

THE  
**GEOLOGICAL MAGAZINE**

**VOL. 106 OF WHOLE SERIES**  
**JANUARY–DECEMBER, 1969**

**Printed in England by Stephen Austin and Sons Limited, Hertford**

# GEOLOGICAL MAGAZINE

with which is incorporated

## THE GEOLOGIST

FOUNDED IN 1864 BY THE LATE DR. HENRY WOODWARD, F.R.S.

Edited by

O. M. B. BULMAN, Sc.D., A.R.C.Sc., F.R.S.,

S. R. NOCKOLDS, Ph.D., F.R.S.,

and

W. B. HARLAND, M.A.

assisted by MRS. K. N. HEROD

Associate Editors

PROFESSOR K. C. DUNHAM, D.Sc., F.R.S.

MR. N. L. FALCON, M.A., F.R.S.

PROFESSOR LEONARD HAWKES, D.Sc., F.R.S.

PROFESSOR SIR WILLIAM PUGH, O.B.E., D.Sc., F.R.S.

PROFESSOR F. W. SHOTTON, M.B.E., M.A., Sc.D., F.R.S.

SIR JAMES STUBBLEFIELD, D.Sc., F.R.S.

PROFESSOR C. E. TILLEY, Ph.D., F.R.S.

Vol. 106 of Whole Series

JANUARY-DECEMBER, 1969



MIMRAM BOOKS

CAXTON HILL, WARE ROAD, HERTFORD, HERTS

# CONTENTS

## ARTICLES

(Figures in bold type denote number of issue)

- ALLEN, J. R. L.**  
Note towards a theory of concentration of solids in natural sands, **4**, 309.
- BAKER, J. W.**  
Correlation problems of metamorphosed Pre-Cambrian rocks in Wales and S.E. Ireland, **3**, 249.
- BLAKE, D. H.**  
Welded tuffs and the Maelifell caldera, Alftafjordur volcano, S.E. Iceland, **6**, 531.
- BLUCK, B. J.**  
Particle rounding in beach gravels, **1**, 1.
- BOWES, D. R., & W. R. SKINNER**  
Geochemical comparison of the Stillwater complex and alpine-type ultrabasic complexes, Beartooth Mountains, Montana and Wyoming, **5**, 477.
- BRIDGER, J. F. D., & R. J. RICE**  
Disturbed Keuper Marl beneath the river gravels of the Soar basin, **6**, 554.
- BROWN, G., J. A. CATT, S. E. HOLLYER, & C. D. OLLIER**  
Partial silicification of chalk fossils from the Chilterns, **6**, 583.
- BRYANT, B., & J. C. REED, Jr.**  
Significance of lineation and minor folds near major thrust faults in the southern Appalachians and the British and Norwegian Caledonides, **5**, 412.
- CHORLEY, R. J.**  
The elevation of the Lower Greensand ridge, S.E. England, **3**, 231.
- COX, F. C.**  
Inclusions in garnet: discussion and suggested mechanism of growth for syntectonic garnets, **1**, 57.
- DURRANCE, E. M.**  
The buried channels of the Exe, **2**, 174.
- ELSDON, R.**  
The structure and intrusive mechanism of the Kap Edvard Holm layered gabbro complex, East Greenland, **1**, 46.
- FANNIN, N. G. T.**  
Stromatolites from the Middle Old Red Sandstone of Western Orkney, **1**, 77.
- FRANKEL, J. J.**  
A mega-porphyritic dolerite on Long Island, Seychelles Archipelago, **3**, 260.
- HELM, D. G.**  
Microscopic and megascopic fabrics in the Skiddaw Group, Black Combe inlier, English Lake District, **6**, 587.
- HUNTINGTON, J. F.**  
Methods and applications of fracture trace analysis in the quantification of structural geology, **5**, 430.
- JAMES, D. M. D., & J. JAMES**  
The influence of deep fractures on some areas of Ashgillian-Llandoveryan sedimentation in Wales, **6**, 562.

