of Chthamalus stellatus (Poli) 521 a new species of Gammarus (G. tigrinus) from Droitwich district 543 | W. J. Rees. The hydroid of the medusa Dipurena halterata (Forbes) (Text-figs. 1-3) | 343 |
| <i>incites flesus</i> L. (Text-figs. 1-5). F. S. Russell. On the seasonal abundance of young fish. VI. The year 1938 (Text-figs. 1-3) L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light Colin B. Rees. The plankton in the upper reaches of the Bristol Channel (Text-figs. 1-13) S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus <i>Bathyporeia</i> (Text-figs. 1, 2) J. B. Cragg. The physiology of maturation and fertilization in <i>Pomatoceros triqueter</i> (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of <i>Chthamalus stellatus</i> (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of <i>Gammarus</i> (<i>G. tigrinus</i>) from Droitwich district (Plates IV-VI) | ext-figs. 1-5) | F. S. Russell. On the nematocysts of Hydromedusae. II. (Text-figs. 1-4) . | 347 |
| figs. 1-3) L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light Colin B. Rees. The plankton in the upper reaches of the Bristol Channel (Text-figs. 1-13) S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus <i>Bathyporeia</i> (Text-figs. 1, 2) E. Emrys Watkin. The pelagic phase in the life history of the amphipod genus <i>Bathyporeia</i> (Text figs. 1, 2) J. B. Cragg. The physiology of maturation and fertilization in <i>Pomatoceros triqueter</i> (L.) I. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of <i>Chthamalus stellatus</i> (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of <i>Gammarus</i> (G. tigrinus) from Droitwich district (Plates IV-VI) | 281Phosphorus, nitrogen, iron and manganese in marine zooplankton387and A. Milne. The ecology of the Tamar Estuary. V. Under- n. Revision of data for red light | | 361 |
| L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light | Phosphorus, nitrogen, iron and manganese in marine zooplankton387and A. Milne. The ecology of the Tamar Estuary. V. Under- n. Revision of data for red light | | |
| L. H. N. Cooper and A. Milne. The ecology of the Tamar Estuary. V. Underwater illumination. Revision of data for red light | nd A. Milne. The ecology of the Tamar Estuary. V. Under- n. Revision of data for red light | ngs. 1-3) | 381 |
| water illumination. Revision of data for red light | n. Revision of data for red light | L. H. N. Cooper. Phosphorus, nitrogen, iron and manganese in marine zooplankton | 387 |
| figs. 1-13) S. M. Marshall, A. G. Nicholls and A. P. Orr. On the growth and feeding of young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus Bathyporeia (Text-figs. 1, 2) E. Emrys Watkin. The pelagic phase in the life history of the amphipod genus Bathyporeia (Text figs. 1, 2) J. B. Cragg. The physiology of maturation and fertilization in Pomatoceros triqueter (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | 397 G. Nicholls and A. P. Orr. On the growth and feeding of the Clyde (Text-figs. 1-12) G. Nicholls and A. P. Orr. On the growth and feeding of the Clyde (Text-figs. 1-12) G. The swimming and burrowing habits of some species of the Bathyporeia (Text-figs. 1, 2) G. The pelagic phase in the life history of the amphipod genus at figs. 1, 2) G. The pelagic phase in the life history of the amphipod genus at figs. 1, 2) G. The pelagic phase in the life history of the amphipod genus at figs. 1, 2) G. The pelagic phase in the life history of the amphipod genus at figs. 1, 2) G. The pelagic phase in the life history of the amphipod genus at figs. 1, 2) G. The pelagic phase in the life history of the amphipod genus at figs. 1, 2) G. The pelagic phase in the biology of maturation and fertilization in Pomatoceros triqueter re of the material (Text-figs. 1-5) G. The biology of Chthamalus stellatus (Poli) G. The biology of Chthamalus stellatus (Poli) G. The biology of Chthamalus stellatus (Poli) G. The biology of Liferinus from Droitwich district G. The market sponges. I. Growth from the planted | | 391 |
| young herring in the Clyde (Text-figs. 1-12) E. Emrys Watkin. The swimming and burrowing habits of some species of the amphipod genus Bathyporeia (Text-figs. 1, 2) E. Emrys Watkin. The pelagic phase in the life history of the amphipod genus Bathyporeia (Text figs. 1, 2) J. B. Cragg. The physiology of maturation and fertilization in Pomatoceros triqueter (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | the Clyde (Text-figs. 1-12) | | 397 |
| amphipod genus Bathyporeia (Text-figs. 1, 2). E. Emrys Watkin. The pelagic phase in the life history of the amphipod genus Bathyporeia (Text figs. 1, 2). J. B. Cragg. The physiology of maturation and fertilization in Pomatoceros triqueter (L.) 1. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | Bathyporeia (Text-figs. 1, 2). 457 The pelagic phase in the life history of the amphipod genus at figs. 1, 2). 467 Oblysiology of maturation and fertilization in Pomatoceros triqueter re of the material (Text-figs. 1-5) 483 bstances controlling the growth of a diatom 499 and J. A. Kitching. The biology of Chthamalus stellatus (Poli) 521 a new species of Gammarus (G. tigrinus) from Droitwich district 543 Studies in the market sponges. I. Growth from the planted 543 | | 427 |
| Bathyporeia (Text figs. 1, 2). J. B. Cragg. The physiology of maturation and fertilization in Pomatoceros triqueter (L.) I. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | a new species of Gammarus (G. tigrinus) from Droitwich district Studies in the market sponges. I. Growth from the planted | | 457 |
| (L.) I. The nature of the material (Text-figs. 1-5) H. W. Harvey. Substances controlling the growth of a diatom Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | re of the material (Text-figs. 1-5) | | 467 |
| Hilary B. Moore and J. A. Kitching. The biology of Chthamalus stellatus (Poli) (Text-figs. 1-4) E. W. Sexton. On a new species of Gammarus (G. tigrinus) from Droitwich district (Plates IV-VI) | and J. A. Kitching. The biology of Chthamalus stellatus (Poli) a new species of Gammarus (G. tigrinus) from Droitwich district Studies in the market sponges. I. Growth from the planted | | 483 |
| (Text-figs. 1-4) | a new species of Gammarus (G. tigrinus) from Droitwich district Studies in the market sponges. I. Growth from the planted | H. W. Harvey. Substances controlling the growth of a diatom | 499 |
| (Plates IV-VI) | Studies in the market sponges. I. Growth from the planted | | 521 |
| | Studies in the market sponges. I. Growth from the planted | | 543 |
| | | L. R. Crawshay. Studies in the market sponges. I. Growth from the planted cutting (Text-fig. 1) | |

The Council of the Marine Biological Association wish it to be understood that they do not accept responsibility for statements published in this *Journal* excepting when those statements are contained in an official report of the Council.

LONDON CAMBRIDGE UNIVERSITY PRESS

PRINTED IN GREAT BRITAIN BY WALTER LEWIS, M.A., AT THE UNIVERSITY PRESS, CAMBRIDGE