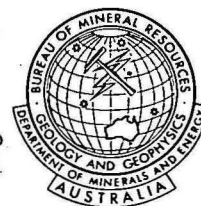


Restricted until after publication.
Manuscript submitted for publication
to: METEORITICS

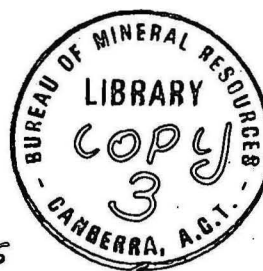
DEPARTMENT OF
MINERALS AND ENERGY

056383



BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD 1975.80



AFMS

AN L6 CHRONDRITE FOUND NEAR PARACHILNA, SOUTH AUSTRALIA

by

S.J.B. REED and D.H. McCOLL

The information contained in this report has been obtained by the Department of Minerals and Energy as part of the policy of the Australian Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

RECORD 1975.80

AN L6 CHRONDRITE FOUND NEAR PARACHILNA, SOUTH AUSTRALIA

by

S.J.B. REED and D.H. McCOLL

AN L6 CHONDRITE FOUND NEAR PARACHILNA, SOUTH AUSTRALIA

S.J.B. Reed

Research School of Earth Sciences, Australian National University,
Canberra, Australia*.

and

D.H. McColl

Bureau of Mineral Resources, Canberra, Australia

ABSTRACT:-

An 8.82 kg stony meteorite found on Motpena Station

(31°6'S., 138°16'E.), near Parachilna, South Australia, is shown to be
a somewhat weathered L6 (olivine-hypersthene) chondrite.

Present address: Dept. of Mineralogy and Petrology,
Downing Place,
Cambridge,
England

CIRCUMSTANCES OF FIND

A single stony meteorite weighing 8.82 kg was found on Motpena Cattle Station (lat. $31^{\circ}06'S$., long. $138^{\circ}16'E$), in August 1968 by Mr N.A. Bartlett, his brother, and Mr B.A. Jahn, in a claypan 15 km northwest of Parachilna railway siding, South Australia (Fig. 1). The claypan is at the junction of the alluvial plains west of the Flinders Ranges and the sand dune belt fringing the eastern shore of Lake Torrens. The meteorite lay in a depression only about 2 cm deep, and there was no evidence of an impact crater (Fig. 2). The find was reported in the Adelaide "Advertiser" of August 13, 1968. The name 'Motpena' has sometimes been used for this meteorite, but 'Parachilna' is preferable.

DISTRIBUTION OF SPECIMENS

The main mass of 4.7 kg and pieces totalling 330 g are in the collection of the Research School of Earth Sciences, Australian National University, Canberra. A piece weighting approximately 2.3 kg is in the South Australian Museum, Adelaide. Other pieces are distributed as follows: Australian Museum, Sydney - 93 g; British Museum (Natural History), London-443 g; Field Museum, Chicago - 300 g; National Museum, Washington - 98 g; Bureau of Mineral Resources, Canberra - 48 g.

GENERAL DESCRIPTION

The stone has a generally rounded form, with some nearly flat facies, and areas showing 'thumbprint' indentations (Fig. 3). One face is fractured and has no fusion crust (Fig. 2). The meteorite is finely cracked, and the cut face shows brown iron oxide staining throughout though the fusion crust is well preserved. The area where the meteorite was found is dry, but the location of the meteorite in a claypan would result in it being immersed in water after occasional heavy rain.

PETROLOGY

The principal phases present are olivine, pyroxene, feldspar, troilite, and metal. Nearly all metal grains are oxidised around their edges. In thin section the silicates show a varied degree of brown staining, though in places they are clear. Only a few chondrules are visible.

MICROPROBE RESULTS

Electron microprobe analysis, using a solid state X-ray detector and a data reduction procedure described elsewhere (Reed and Ware, 1973), was carried out on grains of the principal silicates present, selected for their lack of brown coloration. The compositions of 48 olivine grains expressed as atomic percent Fe/Fe+Mg are plotted in Figure 4. The only significant minor constituent is manganese, averaging 0.36 percent MnO. Olivine with brown coloration was found to have an enhanced iron content and significant aluminium, which was absent from clear grains. The altered grains gave low totals (with iron calculated as FeO), suggesting the presence of ferric iron and/or water, due to weathering.

