

THE  
GEOLOGICAL MAGAZINE.

VOL. LXVII OF WHOLE SERIES.

JANUARY—DECEMBER, 1930.

THE  
GEOLOGICAL MAGAZINE

OR

Monthly Journal of Geology.

WITH WHICH IS INCORPORATED

THE GEOLOGIST.

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

EDITED BY

R. H. RASTALL, Sc.D., M.Inst.M.M.,

FELLOW OF CHRIST'S COLLEGE AND  
UNIVERSITY LECTURER IN ECONOMIC GEOLOGY, CAMBRIDGE.

ASSISTED BY

PROFESSOR W. S. BOULTON, D.Sc.

PROFESSOR J. W. GREGORY, D.Sc., F.R.S.

F. H. HATCH, Ph.D., M.Inst.M.M.

SIR T. H. HOLLAND, K.C.S.I., D.Sc., F.R.S.

PROFESSOR J. E. MARR, Sc.D., F.R.S.

PROFESSOR W. W. WATTS, Sc.D., LL.D., M.Sc., F.R.S.

HENRY WOODS, M.A., F.R.S.

SIR ARTHUR SMITH WOODWARD, LL.D., F.R.S.

VOL. LXVII OF WHOLE SERIES.

JANUARY—DECEMBER, 1930.

LONDON :

DULAU & CO., LTD., 32 OLD BOND STREET, W. 1.

1930.

**HERTFORD**  
**STEPHEN AUSTIN AND SONS, LTD.**

# LIST OF PLATES.

PLATE	FACING PAGE
IV. Photographs in Illustration of "The Geology of the Lower Shire-Zambezi Area" . . . . .	60
V. Quartzites, Glen Coe, Scotland, and Gaspé, Canada . . . . .	72
VI. Horizontal surface on vertically dipping beds of composite texture . . . . .	76
VII. Flow Wrinkles on Basaltic Lava, L. Superior . . . . .	90
VIII. Nordenskiöld Glacier . . . . .	158
IX. Gregory Glacier . . . . .	158
X. Petermann Peak . . . . .	158
XI. Hestercombe Quarry . . . . .	199
Thin sections of Diorite, Hestercombe . . . . .	199
XII. Manchioneal Fossils from Jamaica . . . . .	217
XIII. " " " " . . . . .	218
XIV. Zircon from the Group II Granites of N.W. France . . . . .	240
XV. Zircon, Monazite, and Apatite from the Granites of N.W. Normandy . . . . .	240
XIV. <i>Parallelodon</i> and <i>Beushausenia</i> . . . . .	308
XV. <i>Grammatodon</i> . . . . .	308
XVI. <i>Navicula</i> and <i>Eonavicula</i> . . . . .	310
XVII. Cambrian Fossils from Persia . . . . .	327
XVIII. Photomicrographs of Rock sections from the E. Andes of Ecuador . . . . .	368
XIX. " " " " " " " " " " . . . . .	368
XX. "Hanging-Valley" in volcanic debris, Ecuador . . . . .	364
Gorge through recent volcanic agglomerate, Ecuador . . . . .	364
XXI. Rhyolitic Ash from Tanjong Perak . . . . .	388
XXII. Microphotographs of Rhyolite Ash . . . . .	390
XXIII. Microphotographs of Organisms, Malaya . . . . .	393
XXIV. Peruvian Carboniferous Fossils . . . . .	408
XXV. The "Felstones" of Central Berwickshire . . . . .	541
XXVI. Inishtrahull Gneisses . . . . .	549

