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THE ELSINORA METEORITE: A NEW CHONDRITE FROM NEW SOUTH WALES.

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(Plate xxiv.)

While I was in Broken Hill, New South Wales, during November, 1924, Dr. W. Macgillivray, whose kind hospitality I was at the time enjoying, showed me two specimens which have since proved to be parts of a meteoric stone. Both these specimens he very generously presented to the Museum, and supplied the following information in regard to their history.

"The meteorite was found by Mr. Jorgen Thue-Johnsen, a surveyor of the Public Works Department, when surveying a line on Elsinora Station about 10 miles south-east from Thurloo Downs Homestead, which is about forty-six miles north-west from Wanaaring Township on the Paroo River, New South Wales. It was the only stone in a sandy paddock and hence attracted attention. One of Johnsen's men broke it with a hammer, and the two pieces which he gave me [Dr. Macgillivray] were the largest fragments, as the whole stone was only about ten or twelve inches long and six inches in diameter. It was found in September, 1922."

The locality is latitude 29° 27′ south, longitude 143° 36′ east.

The weight of the two fragments is 1797 grammes, the smaller weighing 517 grammes and the larger 1280 grammes. The specific gravity of the smaller piece taken as a whole is 3·59 and that of the material taken for analysis 3·595.

Unfortunately no record has been kept of the external appearance of the aerolite. Only a relatively small portion of the dull black crust remains. It exhibits two distinct features, namely, broad shallow depressions varying from 15 mm. to 30 mm. in diameter, with a maximum depth of 5 mm., and very small pits. The arrangement of these small pits is not very clear at first sight, but on close examination it was found that they have a more or less regular arrangement, forming stream-lines on one side of the shallow depressions, while on the other side the formation is not nearly so well defined or else is entirely absent. Another portion of the crust is quite flat, without any broad, shallow depressions, and with relatively few small pits. It has a number of cracks, but it is impossible to say whether these were produced by the maltreatment it had received at the hands of Johnsen's men, or whether they were naturally formed.

The distribution of the nickel-iron through the mass is worthy of note. One piece of iron with the appearance of ordinary hoop iron is included. At first glance it would appear that this piece is foreign to the stone, suggesting that the aerolite had been impaled on a piece of hoop iron at the moment of reaching the earth, but as the metal is nickel-iron, there can be no doubt that it actually forms part of the stone. The nickel-iron sometimes occurs in veins through the stone, but more generally it is fairly evenly distributed throughout the mass, and is easily visible to the naked eye. However, on grinding for analysis, it was found that the material could be ground to a fine state with only one or two larger particles of metal. Obviously these visible grains of nickel-iron are either much fractured or made up of numerous smaller particles.

Under the microscope thin sections show a number of chrondules, which consist of either olivine or fibrous radiating enstatite. The groundmass consists of olivine and enstatite with nickel-iron fairly evenly distributed, minute grains of troilite, and felspar, which is for the most part untwinned. Extinction angles were of no value in determining the felspar. It had a lower refractive index than Canada balsam, indicating an acid plagioclase. From the chemical analysis it would appear to be oligoclase with the composition of $Ab_{44}\ An_{10}$. A colourless mineral with only feeble double refraction and a low refractive index is also present in the groundmass. The aerolite belongs to the veined grey chondrites (Cga) of Brezina's classification.

	Attracted.	Unattracted.	Bulk Analysis.	Molecular Ratio.
SiO_2	3·58	43·59	35·47	·591
Al_2O_3	—	2·76	2·02	·020
Fe_2O_3	—	0·22	0·17	·001
FeO	1·54	11·07	9·14	·127
MgO	3·56	27·59	25·21	·630
CaO	0·25	1·89	1·56	·028
Na_2O	—	1·03	0·82	·013
K_2O	—	0·01	0·01	·001
H_2O	—	0·52	0·41	—
TiO_2	—	0·07	0·05	·001
P_2O_5	Present	0·13	0·10	·001
Cr_2O_3	—	0·43	0·34	·002
MnO	—	0·08	0·07	·001
CuO	Present		Present	
FeS	1·02	5·74	4·78	—
Fe	71·24	4·62	18·23	—
Ni	5·20	0·33*	1·31	—
Co	0·08	—	0·02	—
Insoluble	13·34	—	—	—
	99·81	99·78	99·71	—

* Including any cobalt.

The bulk analysis is calculated from the other two.

For the purpose of analysis, a portion weighing approximately 11 grammes was chosen. Owing to the finely divided state of the nickel-iron, the separation of the material into attracted and unattracted parts presented some difficulty. A small electromagnet was found to be the most suitable apparatus to use in this case. The attracted portion weighed 2·1851 grammes, and the unattracted portion 8·5845 grammes. The method of analysis used is that described by G. T. Prior[1] and the results as shown in the preceding table were obtained.