- JONES, R. K., M. BROOKS, M. G. BASSETT, R. L. AUSTIN, & R. J. ALDRIDGE  
An Upper Llandovery limestone overlying Hollybush Sandstone (Cambrian) in  
Hollybush Quarry, Malvern Hills, 5, 457.
- KAMP, P. C. Van De  
The Silurian volcanic rocks of the Mendip Hills, Somerset, and the Tortworth area,  
Gloucestershire, 6, 542.
- KEMPE, D. R. C.  
Natrojarosite and 'collophane' in graphite-sillimanite-schist, 3, 270.
- O'HARA, M. J.  
The origin of eclogite and ariéigte nodules in basalt, 4, 322.
- PATTISON, J.  
Some Permian foraminifers from N.W. England, 2, 197.
- PAUL, C. R. C.  
*Thomacystis*, a unique new hemicosmitid cystoid from Wales, 2, 190.
- PHILLIPS, E. R.  
On the rock name beerbachite, 3, 281.
- PHIPPS, C. B.  
Post-burial sideritisation of calcite in Eocene beds from the Maracaibo Basin,  
Venezuela, 5, 485.
- RAO, T. RAMAMOHANA  
The occurrence of ottrelite along the thrust zone in the Pakhals of Yellandlapad  
area, Andhra Pradesh, India, 5, 452.
- READ, W. A.  
Fluviatile Deposits in Namurian rocks of Central Scotland, 4, 331.
- SAMANTA, B. K.  
Taxonomy and stratigraphy of the Indian species of *Discocyclina* (foraminifera),  
2, 115.
- SARKAR, S. N., A. K. SAHA, & J. A. MILLER  
Geochronology of the Pre-Cambrian rocks of Singhbhum and adjacent regions,  
Eastern India, 1, 15.
- SCHERMERHORN, L. J. G., & W. I. STANTON  
Folded overthrusts at Aljustrel (South Portugal), 2, 130.
- SEARLE, D. L., & F. M. VOKES  
Layered ultrabasic lavas from Cyprus, 6, 515.
- STONE, M.  
Nature and origin of banding in the granitic sheets of Tremearne, Porthleven,  
Cornwall, 2, 142.
- SUTTON, J. S., & M. D. MAX  
Gneisses in the north-western part of County Mayo, Ireland, 3, 284.
- TORRENS, H. S.  
The stratigraphical distribution of Bathonian ammonites in Central England, 1, 63.
- TOZER, E. T.  
Xenodiscacean Ammonoids and their bearing on the discrimination of the Permo-  
Triassic boundary, 4, 348.
- WALKER, A. D.  
The reptile fauna of the 'Lower Keuper' Sandstone, 5, 470.
- WALKER, G. P. L.  
The breaking of magma, 2, 166.

- WASS, R. E., & J. G. BYRNES  
A new genus of Polyzoa (Cryptostomata) from the Devonian of New South Wales, Australia, 2, 159.
- WELLS, A. J.  
The Crush Zone of the Iranian Zagros Mountains, and its implications, 5, 385.
- WEST, I. M., & M. J. HOOPER  
Detrital Portland chert and limestone in the Upper Purbeck Beds at Friar Waddon, Dorset, 3, 277.
- WILLIAMS, E.  
The repeated development of identical joint patterns, N.E. Tasmania, 4, 362.
- WILLIAMS, P. F.  
Notes on some deformation structures of sedimentary origin in the Little Haven-Amroth coalfield, Pembrokeshire, 5, 395.
- WOLFE, M. J.  
A trace fossil from the Lower Dalradian, Co. Donegal, Eire, 3, 274.
- WRIGHT, J. B.  
A simple alkalinity ratio and its application to questions of non-orogenic granite genesis, 4, 370.

## CORRESPONDENCE

- ADAMS, J. K., & R. E. ARVIDSON. Thin sections of free grains using two mounting mediums, 6, 598.
- ALLEN, P. M., & A. J. REEDMAN. Stratigraphic classification in Pre-Cambrian rocks, 2, 213.
- BASSETT, M. G. The age of the oldest Silurian beds of the Rumney (Cardiff) inlier, 1, 90.
- CHAKRABORTY, K. R. Coexisting Pyroxenes, 3, 291.
- DONOVAN, D. T. William Smith's last geological excursion, 2, 214.
- DURRANCE, E. M. Release of strain energy as a mechanism for the mechanical weathering of granular rock material, 5, 496.
- DYER, K. R., N. HAMILTON, & R. D. PINGREE. A seismic refraction line across the Solent, 1, 92.
- FALCON, N. L., & J. V. HARRISON. Is the Zagros fault line of Iran a wrench fault? 6, 608.
- FRANKEL, J. J. The ages of Tertiary rocks at Uloa and Umkwelane, Zululand, 2, 208.
- GASS, I. G. The Red Sea depression, 1, 89.
- HEPWORTH, J. V. Stratigraphic classification in Pre-Cambrian rocks, 2, 212.
- KING, L. The ages of Tertiary rocks at Uloa and Umkwelane, Zululand, 2, 206.
- LISTER, T. R., I. C. BURGESS, & A. J. WADGE. Microfossils from the cleaved Skiddaw Slates of Murton Pike and Brownber (Cross Fell inlier), 1, 97.
- LISTER, T. R., L. R. M. COCKS, & A. W. A. RUSHTON. The basement beds in the bobbing borehole, Kent, 6, 601.
- MORRIS, P. G. Carboniferous Conodonts in the S.W. Pennines, 5, 497.
- ROMANO, M., & J. N. DIGGENS. Longvillian shelly faunas from the Dolwyddelan area, North Wales, 6, 603.