# LIST OF ILLUSTRATIONS IN THE TEXT.

	PAGE
Diagram, illustrating composition of Spilitic Rocks . . . . .	8
"    "	10
Plagioclase diagram of Bowen . . . . .	14
Viscosity-temperature relations of the glass-liquid system . . . . .	19
Map of part of the basin of the Sussex Ouse . . . . .	29
Map of the Lower Shire-Zambezi Area . . . . .	56
Map of Ballachulish . . . . .	69
Cross-bedding from Glen Coe Quartzite . . . . .	70
Cross-bedding from Appin Quartzite . . . . .	71
Diagram illustrating Sedimentation and Tectonics . . . . .	78
Thrust-tectonics . . . . .	82
Drag-tectonics . . . . .	82
"    "	83
Parallel growth in pigeonite . . . . .	103
Illustrating the course of crystallization . . . . .	103
Illustrating the change in liquid as crystallization progresses . . . . .	103
Camera-lucida drawing illustrating texture of the dolerites . . . . .	104
Diagram illustrating vol. per cent and temp. below 0° C. of brine . . . . .	114
Section across Irwin River Basin of W. Australia . . . . .	125
Sketch-map of Queen Mary Reservoir, Littleton, Middlesex . . . . .	137
General geological map of country between Franz Josef and Alp Fjords . . . . .	147
"    "	149
"    "	149
Brownish-weathering black quartzite from Petermann Peak . . . . .	150
Biotite-muscovite granite, Upper Ptarmigan Glacier . . . . .	154
Garnet-mica gneiss and Kyanite schist, Sentinel, Col. . . . .	156
Curves showing grading of sand . . . . .	160
Suture Lines, Genus <i>Dimorphoceras</i> . . . . .	164
Section of Bowland Shales and base of Sabden Shales . . . . .	167
Afwillite crystals (diagrams) . . . . .	169
Map showing outcrop of Diorite . . . . .	195
Locality sketch-map of Jamaica . . . . .	201
Axes of alignment of the granites of Brittany . . . . .	221
The Northern part of the Cotentin Peninsula . . . . .	223
Geological Sketch-map of S. Mayo and W. Galway . . . . .	273
Hinges of Paralleodontinae and an Ambonychiid . . . . .	299
Comparison of the hinge of <i>Cucullaea</i> and <i>Grammatodon</i> . . . . .	305
Hinges of <i>Grammatodon</i> , <i>Cucullaea</i> and <i>Pseudogrammatodon</i> . . . . .	308
Map of the Farsan Is. and Gizan . . . . .	312
Map of the Persian Is., Gizan, and Kamaran Id. . . . .	313
Map of the Persian Gulf area . . . . .	317
Cf. <i>Coosia asiatica</i> Mansuy . . . . .	321
<i>Billingsella</i> aff. <i>lonkiniana</i> Mansuy . . . . .	323
Species of <i>Eonavicula</i> , showing the hinge . . . . .	345
<i>Barbatia helblingi</i> , showing deformation . . . . .	346
Sutural development in <i>Victoriceras victoris</i> . . . . .	353
Changes in the whorl shape with growth in <i>Victoriceras victoris</i> . . . . .	355
Sutural development in <i>Oxynticeras oxynotum</i> . . . . .	356
Changes in the whorl shape with growth in <i>Oxynticeras oxynotum</i> . . . . .	358
Development of the ornamentation in <i>Oxynticeras oxynotum</i> . . . . .	359
Sketch-map of eastern section, Ecuadorian Andes . . . . .	362
General Section near Baños, Ecuador . . . . .	365
Map of Malaya . . . . .	386
Percentage of sand in Red Rock . . . . .	446

	PAGE
Block diagrams showing stages of land surfaces . . . . .	461
Tertiary and Recent Stages in N. China . . . . .	462
<i>Ceratotrochus mennelli</i> n. sp. . . . .	476
Index map of N.W. Washington and S.W. British Columbia . . . . .	485
Cross-section of Harrison Lake at Long Island . . . . .	488
Geological Map of the Coast and Cascade Ranges. . . . .	488
Sketch-map of the Birunga Volcanoes . . . . .	493
Sabinyo, Muhavura lava, and Muhavura leucite basanite . . . . .	496
Inter-growths in rhombic amphibole and basal section of pyroxene . . . . .	515
Geological sketch-map of the district (Berwickshire) . . . . .	531
Inishtrahull from Dunmore Head . . . . .	544
Sketch-map of the most northerly part of Ireland . . . . .	547
Sketch-map of South-Western Scotland and Northern Ireland . . . . .	548
Cross-section showing depression made by solution of coral limestone, Tonga Island . . . . .	551
The delthyrium of <i>Chonetes comoides</i> . . . . .	555
Serial-sections, through the cardinal area of <i>Chonetes comoides</i> . . . . .	556