

The Macquarie River 'meteorite'.

THE Macquarie River (New South Wales, Australia) meteorite, supposedly a mesosiderite, was listed as a doubtful meteorite by E. A. Wülfing (*Die Meteoriten in Sammlungen*, 1897, p. 402) and by T. Hodge-Smith (*Mem. Australian Mus.*, 1939, vol. 7, pp. 27, 34). Wülfing listed the following material in collections: Gregory, 58 g; Paris, Museum, 1 g; v. Siemaschko, 3 g; Hodge-Smith records 9 g in the American Museum of Natural History and 1 g in the Museum d'Histoire Naturelle, Paris. The piece in the American Museum of Natural History (originally in the Bement collection) has been investigated, and it is not a meteorite; the iron does not give a nickel test, and the interstitial material is not silicate, but a mixture of copper and iron sulphides. The specimen is presumably a smelter product. The name Macquarie River should be struck out from the list of meteorites.

The above note had been written when I discovered that O. C. Far-
rington (*Field Museum of Natural History, Geol. Ser.*, vol. 5, pp. 12-14,
1914) had made an extensive study of the 58 g piece of Macquarie River
originally in the Gregory collection. His description tallies exactly with
the appearance of the piece in the American Museum of Natural History,
and his conclusion is the same, that the material is not a meteorite, but
is of artificial origin.

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*Note on the mineralogical characters of some Indian
chromites.*

ORISSA is an important chromite ore-producing area in India, where large quantities of ore occur in the altered dunites. The gangue minerals are antigorite, talc, and tremolite. Study of these chromites in thin and polished sections, and their chemical analyses, brought out some interesting features of their mineralogy. Chromite of this area is coarsely crystalline, showing mostly euhedral outline; the grain size reaches up to 4.5 mm in dimension in some places in the Cuttack district; colour varies from dark grey to brown, on which the ore may be classified into two regional groups, grey ore and brown ore; the sp. gr. of chromite ranges from 4.5 to 5.1. The brown ore shows feeble magnetism. The cell

dimensions of the chromites were determined by powder photograph method, and are tabulated below. There is a close relation of the mineralogical characters of chromite and its chemical composition.

The colour of the chromite in thin section varies from reddish-brown to yellowish-brown. A reddish-brown colour was seen in the grains included in enstatite; the colour is otherwise brown to yellowish-brown in the grains of chromite occurring in the interstices of olivine and enstatite or forming the major ore bodies. Variation in colour indicates lack of uniformity in chemical composition, although the chemical difference between chromites of different modes of occurrence could not be detected. Variations in the colour of chromite were reported by Fisher (1929) and Smith (1958) with similar conclusions. The author's conclusion was further substantiated by a polished section study of chromite. In polished section the chromites of Orissa show deep grey to brownish-grey colour, with variation in reflectance from 14.7 % in the grains included in enstatite to 15.6 % in other chromites; the reflectivity was measured by a Leitz photometer, in green light (5300 Å), in air and with a constant magnification of 160; a cleavage block of blende was used as the standard for measurement. All the chromite is isotropic and negative to standard reagents. Three sets of {111} cleavages could be detected in some of the grains.

A number of interesting oxide minerals have been found along with the chromite: ilmenite, magnetite, hematite, pyrolusite, and cryptomelane (psilomelane). Ilmenite occurs as primary crystallographic intergrowths in chromite (Chakraborty, 1958). Magnetite occurs in the brown ore and probably imparts the observed magnetic property to this variety of chromite. Hematite and manganese oxides are definitely later introductions.

Chemical analyses of the ores also throw some light on the mineralogical character of chromite. Prior to chemical analysis the chromite was separated as far as practicable from inclusions by powdering below 100 mesh, washing, heavy media, and electromagnetic separation. After all these operations a sample of the grains was mounted, polished, and examined under reflected light; no inclusions were observed. Analyses of three samples of chromite from different localities of Orissa gave:

Locality.	Type of chromite.	Cr ₂ O ₃ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MgO.	TiO ₂	Cr:Fe.	Cell dimension.
Keonjhar	grey	55.41	12.21	—	18.85	10.79	0.89	3.8	—
Cuttack	brown	48.45	15.09	3.20	16.02	11.01	trace	2.2	8.252 ± 0.005 Å
Dhenkanal	grey	60.31	9.56	2.74	12.60	13.80	0.20	3.8	8.288 ± 0.005 Å

Following Thayer's method (1946) the chemical composition of these

chromites can be expressed as: $(Mg_{51}Fe_{49}^{''})(Cr_{76}Al_{24}Fe_0^{''})$; $(Mg_{41}Fe_{59}^{''})(Cr_{73}Al_{22}Fe_5^{''})$; and $(Mg_{74}Fe_{26}^{''})(Cr_{77}Al_{19}Fe_4^{''})$. The chromite is a magnesia-rich variety and lies within the aluminian chromite field of Stevens' spinel diagram (1944). The cell dimension is less in the chromite with higher Al_2O_3 and lower Cr_2O_3 content, in agreement with Clark and Ally (1932).

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The composition of nekoite.

NEKOITE was discovered at Crestmore, California, by Eakle (1917), who identified it as okenite. Gard and Taylor (1956) showed it to be a distinct species. The only existing analysis, given in Eakle's paper, indicates the formula $CaO.2SiO_2.2H_2O$. The present work shows that this is incorrect; the true formula is probably $3CaO.6SiO_2.8H_2O$.

A new analysis of the type specimen, on which all the previous work has been done, gave SiO_2 55 %, CaO 24 %, H_2O 19.6 ± 0.2 % (total 99 %). CaO and SiO_2 were together determined on about 1.5 mg and H_2O on 5 mg of material. The molar composition calculated from this analysis is $0.47CaO.SiO_2.1.19H_2O$. The $CaO:SiO_2$ ratio agrees reasonably well with Eakle's formula, but $H_2O:SiO_2$ is significantly above the expected value of 1.0. A weight-loss curve was made on 34 mg of another specimen, also from Crestmore, which Dr. A. B. Carpenter had collected in 1959. This gave a total loss of 22.1 ± 0.1 %, which fits the formula $0.5CaO.SiO_2.1.39H_2O$. Loss of water begins at about $40^\circ C$ and is partly reversible.

The X-ray study by Gard and Taylor showed the contents of the triclinic cell to be $3CaO.6SiO_2.xH_2O$. The present results suggest that x is probably 8 ($H_2O:SiO_2 = 1.33$). The type specimen has probably