

TABLE IX.—Continued.

Element.	Found.	Form.	Sought.	Form.	Coefficient
Sodium,	Sodium chloride,	NaCl	Sodium, oxide,	Na <sub>2</sub> O	.39337
Strontium,	carbonate,	Na <sub>2</sub> CO <sub>3</sub>	" " oxide,	Na <sub>2</sub> O	.58487
Sulphur,	Strontium sulphate,	SrSO <sub>4</sub>	Strontium, oxide,	SrO	.47598
	carbonate,	SrCO <sub>3</sub>	Sulphur, S <sub>3</sub>	S	.13734
	Barium sulphate,	BaSO <sub>4</sub>	" " trioxide,	SO <sub>3</sub>	.39024
	Arsenious sulphide,	As <sub>2</sub> S <sub>3</sub>	" " "	SO <sub>4</sub>	.34335
	Barium sulphate,	BaSO <sub>4</sub>	Tin, "	SnO	1.2000
	Sulphur trioxide,	SO <sub>3</sub>	Stannous oxide,	SnO	.78667
Tin,	Stannic oxide,	SnO <sub>2</sub>	Zinc, "	Zn	.83333
	" " oxide,	ZnO	" " oxide,	ZnO	.80260
Zinc,	" sulphide,	ZnS			.67031
	" "	ZnS			.88515

Table VIII. is taken from Bayley's Chemist's Pocket Book, pp. 10-16.

## INDEX.

	A	Page		Page
Acid,		4	Analysis and assaying,	283
" acetic,		191	Analysis, volumetric,	420
" hydrochloric,		191	Annealed,	29
" nitric,		191	Anthracite,	74
" sulphuric,		191	Antimony,	37
" tartaric,		191	" assay of,	267, 269, 290
Acidimetry,		426	" experiments with,	66
Alkalimetry,		424	" estimation of,	430
Allen,		370	" oxide, assay of,	269
Alloys,		5, 82	" sulphide,	267
" antimony,		98	" ores,	352
" copper and tin,		82	Anode,	153
" copper and zinc,		86	Anvil,	23
" deposition of,		176	Apatite,	135
" gold,		103	Apparatus,	20
" jewellers',		105	Arnold, J. O.,	405
" lead,		96	Arsenic,	2, 37, 351, 431
" Levul's,		100	" action of, with metals,	133
" silver,		99	" estimation of,	290, 334
Aluminium,		38	" in copper,	344
" estimation of,		295	Arsenide of cobalt,	217
" bronze, estima-		329	" of copper,	217
" tion of,		147	" of iron,	217
Amalgamation,		105	" of nickel,	217
Amalgams,		106	Ash, analysis of,	362
" for dentists,		106	" estimation of,	74
" of gold,		105	Assaying,	179
" of platinum,		107	" dry and wet,	179
" of silver,		106	" gravimetric,	180
" of sodium,		106	" volumetric,	180
" of tin,		106	Atomic weights,	469
Amalgamated plates,		149		
Ammonia,		192		
Ammonium, carbonate,		193		
" chloride,		43, 193		
" estimation of,		307, 308		
" molybdate,		193		
" oxalate,		361		
" sulphide,		194		

## B

Baker, T. J.,	150
Balances,	24
Barium, assay of, in heavy spar,	353
Barium carbonate,	195
" chloride,	46, 194



