The Intrusive Granites of the Farsund Area, South Norway

TORGEIR FALKUM, J. RICHARD WILSON, MALCOLM P. ANNIS,
SIDSEL FREGERSLEV & HANS D. ZIMMERMANN

Falkum, T., Wilson, J. R., Annis, M. P., Fregerslev, S. & Zimmermann, H. D.: The intrusive granites of the Farsund area, south Norway. *Norsk Geologisk Tidsskrift,* Vol. 52, pp. 463–465. Oslo 1972.

Field and chemical data reveal three separate intrusive granites in the Farsund area: a dark charnockite, a light hornblende granite, and a light biotite granite. The previous view that these rocks belong to a single, composite granitic body called farsundite, seems untenable.

T. Falkum, J. R. Wilson, M. P. Annis, S. Fregerslev & H. D. Zimmermann. Laboratorium for Endogen Geologi, Geologisk Institut, Aarhus Universitet, 8000 Århus C, Denmark.

The present study of the areal variations of the intrusive granites around Farsund started in 1971. Previous studies have referred to these rocks as 'farsundite'. Middlemost (1968a) reviewed the historical use of this term, and concluded that it should be used 'as a local specific name for the granitic rocks of the Farsund area' (p. 388). Kolderup (1897) suggested that all these granitic rocks belong to a comagmatic series, a view supported by Barth (1935), Middlemost (1968b), and Smithson & Heier (1971). Our preliminary results throw new light on this problem.

Field studies in the northeastern part of the area show that a thin zone of country rock separates an inhomogeneous biotite granite from the light hornblende granite.

Northeast of Farsund the boundary between the dark charnockite and the light hornblende granite in places consists of a zone of rock, 100 to 200 metres wide, similar to the pink gneisses occurring in the country rock sequence to the north (Falkum 1966). Around Farsund the charnockite and hornblende granite are in direct contact. The hornblende granite contains two sets of s-planes of parallel oriented feldspars and/or mafics. The prevalent set is oblique to the contact, while the second set is parallel to both the contact and an internal s-plane in the charnockite. This suggests that the charnockite post-dates the hornblende granite.

Samples have been collected from the charnockite and the hornblende granite according to an orthogonal grid system with 1 km spacings. The major element chemical analyses (carried out by X-ray fluorescence) so far completed are summarized in Table 1. The charnockite has significantly lower MgO, CaO, P_2O_5 and Fe_2O_3/FeO ratio than the hornblende granite, and both rocks are reasonably homogeneous on the outcrop scale. Fig. 1 illustrates the chemical trends of, and distinction between, the charnockite and hornblende granite with respect to MgO/SiO_2 and excludes that they