- ROSE, W. C. C. Stratigraphical sub-divisions of the Skiddaw slates of the Lake District, 3, 293.
- RUSHTON, A. W. A. *Cyclotron*—a new name for *Polyphyuma* Groom, 2, 216.
- TURNER, D. C. A gravity interpretation of the Liruei ring complex, Nigeria, 1, 95.
- VELLA, P. Correlation of base of Middle Headon beds between Whitecliff Bay and Colwell Bay, Isle of Wight, 6, 606.
- WADGE, A. J., M. J. C. NUTT, T. R. LISTER, & D. SKEVINGTON. A probable *Didymograptus Murchisoni* zone fauna from the Lake District, 6, 595.
- WARREN, P. T. The Silo-Devonian boundary, 2, 215.
- WHITEMAN, A. J. The Red Sea depression, 1, 90.
- WRIGHT, J. B., & J. GREEN. Ardnamurchan Centre I—Does it need re-defining, 6, 599.

## REVIEWS

- Aime Regional Technical Symposium, Proceedings of the Second, 2, 225.
- Atlas Advanced, 1, 110.
- Bentheim, Geological guide to, 2, 225.
- Bleaching Earths, 3, 301.
- Brachiopods (Articulate), Shell structure of (Essay Review), 3, 294.
- British Regional Geology: S.W. England, 6, 621.
- Ceylon, Introduction to the Geology of, 1, 105.
- Chemical Evolution, 6, 617.
- Coal and Coal-bearing Strata, 3, 296.
- Cockermouth and Caldbeck, Geology of the Country around, 5, 504.
- Continents and Oceans, Origin of (Essay Review), 1, 100.
- Craven Arms area, Geology of, 6, 619.
- Current Ripples: Their relation to patterns of water and Sediment motion, 6, 614.
- Cyclic Sedimentation, 1, 106.
- Czechoslovakia, Regional Geology of, 3, 295.
- Diapirism and Diaps: A symposium, 6, 611.
- Direct Current Electric Sounding, 2, 226.
- East Midlands, Geology of, 5, 499.
- Earth Sciences, Readings in, 5, 506.
- Erosion in Different Climates, Cycle of, 6, 613.
- Evolution and Environment, 3, 298.
- Feldspars, 6, 623.
- Fife and Agnes Geology: Excursion guide, 1, 106.
- Fossil Plants of the Carboniferous rocks of Great Britain, 6, 621.
- Fossil Plants, Studies on, 6, 616.
- Geochemistry of Organic Substances, 2, 224.
- Geological Maps and Reports, Guide for the preparation of, 1, 109.
- Geological Prospecting and Exploration, 1, 107.
- Geological Survey (Canada) :—
- Geological Maps and Reports, Guide for the preparation of, 1, 109.
  - Geological Survey (Great Britain) :—
  - British Regional Geology: S. W. England, 6, 621.
  - Cockermouth and Caldbeck, Geology of the Country around, 5, 504.
  - Craven Arms Area, Geology of, 6, 619.