	Page		Page
Furnaces, wind, . . . . .	7	Hydrocyanic acid, estimation of, . . . . .	314
Fusibility, . . . . .	2	Hydrocyanic acid, estimation of, volumetrically, . . . . .	432
Fusible alloy, analysis of, . . . . .	321	Hydrogen, estimation of, . . . . .	418
<b>G</b>			
Galic acid method for anti-mony, . . . . .	352	Hydrosulphuric acid, estimation of, . . . . .	314
Gallium, . . . . .	2	<b>I</b>	
Galvanometer, . . . . .	150	Ignition, . . . . .	186
Gangue, . . . . .	36	Iodine, use of, in volumetric analysis, . . . . .	428
Gases, analyses of, . . . . .	413	Iridium, . . . . .	354
" composition of, . . . . .	418	Iron, . . . . .	39
German silver, . . . . .	94	" assay of, . . . . .	197, 295, 351
" analysis of, 330, 331	48	" Swedish, . . . . .	202
Glass, . . . . .	39	" volumetrically, . . . . .	461
Gold, . . . . .	258, 259, 291	" cast, . . . . .	40
" assay of, . . . . .	250	" experiments, . . . . .	57
" assay, corrections in, . . . . .	245	" estimation of, . . . . .	367
" bullion assay, . . . . .	245	" estimation of in ores and slags, . . . . .	408
" estimation of, in alloys, . . . . .	245	" ores, solution of, . . . . .	370
" estimation of, in copper liquors, . . . . .	345	" table of, . . . . .	408
" experiments, . . . . .	61	" pyrites, . . . . .	49
" ore, assay of, . . . . .	254	" refining slags, . . . . .	409
" parting, . . . . .	248	<b>L</b>	
" quartz, assay of, . . . . .	255	Lead, . . . . .	40
" recovery of, . . . . .	171	" assay of, 220, 222, 224, 226, 284	
" solders, . . . . .	105	" assay of in alloys, . . . . .	319
" solution, . . . . .	170	" estimation of silver in, . . . . .	227
" standard, . . . . .	246	" experiments, . . . . .	50
" weights used in assaying, . . . . .	246	" table for calculating results of assays, . . . . .	230
Granulating, . . . . .	22	" wet assay of in ores, . . . . .	347
Graphite, estimation of, . . . . .	376	" " " Storer's method, . . . . .	347
" Turner's method, . . . . .	377	" " " Mohr's method, . . . . .	348
Grinding, . . . . .	182	Lignite, . . . . .	73
Gutta percha mould, . . . . .	155	Limestone, analysis of, . . . . .	356
<b>H</b>			
Hall mark, . . . . .	101	Liquates, . . . . .	5
Hardness, . . . . .	3	Liquation, . . . . .	143
Hematite, . . . . .	119	Litharge, . . . . .	113
Hydriodic acid, estimation of, . . . . .	314		
Hydrobromic acid, . . . . .	313		
Hydrocarbons, . . . . .	418		
Hydrochloric acid, . . . . .	313		

	Page		Page
<b>M</b>			
Magnesia mixture, . . . . .	195, 345	Nickel, solution, . . . . .	172
Magnesium, . . . . .	40	Nitrogen, estimation of, . . . . .	418
" estimation of, . . . . .	304	<b>O</b>	
" pyrophosphate, 359, 361	195	Osmium, . . . . .	354
" sulphate, . . . . .	2, 472	Osm-iridium, . . . . .	354
Malleability, . . . . .	399	Oxides, . . . . .	107
Manganese, estimation of, . . . . .	327	" formation of, . . . . .	108
" bronze, analysis of, . . . . .	47	" reduction of, . . . . .	112
" dioxide, . . . . .	397	<b>P</b>	
" assay of, in iron, . . . . .	466	Parcel coppering, . . . . .	154
" volumetrically, . . . . .	296, 397	Parting, . . . . .	141
" estimation of, . . . . .	135	Pearson, A. H., . . . . .	366
Marl, . . . . .	5	Peat, examination of, . . . . .	73
Matthiessen, . . . . .	421	Pestle, . . . . .	20
Measuring flasks, . . . . .	182	Pewter, . . . . .	98
Mechanical sub-division, . . . . .	471	" analysis of, . . . . .	320
Melting points of metals, . . . . .	285	Phospho-magnesia method, . . . . .	400
Mercurous oxide, . . . . .	287	Phosphor-bronze, analysis of, . . . . .	325
Mercuric, . . . . .	40	Phosphoric acid, estimation of, . . . . .	308, 434
Mercury, . . . . .	273, 274, 275	Phosphorus, . . . . .	43
" assay of, . . . . .	63	" estimation of, in iron, . . . . .	400
Mercury, experiments with, . . . . .	346	" estimation of, Wood's method, . . . . .	404
" wet assay of, in amalgams, . . . . .	346	Phospho-molybdate of ammonia, . . . . .	402
" wet assay of, in ores, . . . . .	346	Pickles, . . . . .	177
Metal, . . . . .	1	Pipettes, . . . . .	422
Metallurgical laboratory, . . . . .	6	Platinum, . . . . .	41
Metallurgy, . . . . .	1	" assay of, . . . . .	281
Metric system, . . . . .	473	" chloride, . . . . .	196
Moisture, estimation of, . . . . .	74, 184	" estimation of, . . . . .	291
Mortar, . . . . .	20	" ores of, . . . . .	354
Moulds, . . . . .	20	" parting vessels, . . . . .	251
" crucible, . . . . .	29	" wet assay of, . . . . .	354
" elastic, . . . . .	160	" " " Claus' method, . . . . .	354
" fusible alloy, . . . . .	159	Plattner's assay, . . . . .	216
" plaster, . . . . .	161	Plumber's solder, Analysis of, . . . . .	319
" wax, . . . . .	158	Plumbic oxide, . . . . .	47
<b>N</b>			
Nickel, . . . . .	41	" sulphide, . . . . .	47
" assay of, . . . . .	277, 296	Pokers, . . . . .	18
" experiments, . . . . .	62	Potash, . . . . .	192
" glance, wet assay, . . . . .	334	Potassium, bichromate, . . . . .	134
" in copper ores, . . . . .	218		
" ore, wet assay, . . . . .	332		
" silver, . . . . .	94		