Nineteen pyroxene analyses are also plotted in Figure 4. The average molecular composition is 76.7 percent En, 1.4 percent Wo, 21.9 percent Fs. The only significant minor constituent is manganese, averaging 0.39 percent MnO.

The feldspar is nearly uniform in composition, averaging 83 percent Ab, 7 percent Or, 10 percent An (5 grains). Much of the feldspar is brown and contains iron.

CLASSIFICATION

The petrology of the Parachilna meteorite places it in the Van Schmus and Wood (1967) class 6, on the grounds of the indistinct chondrules, lack of glass, and presence of coarse-grained feldspar. The distribution of olivine and pyroxene composition (Fig. 4) is broader than is usual for this class, but this may be attributed to slight enhancement of the iron content of some grains due to weathering. The observed compositions lie at the iron-rich end of the range of the L group (olivine-hypersthene) chondrites. The average iron content is unusually high for this group, but this is assumed to be a result of weathering. The Parachilna meteorite is thus classified as an L6 chondrite.

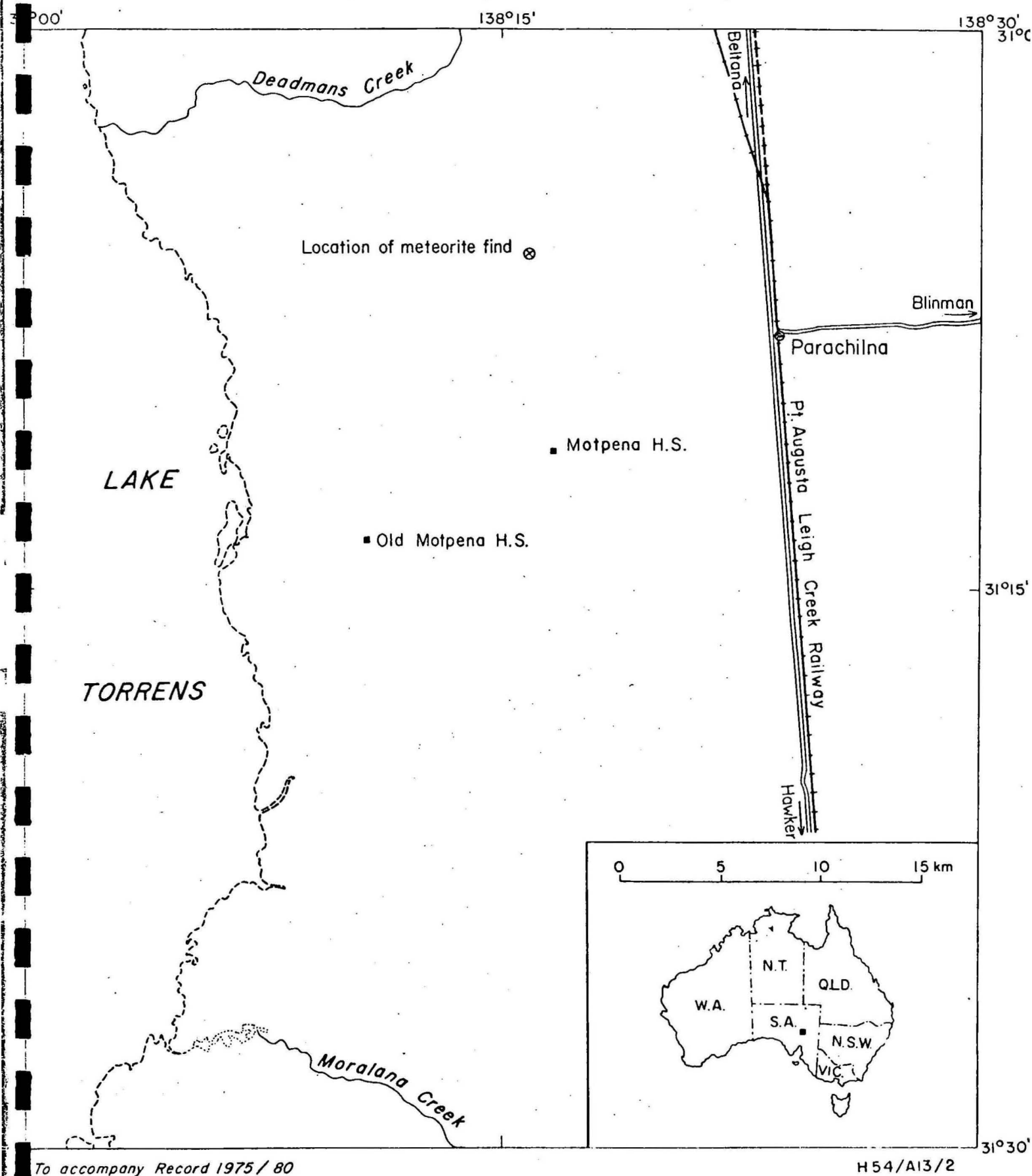
REFERENCES

REED, S.J.B. and WARE, N.G. 1973 - Quantitative electron microprobe analysis using a lithium drifted silicon detector. X-ray Spectr., 2, 69-74.

VAN SCHMUS, W.R. and WOOD, J.A. 1967 - A chemical-petrologic classification for the chondritic meteorites. Geochim. Cosmochim. Acta, 31, 747-765.

FIGURE CAPTIONS

1. Location of the Parachilna meteorite
2. The Parachilna meteorite as found (courtesy of Mr N.A. Bartlett)
3. Another view of the Parachilna meteorite
4. Histograms of atomic percent Fe/Fe+Mg in pyroxene and olivine.



To accompany Record 1975 / 80

H54/A13/2

Fig.1 Location of the Parachilna meteorite.

