distilled at 172–74°/2·5 mm. Found C, 73·9; H, 8.1. $C_{11}H_{14}O_4$ requires C, 74·1 and H, 7·8%). The product was extracted from the reaction mixture with ethyl acetate, the solvent was removed to obtain the product as an oil.

Pechmann condensation of IIa (0·2 g) with ethyl acetoacetate (0·5 ml) by keeping with sulphuric acid (5 ml, 80%) for 24 hr at room temperature furnished the known[1] compound, 3,4,-dihydro-2,5,10-trimethyl-2H,8H-benzo(1,2,-b:3,4-b') dipyran-8-one (IIIa, colourless needles m.p. and m.m.p. with the authentic specimen[1] 155–56°, yield 0·18 g. Found C, 73·5; H, 6·7. $C_{15}H_{16}O_3$ requires C, 73·8; H, 6·5% UV 255, 307 log ϵ 2·84, 3·15) thus establishing that the condensation took place in position 8 in preference to 6 of the 7-hydroxychroman molecule (II). The cause is the steric hindrance of the bulky 5-methyl group to the position 6. The reaction is analogous to that of orcinol with ethyl acetoacetate that gives 5-hydroxy-4,7-dimethylcoumarin[2]. 7-Hydroxy-2,2,5-trimethyl chroman[3] (IIb) (1·5 g) similarly condensed with ethyl acetoacetate (2 ml) by keeping with sulphuric acid (10 ml, 80%) at room temperature overnight, to furnish the angular benzodipyranone viz. 3,4-dihydro-2,2,5, 10-tetramethyl-2H,8H-benzo (1,2-b:3, 4-b') dipyran-8-one (colourless shining needles from aq. methanol, m.p. 129–30°. Found C, 74·4; H, 6·7. $C_{16}H_{18}O_3$ requires C, 74·4 and H, 6·9. UV 227, 255, 310, log ϵ 4·25, 4·15 and 4·19). The constitution follows by analogy to the previous condensation.

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MAGNETIC STUDIES ON MAGNETITE-QUARTZITES OF TAMILNADU, INDIA

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THE study of magnetic behaviour of rocks throws light on various features like the constituents, nature of the magnetic minerals, magnetic granulometry of the rocks, and also the origin and the nature of their formation. Magnetic studies on igneous formations and on North Pacific deep sea sediments were carried out by many workers[1–6]. Similar studies were carried out recently on charnockites[7].

The objective of this note is to find the relationship between the magnetic properties, and the granulometry of magnetite-quartzites. For this purpose magnetite-quartzite samples were collected from different iron ore deposits of Tamilnadu. Magnetic properties like natural remanent intensity (J_n), susceptibility (k) in a field of 0·5 Oe, and high field hysteresis in a field of 2400 Oe were determined on 52 magnetite-quartzite samples. Koenigsberger ratios (Q_n) were calculated. Relative remanence (R) [the ratio of remanent magnetization (J_r) to peak intensity of magnetization (J_m)] and coercive force (H_c) are calculated for each specimen from hysteresis loops.

The intensity of natural remanent magnetization and susceptibility varies from $0{\cdot}12 \times 10^{-3}$ to $528{\cdot}3 \times 10^{-3}$ e.m.u./g. and $0{\cdot}15 \times 10^{-3}$ to $62{\cdot}1 \times 10^{-3}$ e.m.u./g. respectively. Q_n ratio ranges between 0·05 and 92. The J_r/J_m value ranges between 0·009 and 0·49 and coercive force value varies from 11 Oe to 428 Oe for different samples. The high values of J_r/J_m are generally associated with high H_c. The samples (35,46) showing the high values of J_r/J_m) (0·37 and 0·49) exhibit high H values of 333 Oe and 428 Oe. It is found that J_r/J_m ratio (R) increases with an increase in H_c as shown in figure 1. The relative remanence ratio (J_r/J_m) is found to show

