achieved under laboratory conditions. However, the ordered microcline is widely found in nature in the rocks of lower amphibolite facies. The origin of microclines in such cases cah be explained as due to the solid-state conversion of plagioclase (albite rich) into microclines by potassium metasomatism. Petrographic works in the granitic rocks of South-East Precambrian of Mysore reveal that potassium feldspars were formed by the microclinization of plagioclases (Radhakrishna, 1956).

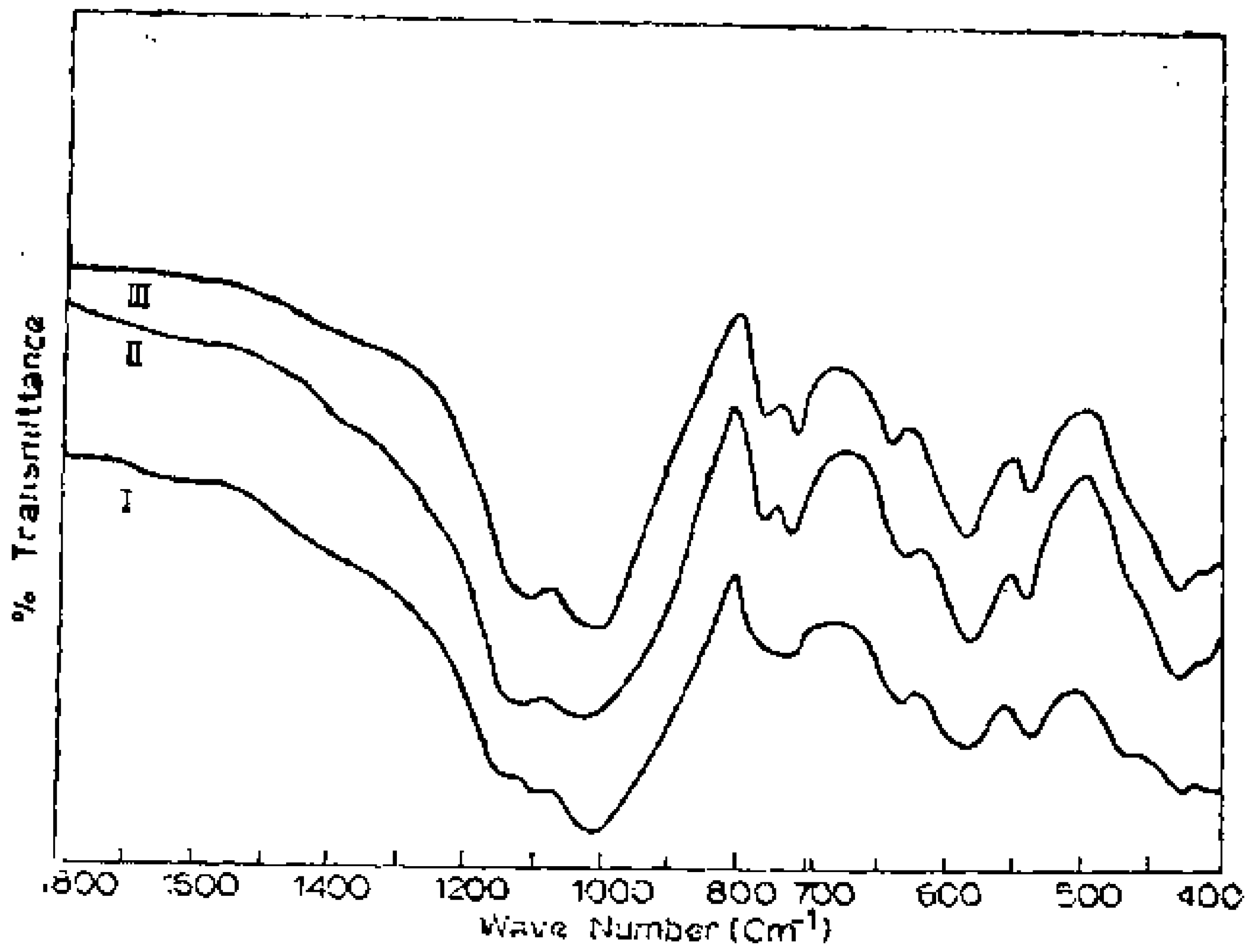

FIG. 2. Infrared spectrum of oligoclase. I—The reaction product by heating with KCl at 600° C. for 72 hrs. II and III—Sanidine.

The experiments, conducted under similar conditions for the reaction of sodium chloride with microcline, do not yield any albite.

1. Hafner and Laves, *Norsk Geologist Tidsskrift*, By₂ 2H, 1962.
2. Radhakrishna, B. P., *Mys. Geol. Assn. Bull.*, **1956**, p. 3.
3. Philip, M. Oiville, *American Mineralogist*, **1967**, **52**, 55.
4. Wyart, J. and Sabatier, G., *Bull. Soc. Franc Mineral*, 1956, **79**, 444.

