approximately the same height of base. In the fourth column of this table are given the ratios of the apparent distances of the horizon and the zenith from the place of observation (OH/OZ), calculated on the assumption of a circular profile for the meridional section of the sky.

The half-arc angles reported by Miller and Neuberger for cloudy skies with average bases at 1,200, 3,900 and 8,900 feet respectively are 29°·2, 28°·0 and 27°·2. These values fit in very well with those in the above table, which show a steady diminution with increasing cloud-height. The observed inverse relationship between the half-arc angle and the cloud-height cannot be explained on a geometrical basis, on which, there should indeed be a positive correlation between the two.

The true explanation for the observed anomaly appears to consist in the subjective perception of depth, which varies according to the kind and colour of the cloud. As the author has recently pointed out while discussing the apparent enlargement of the sun and the moon near the horizon,[5] a darker object tends to impress the eye as being more distant and bigger than a brighter one at the same distance, all other conditions remaining equal. The thicker and darker the cloud, the more convex would the overcast sky therefore appear. Amongst the cloudy skies referred to in the above table, the maximum convexity would seem to be associated with the thick and greyish altostratus cloud, which is practically impervious to direct sunlight; and the minimum convexity with the high and whitish cirro-stratus cloud, through which the sunlight easily penetrates. In the case of low clouds, the thicker and darker the ceiling, the higher does it look.

One fact of practical interest that emerges from this investigation is that subjective impression considerably influences the visual estimation of the heights of base of clouds. There is a general tendency to under-estimate the heights of medium and high clouds. This tendency is more pronounced, the brighter and thinner the clouds are. The heights of low clouds are overestimated and this the more so, the thicker they appear. It may, therefore, be laid down as a safe rule to follow in utilising data of estimated cloud heights in meteorological work, that the actual heights are higher in the case of medium and high clouds and lower in the case of low clouds than the estimated ones.

In conclusion, the author wishes to express his grateful thanks to Mr. B. N. Sreenivasaiah, Regional Director, Regional Meteorological Centre, Madras, for his kind encouragement during the course of this work.

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ZARATITE IN THE NUASAHI CHROME ORE

The presence of zaratite, a carbonate of nickel, in chrome ore has not so far been recorded from any of the chrome deposits of India, viz., the Sukinda area, the Baliapatam, the Mysore and the Madras deposits. The chromite of pocket recently discovered at Nuasahi (21° 17′, 86° 20′) in Keonjhar State has revealed the presence.

It is grass green in colour and earthy in appearance. It is under the microscope a highly pleochroic light green to yellow and has a high refractive index and a high birefringence. It is unusual to get one.

The mineral occurs in the inter-spaces between the chromite grains. Further it not only fills in the cracks in the chromite grains but rarely shows some sort of a graphic texture with it. Occasionally it is entirely enclosed in chromite.

The chemical formula for the mineral, according to Dana, is $NiCO_3.2Ni(OH)_2.4H_2O$ (?). The Indian material has not been individually analysed but chrome ore, containing the mineral alone analysed 0·3 per cent nickel and 0·6 per cent cobalt and 1·8 per cent water (including moisture). Nickel seems to have been partly replaced by cobalt in the present mineral.

Phillips[1] had ascribed the presence of zaratite in the Shetland chromite ore to the weathering of traces of nickel originally present in the chromite itself or in a nickeliferous olivine.

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December 6, 1946

1. *Q. J. G. S.*, **83**, 615.

MALE FERNS OF KASHMIR

MALE-FERN is one of the oldest anthelmentic drugs known and was used by the ancient physicians, Pliny and Galen. It is administered in the form of extract filixmas for eradicating tape-worm infection in man and livestock.

The British Pharmacopœial Drug is derived from the rhizomes and frond bases of *Dryopteris filmas* (Linn.) Schott, a fern indigenous to Great Britain. It should be used within one year of the date of its collection. In America *D. marginalis* A. Gray, which is found in Eastern and Central United States and North to Prince Edward Island forms the source of American Male-fern.

D. filixmas and *D. marginalis* are not indigenous to India but the other ferns belonging to the *Dryopteris filixmas* complex grow wild in the Himalayas in general and in the mountainous ranges of Kashmir in particular. These ferns are *Dryopteris rasthorna* (Blatter) Ching; *D. blanfordii* (Hope) Ching, *D. odontoloma* (Moore) Ching; *D. ramosa* (Hope) Ching; and *D. marginata* (Wall.) Christ.

Considerable quantities of the male-fern extract are annually imported into India for medicinal purposes. In order to study if the