	Page		Page
Potassium, chlorate, . . . . .	45	Manganese from nickel and cobalt, . . . . .	301
" cyanide, 45, 166, . . . . .	194	Nickel from cobalt, . . . . .	301
" estimation of, . . . . .	306	Magnesium from barium, strontium, and calcium, . . . . .	305
" nitrate, . . . . .	44	Potassium, sodium, and ammonium, . . . . .	307
" nitrite, . . . . .	194	Sulphuric acid from other members of Group I., . . . . .	311
" sulphate, . . . . .	194	Silica from phosphoric acid, . . . . .	312
" tartrate, . . . . .	44	Silica from boracic acid, . . . . .	312
Precipitation, . . . . .	187	Hydrosulphuric acid from members of Group II., . . . . .	315
" of copper, . . . . .	145	Hydrocyanic acid from hydrobromic, hydriodic, and hydrochloric acids, . . . . .	315
" of gold, . . . . .	146	Hydriodic acid from hydrochloric and hydrobromic acids, . . . . .	316
" of silver, . . . . .	145	Hydrochloric acid from hydrobromic acid, . . . . .	316
R		Shot metal, analysis of, . . . . .	322
Re-agents, general, . . . . .	189	Shrötter's apparatus, . . . . .	357
special, . . . . .	190	Sieve, . . . . .	21
Red lead, . . . . .	114	box, . . . . .	21
Regulus, . . . . .	37	Silica, . . . . .	47, 351
Resistance, . . . . .	153	estimation of, . . . . .	310
Reducing agents, . . . . .	112	Silicates, analysis of, . . . . .	360
Rhodium, . . . . .	354	of alumina, . . . . .	70
Roasting dishes, . . . . .	34	" copper, . . . . .	71
Roberts-Austen, . . . . .	99, 231	" iron, . . . . .	72
Rolling mill, . . . . .	23	" lead, . . . . .	72
Ruthenium, . . . . .	355	" lime, . . . . .	63
S		" magnesia, . . . . .	69
Sampling, . . . . .	181, 237	Silicon, estimation of, in iron, . . . . .	381, 387
Sand, . . . . .	68	Silicon-bronze, analysis of, . . . . .	326
Schwarz, Dr. H., . . . . .	447	Silver, . . . . .	41
Scoop, . . . . .	20	alloys, . . . . .	99
Scoria, . . . . .	142	alloys, table showing variation by rate of cooling, . . . . .	231
Scorification, . . . . .	142	alloys, oxidation of, . . . . .	232
Scorifier, . . . . .	19, 34, 142	assay, 231, 232, 235, 236, 283	240
Separations:—		" by scorification, . . . . .	240
Silver, lead, and mercury, . . . . .	285	" effect of impurities on, . . . . .	235
Mercury, copper, cadmium, and bismuth, . . . . .	289	" fluxes employed in, . . . . .	237
Gold, platinum, tin, antimony, and arsenic, . . . . .	292		
Tin, antimony, and arsenic, . . . . .	293		
Iron, aluminium, and chromium, from nickel, cobalt, zinc, and manganese, . . . . .	298		
Aluminium from iron, . . . . .	299, 300		
Manganese from zinc and nickel, . . . . .	300		
Zinc from nickel, cobalt, and manganese, . . . . .	300		