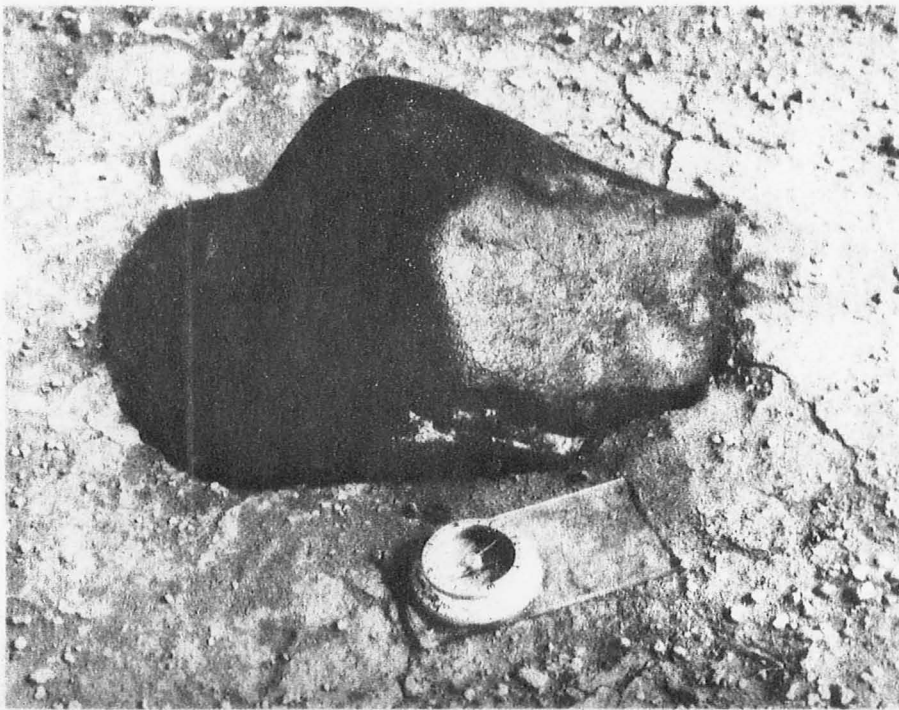


Figure 2

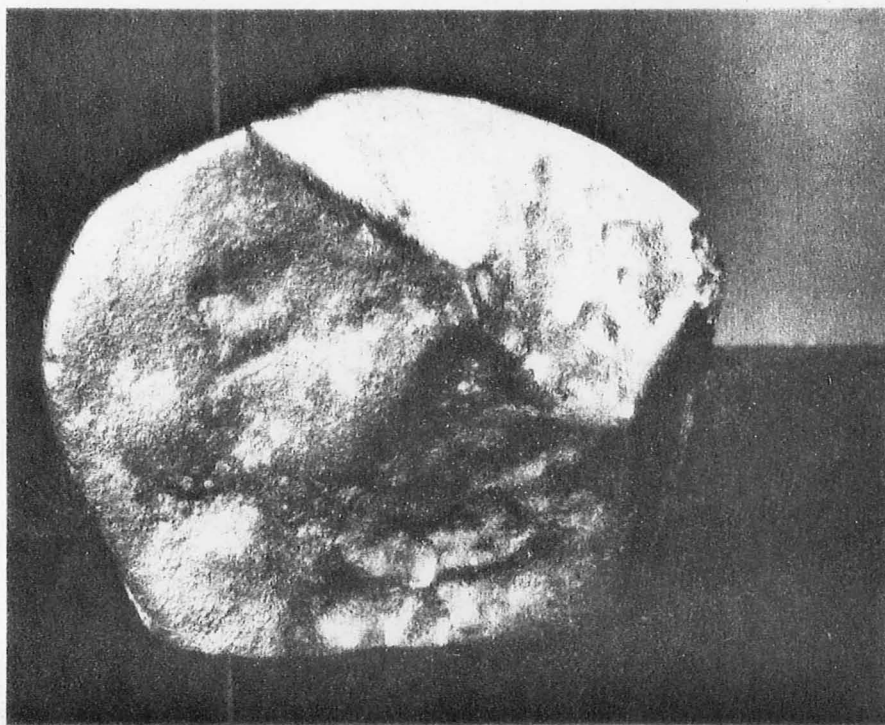


Figure 3