MAGNETIZATION OF METANORITE DYKE IN HIRAPUR, DHANBAD

JAGDEO SINGH AND M. KRISHNA RAO
Department of Applied Geophysics, Indian School of Mines, Dhanbad

METABASIC rocks of pre-Cambrian age occur intruding the Archean metamorphic rocks in and around Dhanbad (Bihar State). They include metanorite, metadolerite and epidiorite. The rocks were originally of doleritic composition but have been later subjected to metamorphism. They occur as irregular masses forming high and low hillocks and as broad dykes.

A magnetic study of a metabasic dyke in Dhaiya, Dhanbad, has been made by the authors.[1] The Hirapur and Dhaiya dykes are connected and they are about a mile apart.

The metanorite of Hirapur is composed of plagioclase (mostly labradorite) and pyroxene as essential, and olivine, biotite and magnetite as accessory minerals. The pyroxene is mainly pink hypersthene. Pyroxene is altered to fibrous green amphibole. Ophitic to sub-ophitic texture is seen. Satyanarayana Murty and Agrawal[2] reported cloudiness of felspars in this metanorite and they attributed this to the effects of metamorphism.

The intensity and direction of natural remnant magnetization (N.R.M.) has been studied with Astatic magnetometer on oriented samples cut in the form of cylinders (discs). Volume susceptibility (k) has been determined with an A.C. bridge. The ratio J_n/J_i (Koenigsberger ratio, Q_n) is calculated. The results are shown in Table I. J_n and J_i stand for intensity of N.R.M. and induced magnetization (taking the total magnetic field at Dhanbad to be 0·45 oest.) and D and I for declination (East of north) and inclination (positive downwards) of N.R.M. respectively. The samples have been found to be magnetically stable.

The N.R.M. directions are shown in the stereographic projection (Fig. 1). All the samples have negative inclination. Based on the direction of horizontal magnetization, the samples are classified into two groups :

Group (1) : Normally magnetized in horizontal direction (samples H 10 to H 16).—The mean declination and inclination of these 7 samples are 30° and − 63°. This corresponds to normal magnetization in the southern hemisphere. The intensity of N.R.M., although quite low, is more or less consistent and varies from $0{\cdot}827 \times 10^{-3}$ to $0{\cdot}340 \times 10^{-3}$ c.g.s. units.

Group (2) : Reversely magnetized in the horizontal direction (samples H 1 to H 9, H 17 and H 18).—The mean declination and inclination of these 11 samples are 223° and − 59°. This corresponds to reversed magnetization in northern hemisphere. The intensity of N.R.M. is low and varies from $2{\cdot}515 \times 10^{-3}$ to $0{\cdot}214 \times 10^{-3}$ c.g.s. units.

The Koenigsberger ratio for all the 18 samples varies from 2·3 to 11·4 and the susceptibility, from 195×10^{-6} to 575×10^{-6} c.g.s. units.