	Page		Page
Silver, assay, Indian Method, . . . . .	446	Sulphides, . . . . .	119
" in Mints and Assay Offices, . . . . .	442	" formation of, . . . . .	120
" of old cupels, . . . . .	243	" re-action of, on oxides and sulphates, 130, 133	124
" weights used, . . . . .	233	" reduction of, . . . . .	124
bromide, . . . . .	317	" roasting of, . . . . .	127
chloride, . . . . .	317	Sulphur, . . . . .	43, 351
electro experiments, . . . . .	162	" assay of, . . . . .	75, 364
estimation of, in copper liquors, . . . . .	345	" in iron, . . . . .	393
experiments, . . . . .	59	" in speise, . . . . .	335
iodide, . . . . .	317	" in pyrites, etc., 343	343
nitrate, . . . . .	196	" Pearson's method, . . . . .	366
nitrate, electro experiments, . . . . .	168	" volumetrically, 467	467
recovery of, from solutions, . . . . .	172	" Waage's method, . . . . .	367
solders, . . . . .	102	Sulphuretted hydrogen, . . . . .	191
solutions for plating, . . . . .	167, 169	" estimation of, . . . . .	314
Slag, analysis of, . . . . .	360	Sulphuric acid, estimation of, . . . . .	308
Slags, . . . . .	36	of, . . . . .	308
Soda, . . . . .	192	Surcharge, . . . . .	251
Sodium, acetate, . . . . .	193	T	
carbonate, . . . . .	44, 193	Tangents, table of, . . . . .	477
chloride, . . . . .	43	Tenacity, . . . . .	3, 472
estimation of, . . . . .	306	Thermometer degrees, . . . . .	476
hydrogen sulphite, . . . . .	192	Tin, . . . . .	42
phosphate, . . . . .	193	" arsenide, . . . . .	326
sulphide, . . . . .	194	" assay of, . . . . .	260, 262, 264, 265, 266, 290
thiosulphate, use of, in volumetric analysis, . . . . .	193, 428	" estimation of, . . . . .	431
Solders, . . . . .	97	" experiments, . . . . .	52
quick, . . . . .	97	" ores, wet assay of, . . . . .	349
Solution, . . . . .	134	" Klaproth's method, . . . . .	349
Specific gravity, . . . . .	4, 78	" Hallet's method, . . . . .	350
Speise, cobalt, . . . . .	134, 281	" oxide, . . . . .	350
copper, . . . . .	134, 279	" phosphide, . . . . .	325
nickel, . . . . .	134, 278	Titanium, estimation of, . . . . .	406
Spitting, . . . . .	136	Tongs, . . . . .	18
Stack, . . . . .	11	Touchstone, . . . . .	252
Standards, . . . . .	101	Tough, . . . . .	3
Stannous chloride, . . . . .	196	Trays, . . . . .	19
Starch solution, . . . . .	429	" wood, . . . . .	35
Steel, . . . . .	39	" iron, . . . . .	35
by scorification, . . . . .	99	Tungsten, . . . . .	350
effect of impurities on, . . . . .	19	Tungsten, in tin ores, . . . . .	266
fluxes employed in, . . . . .	177	Turner's furnace for carbon, . . . . .	381
Stripping liquor, . . . . .	304		
Strontium, estimation of, . . . . .	304		

