

confirm the conclusion¹ drawn from gravity data, that in general the mass deficiency of the North Sea Basin sediments is compensated isostatically.

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¹ Collette, B. J., *Pub. Neths. Geodetic Commission, Delft*, 5, 47 (1960).

GEOLOGY

Bauchite: a New Variety in the Quartz Monzonitic Series

THE name 'bauchite' is proposed for a coarse plutonic fayalite-bearing rock which was first described by me from Bauchi in northern Nigeria¹. I share the reluctance of modern petrologists to propose new variety names for rocks. There are, however, cases in which a variety name is justifiable to imply a significant physical, chemical or petrological characteristic not adequately conveyed by the general or group name. The case of charnockite is an example: to have simply described a charnockite as a hypersthene granite would never have conveyed the petrological peculiarities of the rock.

Variety names may therefore be justified if the rock to be named satisfies the following conditions: (1) the rock has a fairly large occurrence covering a few square miles, or in the case of dykes if they are found widespread over a few square miles; (2) it is found in two or more localities in similar petrological settings; (3) it possesses certain invariable physical, mineralogical or chemical characteristics by which it is distinguished from other rocks; (4) these invariable characteristics are the result of unusual petrogenetic history of the rock and are found in all specimens from different localities without exception.

When the fayalite quartz monzonitic rock of the Nigerian basement complex was considered in the light of these criteria, it was found necessary to propose a special name for it. This rock, which has been fully described by me¹, is usually very coarse grained with the microcline perthite averaging 3 cm by 2 cm. It is of peculiar dark brownish-green colour—much too dark for its mineralogical composition. This colour is invariable, and is its most distinguishing physical characteristic. In general appearance, it bears resemblance to larvickite, but it is composed of perthite, plagioclase, fayalite, pyroxene, amphibole, quartz and ore. Myrmekitic intergrowths of plagioclase and quartz are widespread around the margins of the perthite. In view of the extreme coarseness of the rock, conventional methods of modal analysis were found useless. Using enlarged photographs of large stained hand specimens², the variation in the perthite:plagioclase:quartz ratios suggests that the rock, belonging to the quartz monzonitic series, varies from the quartz syenite to adamellite.

The rock is mineralogically distinguished by the presence of fayalite commonly associated with ferrohastingsite, with the latter invariably developed as a mould round the plagioclase and the fayalite developed inside the quartz grains. Chemically, the rock is characterized by high FeO and very low MgO.

The rock is now known to be fairly widespread in Nigeria. Around Bauchi town a single occurrence covers about 20 square miles. Other bodies, each as large as this, occur to the south and west of Bauchi. Large outcrops of the rock have recently been found in three other widely scattered localities in northern and western Nigeria.

In all these localities the rock is found to occur surrounded by coarse granite of very similar texture with

a gradational contact relationship, marked in the field only by a sudden change of colour from the light colour of the granite to the dark green colour of the bauchite. Petrographic investigation reveals that the rock often shows a fringing zone of charnockite towards its contact with the granite, as hypersthene takes the place of fayalite around the contact areas. This relationship as well as the greenish colour common to both suggest some petrogenetic affinity between charnockite and bauchite. The latter cannot, however, be described as charnockite as hypersthene is not generally found with the fayalite in this rock.

Table 1. CHEMICAL COMPOSITION OF FAYALITE QUARTZ-MONZONITE, BAUCHI

	Norms			Norms	
	1 (%)	2 (%)		1 (%)	2 (%)
SiO ₂	67.96	70.59	Q	19.2	23.6
Al ₂ O ₃	14.77	13.90	Or	34.5	33.5
Fe ₂ O ₃	0.98	1.17	Ab	30.0	30.0
FeO	2.88	2.30	An	8.8	6.8
MgO	0.41	0.30	Wo	1.2	1.0
CaO	2.37	2.08	En	1.2	0.8
Na ₂ O	3.25	3.30	Fs	3.4	2.4
K ₂ O	5.75	5.55	Mt	1.1	1.2
H ₂ O ⁺	0.36	0.33	Il	0.5	0.4
H ₂ O ⁻	0.16	0.14	Ap	0.3	0.3
TiO ₂	0.38	0.33			
P ₂ O ₅	0.12	0.15			
MnO	0.04	0.05			
BaO	0.44	0.13			
Total	99.87	100.32			

1, ME 101, fayalite quartz-monzonite, Kobi Hill, Bauchi.
2, ME 222, fayalite quartz-monzonite, Kofar Wombai Hill, Bauchi.
Both analyses by the Colonial Geological Surveys (Mineral Resources Division), London.
Norm calculations made by me, after Barth (1951, pp. 79-81).

I have been engaged in the investigation of the rock, and from a consideration of the structural and petrological characteristics of the rock have concluded that the bauchite originated by an emanation into granite of ferrous iron rich fluid or magma³. The green colour of charnockite and bauchite is believed to be due to impregnation of feldspars with ferrous iron during the emanation. Fayalite was crystallized as a result of reaction between quartz and the emanation; and ferrohastingsite by reaction with plagioclase feldspars. The physical factors that determine whether fayalite or hypersthene will crystallize are not clear to me, but in view of the relationship of charnockite as fringe to bauchite, it may very well be temperature.

The occurrence of high-level intrusive fayalite-bearing granitic rock in the younger granite province of Nigeria⁴ may be of some significance. Here, the fayalite-bearing rocks occur as ring or polygonal dykes associated with most of the ring-complexes of this province and vary from syenite to granite porphyry. These rocks are also invariably green but usually of lighter shade. The exact relationship of these to the rock in this account is not yet clear.

In conclusion, the name bauchite is used to denote a dark greenish fayalite-bearing rock of quartz syenite to adamellite mineralogical composition which was first described from Bauchi town in northern Nigeria¹. Its salient and diagnostic characteristics are: (1) The feldspar of the rock, a micropertthite, is dark green in colour and the quartz is brownish-green with resinous lustre. (2) Fayalite occurs in association with amphibole and is commonly arranged in zones. The amphibole is commonly moulded around the plagioclase and the fayalite is usually in a quartz matrix. (3) The rock occurs in plutonic setting commonly fringed by charnockite and surrounded by a plutonic granite.

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¹ Oyawoye, M. O., *Geol. Mag.*, 98, 6, 473 (1961).

² Oyawoye, M. O., Ph.D. thesis, Durham University (Micro Reproduction by Micro Methods Ltd., nr. Wakefield, Yorks, 'appendix' (1959).

³ Oyawoye, M. O., *J. Geol.*, 70, No. 5, 604 (1962).

⁴ Jacobson, R. R. E., et al., *Geol. Soc. Lond. Mem.*, 1 (1958).