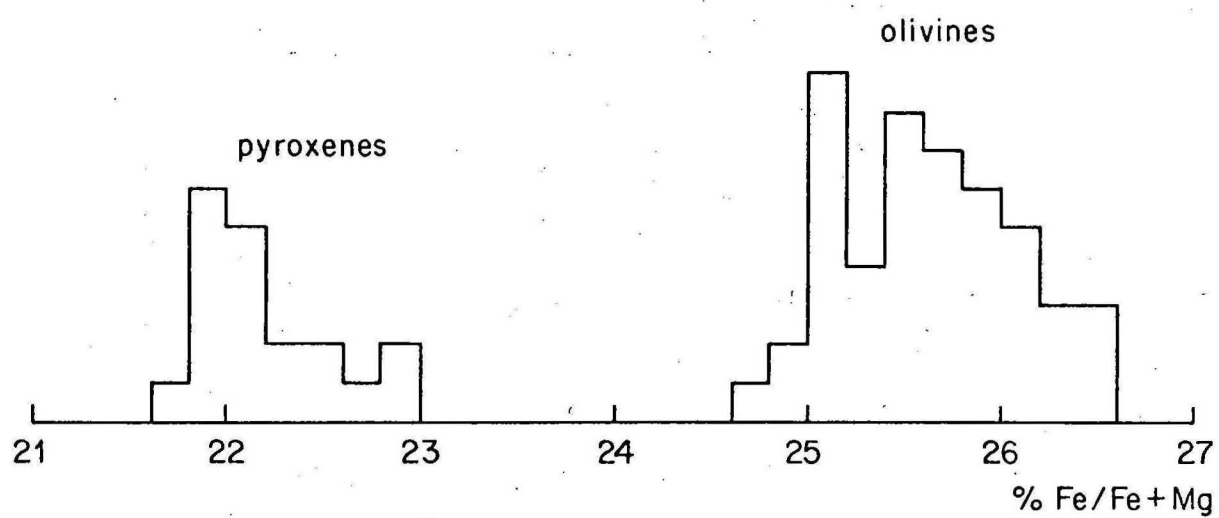


Fig. 4. Histograms of Atomic percentage Fe/Fe + Mg in pyroxene and olivine.

Record 1975/80

M(Pt) 244