	Page		Page
U		W	
Uranium nitrate, . . . . .	435	Waage, . . . . .	367
"    phosphate, . . . . .	434	Washing, . . . . .	21
V		Waste, Treatment of, . . . . .	242
Vanning, . . . . .	21	Weighing, . . . . .	183
"    ladle, . . . . .	22	Wood, . . . . .	73
"    shovel, . . . . .	22	Wood ashes, . . . . .	135
Vegetating, . . . . .	136	Z	
Voltaic cell, . . . . .	148	Zinc, . . . . .	42
Volumetric analysis, . . . . .	420	"    assay (dry), . . . . .	269, 271
"    classification	421	"    volumetrically, . . . . .	458
"    of, . . . . .	421	"    (wet), . . . . .	296, 336, 337
"    methods of, . . . . .	424	"    experiments, . . . . .	64
		"    oxide, . . . . .	49

## Works by ARTHUR H. HIORNS.

*Globe 8vo, 3s.*

### A TEXT-BOOK OF ELEMENTARY METALLURGY.

QUESTIONS. *Globe 8vo, 1s.*

*CHEMICAL NEWS*.—"The body of the work has few blemishes."

*MECHANICAL WORLD*.—"We have no hesitation in saying that this book will become as popular as it is useful. In it the intending student of Metallurgy will find a clear description of the principles involved written in a style that arouses and maintains the interest in a subject which can easily be made very 'dry' by injudicious treatment."

*Second Edition. Globe 8vo, 6s.*

### PRACTICAL METALLURGY AND ASSAYING.

*ATHENÆUM*.—"Sound instruction in the physical properties of metals and their alloys and kindred subjects is given in a series of well-chosen, simple experiments. The processes of analysis of metals are detailed with great care and skill."

*GLASGOW HERALD*.—"The book is a most valuable contribution to the subject, and will be of much benefit to the student, or teacher, or practical assayer. It is well got up, and the numerous illustrations add to its value."

*SCOTSMAN*.—"The work is written in a clear and practical style, and is very rich in examples and exercises. In scope it meets on the one hand the necessities of the elementary stage of the Science and Art Department Syllabus, and provides useful matter for students ambitious of honours in metallurgy. It fills a place of its own, and fills it well."

*Globe 8vo, 6s.*

### PRINCIPLES OF METALLURGY.

*SPEAKER*.—"It is unnecessary to praise the work of a practical authority like Mr. Hiorns."

*Globe 8vo, 10s. 6d.*

### STEEL AND IRON FOR ADVANCED STUDENTS.

MACMILLAN AND CO., LTD., LONDON.

## Works by ARTHUR H. HIORNS.

Globe 8vo, 3s. 6d.

### IRON AND STEEL MANUFACTURE FOR BEGINNERS.

*MECHANICAL WORLD.*—"In the present work, the chapters on steel are written with much care. The chapter on iron founding is valuable, because it is practical. . . . The book is calculated to be of much service to beginners, and for this purpose it deserves to be recommended."

*BUILDER.*—"This handy little book, consisting of fifteen chapters, is well worth perusal by engineers, as it deals in a very able manner with the fundamental principles of the various processes employed in the manufacture of iron and steel, and gives a practical account of both the chemical and mechanical properties of these metals. . . . We welcome any book which describes in good language and practical form the latest that is known upon the relative advantages of iron and steel. . . . The first chapter is interesting for its historical matter, and the succeeding chapters each conclude with a set of from nine to twenty-three useful questions, intended to test the proficiency of the reader when studying its pages. The book is sufficiently illustrated as an elementary text-book, and concludes with a concise and well-arranged index."

Globe 8vo, 6s.

### MIXED METALS OR METALLIC ALLOYS.

*SCOTSMAN.*—"A useful and valuable supplement to the usual text-books of metallurgy. . . . It is written with a fulness that makes it valuable for purposes of reference as well as for study."

*MANCHESTER EXAMINER.*—"An excellent manual for students of metallurgy."

*MANCHESTER GUARDIAN.*—"It is clear and accurate. The preparation of mixed metals, the proportion of metals in the various alloys commercially important, and their mechanical properties, are all treated with sufficient fulness."

*BIRMINGHAM DAILY GAZETTE.*—"Mr. Hiorns writes with the ample knowledge of a specialist dealing with his own subject."

Globe 8vo, 5s.

### METAL COLOURING AND BRONZING.

*MECHANICAL WORLD.*—"We can recommend this work with pleasure as an eminently practical treatise on the subject."

