The meteoric stone of Lake Brown, Western Australia.

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THE discovery of the meteoric stone near Lake Brown,[1] County Avon, South-West Division, Western Australia, was recorded by Dr. Edward S. Simpson in the Annual Progress Report of the Geological Survey of Western Australia for 1921 (1922, p. 53).[2] The following details concerning the meteorite are taken from that report and from a letter of September 25, 1925, sent by Dr. Simpson with the specimen, weighing 174 grams, which was presented to the British Museum collection by Mr. A. Gibb Maitland, at that time Government Geologist of Western Australia.

The stone was first seen by Mr. N. A. Stuckey in 1919, and was re-discovered later by Mr. H. G. Stokes, by whom it was presented to the Museum of the Geological Survey of Western Australia in Perth, where it is now preserved. As received it measured about $17 \times 15 \times 14$ inches and weighed 21½ lb. (9·75 kg.).[3] On one side it shows a few shallow 'thumb-marks' (fig. 1), and on another 'well-marked air-friction striae radiating from a corner' (fig. 2). Its specific gravity, as determined by Dr. Simpson, is 3·505.

Examination of the British Museum specimen (B. M. 1925,1037) showed that the stone has the characters of an intermediate chondrite. The fractured surface is of light grey colour, but is stained in parts with oxide of iron owing to the oxidation which the stone has suffered since its fall. Under the microscope a thin section shows

[1] Lake Brown is a lake and also a railway-station at latitude 31° S., longitude 118½° E., about. On the map of Western Australia by J. Arrowsmith (London, 1863) and in the British Museum 'Catalogue of Meteorites' (1923) the county is given as Carnarvon.

[2] Separate from Report of the Department of Mines, Western Australia, for 1921, Perth, 1922, p. 123. The entry there reads: 'Lake Brown. A pale grey aerolite with but little metallic nickel iron. Total weight 2½ lbs. Found in 1919 by Mr. Stuckey.'

[3] In the original report (loc. cit.) the weight is wrongly given as 2½ lb.

the usual characters of a white or intermediate chondrite, the chondrules being all fragmental and scarcely to be distinguished from the fairly holocrystalline matrix.

Chemical composition.—Dr. Simpson sent with the British Museum specimen a portion weighing 37 grams which, with a view to analysis,

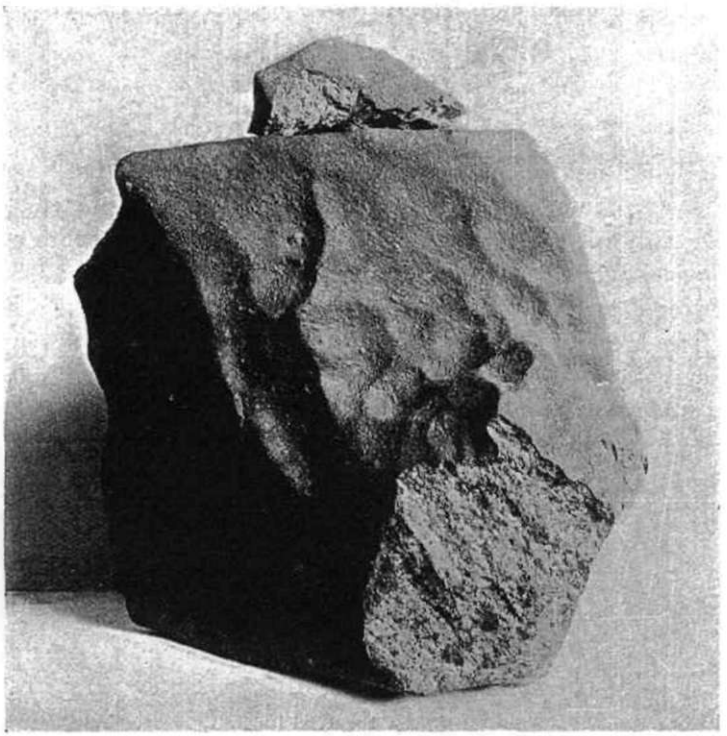

FIG. 1.[1] Meteoric stone of Lake Brown, Western Australia, showing 'thumb-marks'. $\times\frac{1}{3}$.

he had separated into three parts, viz. 32 grams (mostly silicates) which had passed through a 90-mesh sieve, 4·05 grams (mainly metal) which had passed through a 30-mesh sieve, and 0·95 gram (mainly metal) which could not pass the 30-mesh sieve. This material was taken for the analyses, the results of which are given below. By the magnetic comb it was separated into 3·4127 grams attracted and 32·500 unattracted.

[1] Figs. 1 and 2 are reproduced from photographs sent by Dr. E. S. Simpson, and represent the meteorite as first received by the Geological Survey of Western Australia.