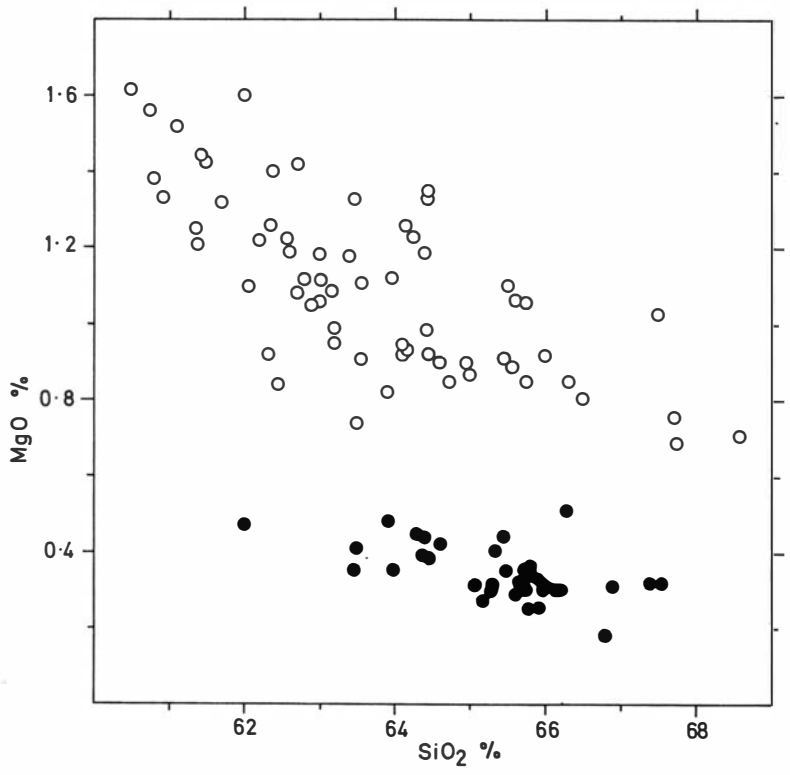

Fig. 1. Open circles – hornblende granite. Closed circles – charnockite.

Table 1. Mean chemical analyses with standard deviations.

n =	A 37	(S)	B 9	(S)	C 63	(S)	D 9	(S)	E 2
SiO_2	65.38	1.13	64.62	0.68	64.67	1.87	62.72	0.55	76.47
TiO_2	0.97	0.12	1.01	0.06	1.14	0.19	1.03	0.06	0.29
Al_2O_3	13.60	0.33	14.03	0.26	14.22	0.61	14.65	0.38	12.82
Fe_2O_3	1.47	0.42	1.09	0.21	2.16	0.38	1.68	0.18	2.49
FeO	5.09	0.76	5.70	0.30	3.84	0.62	4.06	0.27	0.49
MnO	0.106	0.011	0.111	0.006	0.099	0.016	0.096	0.006	0.019
MgO	0.340	0.070	0.39	0.026	1.103	0.230	0.90	0.065	1.025
CaO	2.78	0.30	3.22	0.12	3.75	0.53	4.41	0.13	0.45
Na_2O	3.42	0.13	3.50	0.06	3.33	0.24	3.47	0.13	3.62
K_2O	5.49	0.52	4.93	0.24	4.61	0.43	4.36	0.14	3.79
P_2O_5	0.335	0.044	0.388	0.024	0.562	0.109	0.596	0.044	0.069
Total	98.981		98.989		99.484		97.972		101.33

A (S) Mean and standard deviation of charnockite.
B (S) Mean and standard deviation of 9 charnockite samples collected at one metre intervals.
C (S) Mean and standard deviation of hornblende granite.
D (S) Mean and standard deviation of 9 hornblende granite samples collected at one metre intervals.
E Mean of two biotite granite samples.

belong to a single differentiation series. The biotite granite seems to differ considerably from both the charnockite and the hornblende granite (Table 1).

Thus both field and geochemical evidence indicate that the 'farsundite' consists of three different intrusions and their contrasting chemistry makes it unlikely that they belong to the same magmatic differentiation series.

Acknowledgements. – We are grateful for financial support from Statens Naturvidenskabelige Forskningsråd of Denmark. (J. Nr. 511–744 & 1642).

September 1972

REFERENCES

Barth, T. F. W. 1935: The large pre-Cambrian intrusive bodies in the southern part of Norway. *XVI Internat. Geol. Congress, Vol. 1,* 297–309.

Falkum, T. 1966: Structural and petrological investigations of the Precambrian metamorphic and igneous charnockite and migmatite complex in the Flekkefjord area, southern Norway. *Norges geol. undersøkelse 242,* 19–25.

Kolderup, C. F. 1897: Die Labradorfelse des westlichen Norwegens. I. Das Labradorfelsgebiet bei Ekersund und Soggedal. *Bergens Mus. Aarbog 1896, 5,* 1–222.

Middlemost, E. 1968a: The term farsundite. *Geol. Mag. 105,* 387–389.

Middlemost, E. 1968b: The granitic rocks of Farsund, south Norway. *Norsk geol. tidsskr. 48,* 81–99.

Smithson, S. B. & Heier, K. S. 1971: K, U, and Th distribution between normal and charnockitic facies of a deep granitic intrusion. *Earth Plan. Sci. Letters 12,* 325–326.