Globe 8vo, 6s.

### METALLOGRAPHY.

MACMILLAN AND CO., LTD., LONDON.

## Works by Sir ARCHIBALD GEIKIE,

F.R.S., D.C.L., etc.

### THE ANCIENT VOLCANOES OF GREAT BRITAIN.

With Seven Maps and numerous Illustrations. In Two vols. Super royal 8vo, 36s. net.

### THE SCENERY OF SCOTLAND VIEWED IN CONNECTION WITH ITS PHYSICAL GEOLOGY. Third edition. Crown 8vo, 10s. net.

### THE FOUNDERS OF GEOLOGY. Second edition. 8vo, 10s. net.

### TEXT-BOOK OF GEOLOGY. With Illustrations. Fourth edition. 2 vols., 8vo, 30s. net.

### CLASS-BOOK OF GEOLOGY. Illustrated with woodcuts. Fourth edition. Crown 8vo, 5s.

### GEOLOGY. With Illustrations. Pott 8vo, 1s. [*Science Primers.*]

### OUTLINES OF FIELD GEOLOGY. New and revised edition. Extra fcap. 8vo, 3s. 6d.

### GEOLOGICAL SKETCHES AT HOME AND ABROAD.

With Illustrations. 8vo, 10s. 6d.

### ELEMENTARY LESSONS IN PHYSICAL GEOGRAPHY.

Illustrated with woodcuts and ten plates. Fcap. 8vo, 4s. 6d.

QUESTIONS FOR THE USE OF SCHOOLS. Fcap. 8vo, 1s. 6d.

### PHYSICAL GEOGRAPHY. Illustrated. Pott 8vo, 1s.

[*Science Primers.*]

### THE TEACHING OF GEOGRAPHY. Globe 8vo, 2s.

### GEOGRAPHY OF THE BRITISH ISLES. Pott 8vo, 1s.

### LANDSCAPE IN HISTORY AND OTHER ESSAYS. 8vo, 8s. 6d. net.

### MEMOIR OF SIR A. C. RAMSAY. 8vo, 12s. 6d. net.

MACMILLAN AND CO., LTD., LONDON.

**WORKS ON  
GEOLOGY AND MINERALOGY.**

**THE GEOLOGY OF NOVA SCOTIA, NEW BRUNSWICK,  
and PRINCE EDWARD ISLAND; or, ARCADIAN GEOLOGY.**  
By Sir J. W. DAWSON, LL.D., F.R.S., F.G.S., Principal and  
Vice-Chancellor of McGill College and University, Montreal.  
Fourth edition. 8vo, 21s.

**THE KLERKSDORP GOLD FIELDS.**

Being a description of the Geologic and of the Economic  
conditions obtaining in the Klerksdorp district, Transvaal  
Colony. By G. A. DENNY. Fully illustrated with Plans,  
Sections, a complete Map of the Klerksdorp district, and a  
Geological Map of the same area. Royal 8vo, 42s. net.

**OBSERVATIONS OF A NATURALIST IN THE PACIFIC**  
between 1896 and 1899. By H. B. GUPPY, M.B. Vol. I.,  
Vanua Levu, Fiji: Its Physical and Geological Characters.  
Illustrated. 8vo, 15s. net. Vol. II., Plant Dispersal. 8vo,  
21s. net.

**THE GOLD MINES OF THE RAND.**

Being a description of the Mining Industry of Witwaters-  
rand, Transvaal Colony. By FREDERICK H. HATCH (Mining  
Engineer) and J. A. CHALMERS (Mining Engineer). With  
maps, plans, and illustrations. Super royal 8vo, 17s. net.

**GEOLOGY OF SOUTH AFRICA.**

By Dr. F. H. HATCH and Dr. G. S. CORSTORPHINE. Illus-  
trated. 8vo, 21s. net.

**GEOLOGY AND GENERAL PHYSICS.**

By Lord KELVIN, D.C.L., P.R.S., F.R.S.E., Professor of  
Natural Philosophy in the University of Glasgow, and Fellow  
of St. Peter's College, Cambridge. Crown 8vo, 7s. 6d.