The analyses were conducted by the methods described in previous papers. In the attracted the cobalt was separated from nickel by means of α-nitroso-β-naphthol, and in the filtrate nickel was precipitated by dimethylglyoxime. Of the unattracted, a part weighing 5·9167 grams was separated by means of dilute hydro-

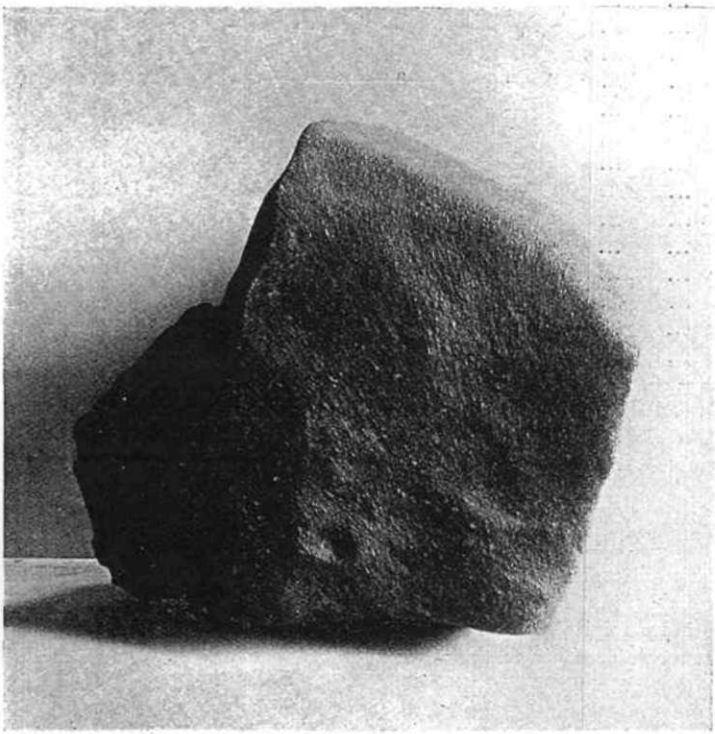

FIG. 2. Meteoric stone of Lake Brown, Western Australia, showing radiating flow-lines. $\times \frac{1}{3}$.

chloric acid into 2·9192 grams insoluble and 2·9975 soluble. Analyses were made of the attracted (partial analysis), the unattracted, and the insoluble of the unattracted, with the results shown in Table I.

These results show that the Lake Brown meteoric stone conforms to theory in having a rather low content of nickel-iron rich in nickel and ferromagnesian silicates correspondingly rich in ferrous oxide. In chemical composition it is remarkably similar to the Warbreccan (Queensland) stone,[1] the bulk analysis of which is given in the last

[1] G. T. Prior, The meteoric stones of Launton, Warbreccan ... Min. Mag., 1916, vol. 18, p. 8.

TABLE I.

	Attracted.	Total unattracted.	Insoluble of unattracted.	Bulk analysis.	War-breccan.
Fe	63·79 [1]	—	—	6·10	6·03
Ni	11·27	—	—	1·08	1·06
Co	0·60 [2]	—	—	0·06	0·08
Fe	—	4·29	—	3·98	4·09
S	—	2·46	—	2·28	2·31
SiO_2	3·17 [3]	42·51	52·52	39·43	39·86
TiO_2	—	0·38	—	0·35	0·21
Al_2O_3... ...	—	2·16	5·43	2·00	1·71
Cr_2O_3... ...	—	0·19	0·40 [4]	0·18	0·41
Fe_2O_3... ...	—	3·94	—	3·65	2·15
FeO	—	12·93	16·24	11·99	12·84
MnO	—	0·27	—	0·25	0·39
NiO	—	0·35	—	0·32	0·12
CaO	—	2·03	5·10	1·88	2·01
MgO	—	27·11	18·58	25·15	24·75
Na_2O... ...	—	0·87 [5]	1·93	0·81	0·92
K_2O	—	0·11 [5]	0·25	0·10	0·06
$H_2O(-110°)$...	—	0·08	—	0·08	0·80
$H_2O(+110°)$...	—	0·54	—	0·50	
P_2O_5	—	0·33	—	0·31	0·26
Insoluble ...	10·73	—	—	—	—
	—	100·55	100·45	100·50	100·06

[1] i.e. 66·04 total iron estimated less 2·19 contained in the soluble portion of admixed unattracted.

[2] Probably too low, owing to possible loss on ignition of the α-nitroso-β-naphthol precipitate.

[3] From soluble silicate; the other constituents of which were not determined here.

[4] From analysis of unattracted.

[5] From analysis of insoluble.

column above. The approximate mineral composition of the stone is: nickel-iron 7, troilite 6, olivine 36, pyroxene 38, felspathic material 8, ferric oxide, water, &c., 5%. The ratio Fe : Ni in the nickel-iron is about $5\frac{1}{2}$, and in conformity with this the ratio MgO : FeO in the ferromagnesian silicates is about $3\frac{1}{2}$. The composition of the stone may therefore be expressed by the symbol $f_7\, n_{5\frac{1}{2}}\, m_{3\frac{1}{2}}\, t_6$, where f denotes the percentage of nickel-iron, n the ratio of iron to nickel in it, m the ratio of MgO to FeO in the ferromagnesian silicates, and t the percentage of troilite.

The Lake Brown meteoric stone is an intermediate hypersthene-chondrite of Baroti type.