- Fossil Plants of the Carboniferous rocks of Great Britain, 6, 621.  
 Haslemere, Geology of the Country around, 5, 503.  
 Macclesfield, Congleton, Crewe, and Middlewich, Geology of the Country around, 2, 225.  
 Market Harborough, Geology of the Country around, 5, 503.  
 Okehampton, Geology of the Country around, 6, 615.  
 South Wales Coalfield, Geology of, 6, 622.  
 Geology in Colour, Science of, 1, 100.  
 Geology, Methods of, 6, 619.  
 Geophysical Well-logging, 6, 624.  
 Geotectonic Researches, Heft 28, 5, 502.  
 Great Barrier Reef (Essay Review), 2, 217.  
 Haslemere, Geology of the Country around, 5, 502.  
 Hydrology, Principles of, 3, 296.  
 Land Evaluation, 5, 505.  
 Life, History of, 1, 107.  
 Lower Vertebrate Phylogeny, Current Problems of, 3, 301.  
 Macclesfield, Congleton, Crewe, and Middlewich, Geology of the Country around, 2, 225.  
 Marine Geology, Introduction to, 2, 224.  
 Marine Sediments (Recent): A Symposium, 2, 220.  
 Market Harborough, Geology of the Country around, 5, 503.  
 "Meteor" oceanographic research: geology and geophysics, 5, 507.  
 Migmatites and the origin of Granitic Rocks, 2, 222.  
 Mineral Resources—Methods of investigation, 6, 609.  
 Okehampton, Geology of the Country around, 6, 615.  
 Paleontology, Introduction to: Search for the Past, 5, 501.  
 Paleontology, Notes and Comments on Vertebrate, 3, 303.  
 Petroleum Production, Surface Operations in, 6, 620.  
 Prehistoric Time Scale based on Organic Evolution, Growth of, 2, 221.  
 Quaternary, 6, 618.  
 Quaternary Palaeoecology, 1, 104.  
 Rock, Engineering Properties of, 2, 224.  
 Ruhr Coalfield, Sedimentation and Epeirogenesis, 5, 500.  
 Scientific American Resource Library: Readings in Earth Sciences, 5, 506.  
 Sedimentation in the Bering Sea, Recent, 6, 618.  
 Sedimentation and Epeirogenesis in the Ruhr Coalfield, 5, 500.  
 Sedimentology of the Old Red Sandstone of N.E. Scotland, 6, 622.  
 Seismological Commission (European), Proceedings of the Eighth Assembly, 6, 615.  
 Soils in tropical and subtropical regions, Introduction to the study of, 1, 107.  
 South Wales Coalfield, Geology of the, 3, 302; 6, 622.  
 Water, Earth, and Man: A synthesis of Hydrology, Geomorphology, and Socio-Economic Geography, 5, 506.

## PLATES

1. Roundness of various size fractions, 1, *facing p. 14.*
2. Granular rocks from Contact Mountain and Junction Nunatak, 1, *facing p. 56.*
- 3–6. Garnet porphyroblasts from the Glen Clunie area, 1, *facing p. 62.*
7. Stromatolites and Calcareous Tufa, 1, *facing p. 88.*
8. Line rock and graded unit, Tremearne, 2, *facing p. 158.*
9. A new genus of Polyzoa, 2, *facing p. 165.*
10. Breadcrust blocks, Vulcano, 2, *facing p. 173.*

11. *Thomacystis tuberculata* gen. et sp. nov., 2, facing p. 196.
12. Foraminifera from the Manchester marl, 2, facing p. 205.
13. (a) Hand specimen of Mega-porphyritic Dolerite, 3, facing p. 269.  
(b and c) Plagioclase Mega-Phenocrysts with dark brown patches.
- 14–15. Trace fossil, Lower Dalradian, 3, facing p. 276.
16. *Paratirolites* and *Tompophiceras*, 4, facing p. 361.
17. Gemini photograph of area East of Shiraz, 5, facing p. 394.
18. (a) Laminar folds, 5, facing p. 410.  
(b) Load marks.
19. (a and b) Oblique pouches, 5, facing p. 411.
20. Textural features of rocks of the thrust zone, 5, facing p. 456.
21. (a) Compacted sandstone, X50, 5, facing p. 495.  
(b) Calcite cemented sandstone, X200.
22. (a) Calcite cemented sandstone, X200, 5, facing p. 495.  
(b) Siderite cemented sandstone, X200.
23. (a) Siderite cemented sandstone, X200, 5, facing p. 495.  
(b) Remnant siderite granules, X200.
24. (a) Remnant siderite granules, X200, 5, facing p. 495.  
(b) Calcite cemented sandstone, X50.
25. (a and b) Bead-like siderite granules, X50, 5, facing p. 495.
26. (a) Remnant siderite granules, X50, 5, facing p. 495.  
(b) Styololite seam, X50.
27. Maelifell and Photomicrograph of welded tuff, 6, facing p. 541.
- 28–29. Silurian volcanics, Mendip Hills, 6, facing p. 553.
30. (a, b, and c) D<sub>1</sub> Fabrics, 6, facing p. 594.
31. (a and b) D<sub>2</sub> Fabric, 6, facing p. 594.