**TABLES FOR DETERMINATION OF ROCK-FORMING  
MINERALS.** Compiled by F. LOEWINSON-LESSING, Professor  
of Geology at the University of Dorpat. Translated by J.  
W. GREGORY. 8vo, 4s. 6d. net.

MACMILLAN AND CO., LTD., LONDON.

**WORKS ON  
GEOLOGY AND MINERALOGY.**

**A TREATISE ON ROCKS, ROCK-WEATHERING, AND  
SOILS.** By GEORGE P. MERRILL, Curator of Geology in the  
United States National Museum, and Professor of Geology  
in the Coreoran Scientific School and Graduate School of  
Columbian University, Washington, D.C. 8vo, 17s. net.

**MINERALOGY: An Introduction to the Scientific Study  
of Minerals.** By H. A. MIERS, F.R.S., Professor of Miner-  
alogy in the University of Oxford. 8vo, 25s. net.

**PAPERS ON GEOLOGY**

By Sir JOSEPH PRESTWICH, F.R.S. 8vo, 10s. net.

**CERTAIN PHENOMENA BELONGING TO THE LAST  
GEOLOGICAL PERIOD.** By the same author. 8vo, 2s. 6d.  
net.

**ECONOMIC GEOLOGY OF THE UNITED STATES.**

By Professor H. RIES. Illustrated. 8vo, 11s. net.

**VOLCANOES OF NORTH AMERICA.**

By I. C. RUSSELL. 8vo, 16s. net.

**AN INTRODUCTION TO GEOLOGY.**

By WILLIAM B. SCOTT, Blair Professor of Geology and  
Paleontology in Princeton University. Ex cr. 8vo, 8s. net.

**GEOLOGY FOR BEGINNERS.**

By W. W. WATTS, M.A., F.G.S., Assistant Professor in  
Geology at the Birmingham University. With 310 Illustra-  
tions. Globe 8vo, 2s. 6d.

**ELEMENTS OF CRYSTALLOGRAPHY FOR STUDENTS  
OF CHEMISTRY, PHYSICS, AND MINERALOGY.** By GEO.  
HUNTINGDON WILLIAMS, Ph.D., Assistant Professor in the  
Johns Hopkins University. Crown 8vo, 6s.

**ELEMENTS OF PALEONTOLOGY.**

By KARL A. VON ZITTEL, Professor of Geology and Paleon-  
tology at Munich. Translated and edited by CHARLES R.  
EASTMAN, Ph.D. Revised and enlarged from the German  
original. Vol. I. Medium 8vo, 25s. net. Vol. II. 10s. net.

MACMILLAN AND CO., LTD., LONDON.

## IMPORTANT WORKS ON METALLURGY.

---

**A HANDBOOK OF GOLD MILLING.** By HENRY LOUIS, Professor of Mining in the Durham College of Science. Second edition. Illustrated. Cr. 8vo, 10s. net.

**A TREATISE ON ORE DEPOSITS.** By J. ARTHUR PHILLIPS, F.R.S. Illustrated. Second edition. Revised by HENRY LOUIS, Professor of Mining in the Durham College of Science. 8vo, 28s.

**CANADA'S METALS.** A Lecture delivered at the Toronto Meeting of the British Association for the Advancement of Science, August 20, 1897. By Professor Sir W. C. ROBERTS-AUSTEN, F.R.S., Professor of Metallurgy, Royal College of Science. 8vo, 2s. 6d. net.

**A HANDBOOK OF METALLURGY.** By CARL SCHNABEL. Translated by Professor H. LOUIS. Illustrated. Second edition. Vol. I. Medium 8vo, 25s. net.

**THE GOLDFIELDS OF AUSTRALASIA.** By K. SCHMEISSER. Translated and edited by Prof. HENRY LOUIS. Fully illustrated. Medium 8vo, 30s. net.

**THE WITWATERSRAND GOLDFIELDS BANKET AND MINING PRACTICE.** By S. J. TRUSCOTT, F.G.S., Mine Manager (Hoofdopzichter), Transvaal Colony. With numerous plans and sections. Second edition. Super royal 8vo, 30s. net.

MACMILLAN AND CO., LTD., LONDON.



