

## MINERALOGICAL NOTES.

By T. COOKSEY, Ph.D., B.Sc.  
(Mineralogist to Australian Museum).

## 1.—PRECIOUS OPAL FROM WHITE CLIFFS, N.S.W.

On examining a cut and polished specimen of a fossil-bearing ferruginous sandstone boulder from White Cliffs, N.S. Wales, I was struck by the appearance of the precious opal which had replaced the carbonate of lime of the shells. The rock is permeated with the opal, and particularly when polished has a very beautiful appearance. The minute surfaces in the interior of the opal which produce the play of color, when viewed with a lens, appear to be quite flat and terminated by perfectly straight edges often parallel. On a closer examination under the microscope with reflected light, the appearance in many places was strikingly similar to that of a section of crystalline marble viewed with crossed nicols. The light and dark banded appearance due to twinning in the marble was perfectly imitated in the opal and on rotating the specimen on the stage the bands became alternately coloured.

As the play of colour in the opal is produced by minute cracks in its substance, the planes of colour seen by reflected light are therefore produced by cracks which apparently occupy the same position as the cleavages of the calcite displaced by the opal; occasionally the traces of cleavages could be seen distinctly on one of the bright surfaces and the angles formed by their intersection were approximately those found in calcite. Other portions again showed a somewhat fibrous structure. In many places on focussing into the substance of the opal these cleavage planes could be distinctly seen, and the rhombic forms produced by them were so exactly similar to those obtained by cleavage in calcite that a doubt as to their origin seemed out of the question.

From the above observations it is evident that the carbonate of lime of which the shells were originally composed had first been converted into crystalline calcite (by which all shell structure had necessarily been lost), and then the calcite replaced by opal. The latter had also reproduced the cleavages of the former, and it is these that cause the play of colour which gives to the opal its precious character. Cracks or fractures of a conchoidal form are also present and also produce colour by reflected light but the brilliancy of the specimen for the most part results from the presence of these characteristic cleavages.

## 2.—BASIC SULPHATE OF IRON FROM MOUNT MORGAN.

A specimen supposed to have been a fossil bone was sent to this Museum for examination and identification by Mr. R. L. Jack, Government Geologist for Queensland, he having received it from Mount Morgan.