the best of the writer's knowledge unreported as a deuteric species in intrusive rocks of intermediate composition.

Heulandite. At several places in the Snake River Canyon, about 20 miles south of Jackson, exposures of the Aspen formation (Lower Cretaceous) contain dark red felted films that coat bedding planes of sandy, grayish black shales. Individual cleavage surfaces reach 0.1 inch. *X*-ray powder diffraction data identify the species as heulandite. No record could be found of this type of occurrence for heulandite.

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OCCURRENCE OF CRYPTOMELANE IN MANGANESE ORES, BALAGHAT DISTRICT, INDIA

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In the course of detailed geological studies around the village Ukwa, Balaghat District, Madhya Pradesh, India, a large number of samples of manganese ores were collected. Thorough microscopic and *x*-ray diffraction studies of the ores were carried out.

Ore microscopic investigation of the polished ores revealed that the mineral cryptomelane is usually associated with other manganese minerals such as braunite, bixbyite, hollandite and pyrolusite. Cryptomelane occurs as

1. irregular veins in other neighboring minerals except pyrolusite,
2. colloform bands alternating with pyrolusite,
3. irregular bodies surrounding braunite grains.

The color under the ore microscope is white with a bluish tint, and the mineral is weakly anisotropic. The mineral gives the following etch reactions:

With $SnCl_2$—darkens immediately.
With $H_2O_2+H_2SO_4$—etches strongly.
With HNO_3—stains brown.

Negative test with aqua regia, KCN, KOH and $FeCl_3$.

Since cryptomelane cannot be distinguished from psilomelane under the ore microscope, *x*-ray studies were made. *X*-ray powder photographs were taken with CuK radiation, using a 9.946 cm-diameter camera. The glass capillaries containing the samples were supported in plasticine and rotated during exposure. Measurements were made on the films using a steel scale; the positions of the lines could be read to within 0.1 mm. The *x*-ray diffraction data given in the following table correspond to that

TABLE 1. *X*-RAY DIFFRACTION DATA FOR MANGANESE ORE FROM UKWA, MADHYA PRADESH, INDIA

d Å	I/I_0	Braunite A.S.T.M. Card No. 3-0813	Pyrolusite A.S.T.M. Card No. 2-0567	Cryptomelane A.S.T.M. Card No. 4-0603
6.95	40			6.92 (90)
4.93	25			4.91 (50)
4.65	30	4.65 (50)		
3.48	35			3.47 (100)
3.33	20	3.33 (5)		
3.11	50		3.12 (100)	3.11 (100)
2.96	30	2.96 (5)		
2.69	100	2.69 (100)		
2.40	30		2.40 (80)	2.40 (40)
2.14	50	2.14 (20)		
1.97	10		1.97 (40)	
1.82	15	1.82 (5)		
1.76	10	1.76 (5)		
1.65	90	1.65 (70)		1.64 (30)
1.63	40		1.63 (90)	
1.54	25	1.53 (10)		1.54 (15)
1.50	13	1.50 (10)		
1.46	10	1.46 (10)		
1.42	60	1.42 (30)		
1.39	15		1.39 (20)	
1.37	10	1.37 (5)		
1.35	20	1.35 (10)		

of an ideal cryptomelane. The cell dimensions are $a=9.82$, $c=2.85$ Å, $c/a=0.291$, in agreement with data on cryptomelane by Ramsdell (1942).

Textural study of the polished samples reveals that the mineral cryptomelane was developed after the formation of all the other manganese minerals except pyrolusite. Cryptomelane and pyrolusite are largely contemporaneous.

The work reported here was carried out in the Khaira laboratory of Physics and in the Geological Laboratory, University College of Science, Calcutta. The authors wish to express their gratitude to Prof. S. N. Bose, F.R.S. and Prof. N. N. Chatterjee, Head of the Department of Geology, for many discussions and the interest with which they have followed the work.

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SERPENTINE-LIMESTONE CONTACT AT TALERI MOHAMMAD JAN, ZHOB VALLEY, WEST PAKISTAN—A CORRECTION

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In an earlier paper (Bilgrami, 1960) a serpentine-limestone contact at Taleri Mohammad Jan has been described in some detail. The field work for that paper was done during the summer of 1952. Since then several mining companies have carried out extensive prospecting operations for chromite, asbestos and vesuvianite. These mining operations have exposed many of the contact areas to a depth of about fifty feet. In these quarry faces new sections have been exposed and show a different relationship between the rock types than was inferred from the observations on the surface. It is now clear that what was taken to be a stoped limestone block is actually a part of a dolerite dike altered to rodingite at its contact with the serpentine where vesuvianite, clinochlore, grossularite and diopside have also been developed. On the surface the dike rock (B.18) is earthy-yellow in color, is very fine-grained and effervesces with dilute HCl. In thin section this rock is composed of almost equal amounts of vesuvianite, grossularite and clinochlore with minor calcite, prehnite and ore grains. Ten feet vertically below the surface the same dike rock is medium-grained and dark-colored. In thin section the rock is composed of pale-green chlorite, pink garnet, magnetite, a few crystals of spinel and a little kaolinite. Chlorite is pale-green in color, shows one set of well-developed cleavages and has a bleached appearance in parts. Most of the chlorite appears to have formed by the alteration of garnet. Spinel in colorless crystal aggregates occurs in patches. Rarely unaltered crystals of colorless augite occur as phenocrysts.

A chemical analysis of the surface rodingite (B.18) is given in Table I with comparisons. It shows higher SiO_2 and MgO and lower Al_2O_3, total iron and alkalies as compared with the type rodingite (Marshall, 1911).