The following is the mineral constitution of the stone as calculated from the bulk analysis:—

Orthoclase	0·56	
Albite	6·81	
Anorthite	1·67	
Felspar		9·04
$CaO.SiO_2$	2·20	
$MgO.SiO_2$	18·60	
$FeO.SiO_2$	1·72	
Bronzite		22·52
$2MgO.SiO_2$	31·08	
$2FeO.SiO_2$	11·22	
Olivine		42·30
Apatite		0·31
Chromite		0·45
Troilite		4·78
Magnetite		0·23
Ilmenite		0·15
Iron	18·23	
Nickel	1·31	
Cobalt	0·02	
Nickel-iron		19·56
Water		0·41
		99·75

From the above results it will be seen that this chondrite belongs to Group 2 (Cronstad type) of Prior's classification. The ratio of Fe to Ni in the nickel-iron is 13·7, and the ratio of MgO to FeO in the magnesium silicates is 5.

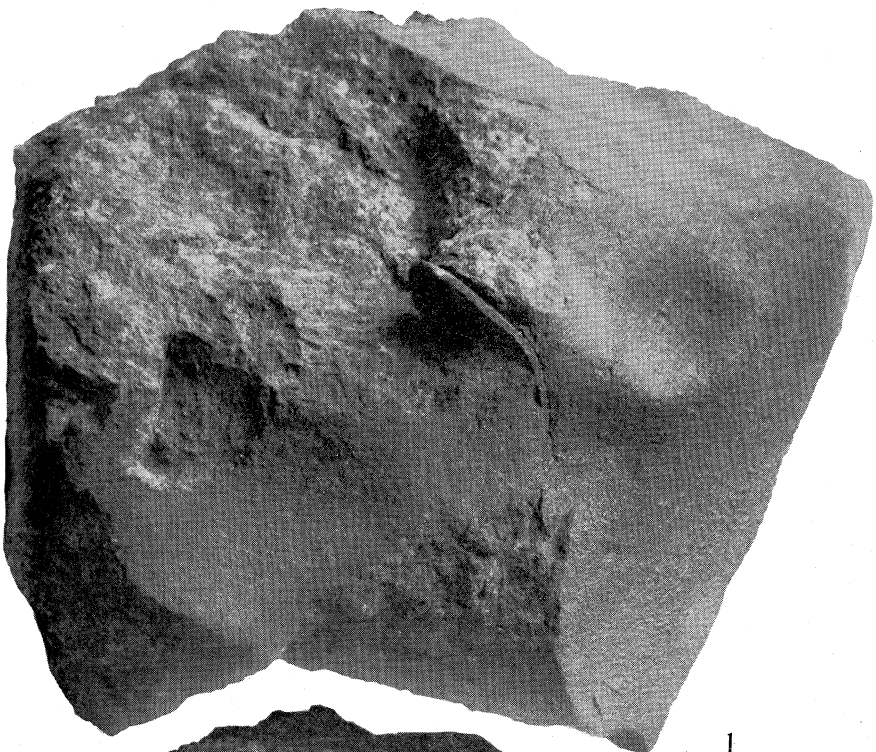
[1] Prior.—Mineralogical Magazine, xvii, 1913, pp. 24-25.

EXPLANATION OF PLATE XXIV.

Fig. 1. Elsinora meteorite, showing a vein of nickel-iron near the centre of the photograph.

Fig. 2. Another view of the same meteorite.

(Slightly larger than natural size.)



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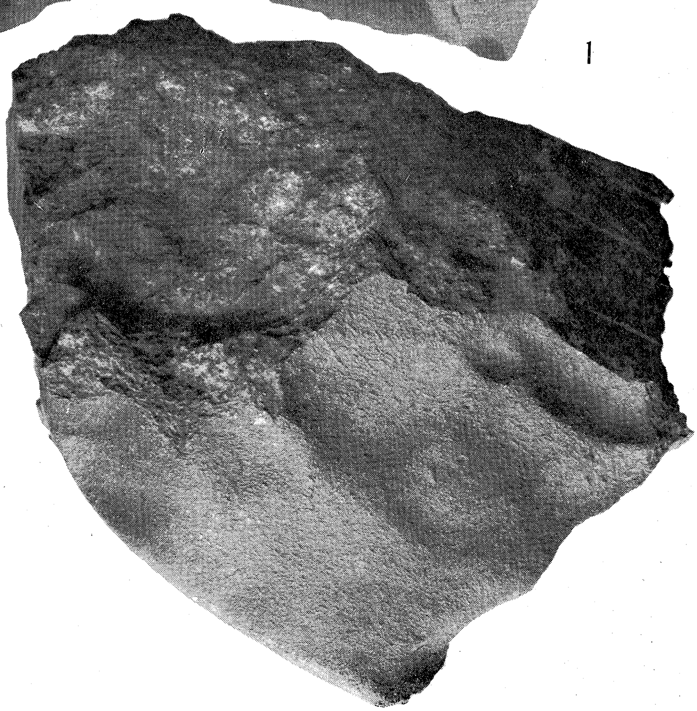

2

G. C. Clutton, photo.