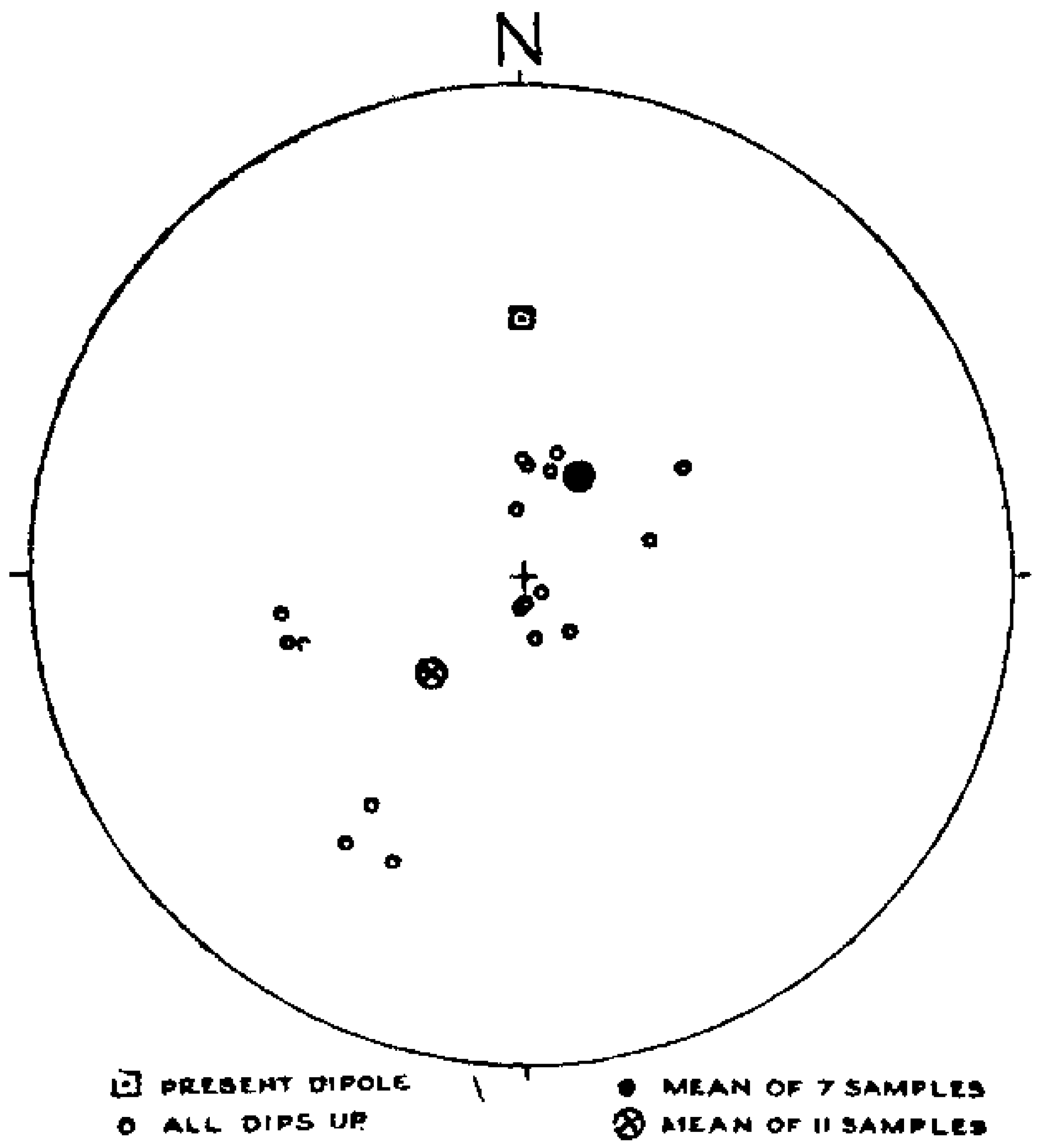

FIG. 1. Hirapur dyke stereographic projection.

TABLE I

Sl No.	Sample No.	D	I	$Jn \times 10^3$ c.g.s. units	$k \times 10^6$ c.g.s. units	$J_i \times 10^3$ c.g.s. units	Q_n
1	H 1	183	−84	2·515	489	0·220	11·4
2	H 2	185	−83	2·373	489	0·220	10·8
3	H 3	170	−75	1·387	326	0·147	9·5
4	H 4	214	−23	0·621	407	0·183	3·4
5	H 5	205	−24	0·845	575	0·259	2·3
6	H 6	253	−40	0·580	489	0·220	3·8
7	H 7	214	−31	0·704	407	0·183	3·9
8	H 8	139	−73	0·235	244	0·101	2·3
9	H 9	130	−84	0·214	195	0·088	2·4
10	H 10	16	−65	0·414	244	0·101	4·0
11	H 11	72	−59	0·376	245	0·101	3·7
12	H 12	56	−46	0·346	163	0·073	5·4
13	H 13	354	−74	0·729	326	0·147	5·0
14	H 14	3	−64	0·705	243	0·101	7·0
15	H 15	16	−60	0·827	244	0·101	8·0
16	H 16	0	−63	0·752	309	0·139	5·5
17	H 17	261	−37	0·987	244	0·110	9·0
18	H 18	254	−37	0·940	246	0·111	8·6

The palæolatitudes (λ) for the place, as deduced from the two groups of magnetization, are shown in Table II.

TABLE II

Sl. No.	Direction of N.R.M. in hor. plane	No. of samples	D	I	α_{95}	K	λ^-
1	Normal ..	7	30°	−63°	11°	33	44° S
2	Reversed ..	11	223°	−59°	19°	6	40° N

The magnetization of the two groups of samples is consistent with the position of India in the southern and northern hemispheres. The Deccan traps[3] and Rejmahal traps[4] and some dykes contemporaneous with these show a position in southern hemisphere, while Yeldurti hematites,[5] Visakhapatnam charnockites,[6] Malani rhyolites, Bijawar Traps and Mundwara Complex[7] and a dyke near Hyderabad[8] show a position in northern hemisphere.

It is interesting to note that both the groups are present in the same outcrop. An explanation is attempted here: The entire dyke has not been effected by metamorphism uniformly. Portions of the dyke not heated above the curie point of magnetic minerals, retained their original magnetism of northern hemisphere and those heated above the curie point acquired magnetism of southern hemisphere. It is presumed here that continental drift has taken place.

1. Krishna Rao, M. and Singh, Jagdeo, *Curr. Sci.*, 1959, **28**, 157.
2. Satyanarayana Murty, K. V. V. and Agrawal, Y. K., *Sci. and Cult.*, 1960, **26**, 272.
3. Clegg, J. A., Deutsch, E. R. and Griffiths, D. H., *Phil. Mag.*, 1956, **1**, 419.
4. —, Radakrishnamurty, C. and Sahasrabudhe, P. W., *Nature*, 1958, **181**, 830.
5. Verma, R. K., Pullaiah, G. and Bhalla, M. S., *Geophy. Jnl.*, 1966, **11**, 5, 499.
6. Bhimasankaram, V. L. S., *Curr. Sci.*, 1964, **33** (15), 465.
7. Athavale, R. N., Radhakrishnamurty, C. and Sahasrabudhe, P. W., *Geophy. Jnl.*, 1963, **7** (3), 304.
8. Verma, R. K., Pullaiah, G. and Hasnain, I., *Bull. Natl. Geophy. Res. Inst.*, 1968, **6** (2), 79.