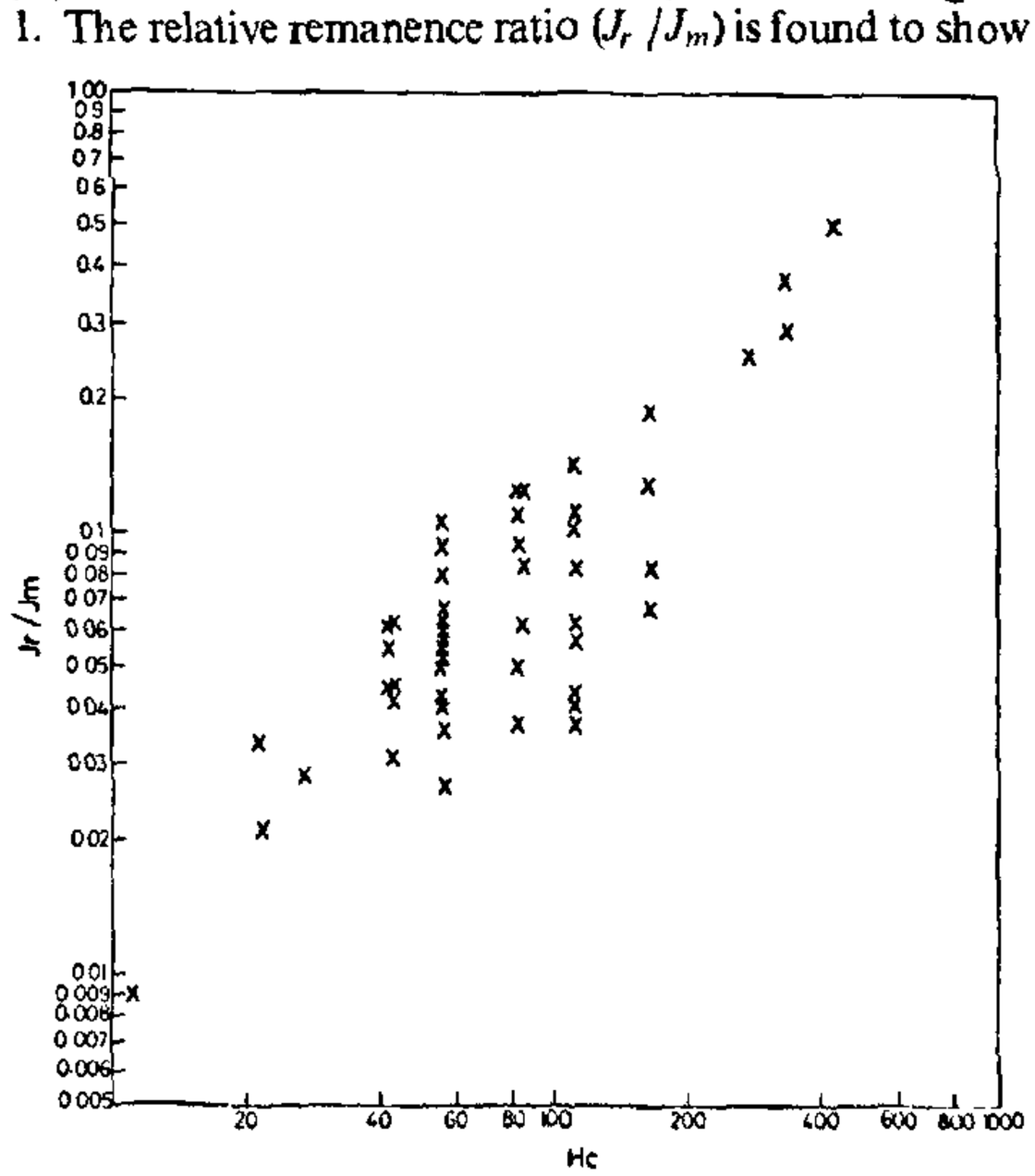

Figure 1. Variation of J_r/J_m with coercive force (H_c)

a linear variation a coercive force (H_c). According to Nagata[8] there is a general increase in J_r J_m with H_c in igneous rocks. A similar pattern has been reported by Rakshit[9] for Rajmahal basalts, and by Ramaswamy and Ramamurthy[7] for charnockites.

Many authors[1,6,7,10,11] have discussed J_r/J_m value in terms of domain structures. According to them the J_r/J_m value close to 0·5 indicates single domain grains

in rock specimens. Johnson *et al*[6] investigated the magnetic behaviour of some specimens from North Pacific deep sea sediments and reported the presence of multidomain structures since the J_r/J_m value was found to be less than 0·5. Radhakrishnamurty *et al*[1] made a granulometric analysis of basalts and concluded that an R value less than 0·5 indicated a mixture of SD and MD grains while the R value close to 0·5 indicated the presence of large percentage of SD grains. The theoretical value of 0·5 for $J_r J_m$ ratio is expected for SD particles distributed in nonmagnetic matrix[4,12,13]. The increase in H_c and saturation remanence reflects the increase in J_r/J_m ratio as the fraction of single-domain regions increase[14]. The samples (35,46) showing high J_r/J_m ratio and exhibiting high H_c probably indicate a predominance of SD particles. Similar interpretations have been given by Day *et al*[15]. Radhakrishnamurty *et al*[12] suggest the presence of MD grains if the J_r/J_m is less than 0·2. In the present study it is found that the majority of the samples have a value less than 0·2 and it is probable that they contain mostly MD grains, and in the samples where the J_r/J_m value is above 0·2 but below 0·5 there may be a mixture of MD and SD grains. Similar interpretations have been given by Davis and Evans[5].

It may be inferred from the magnitude of R value that the samples of magnetite-quartzites contain MD grains in the majority of the samples and a mixture of SD and MD grains in a few cases. The relative remanence ratio is found to show a linear variation with coercive force (H_c).

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OCCURRENCE OF TOMATO BUNCHY-TOP VIRUS IN INDIA

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DURING survey of tomato plantations at Ganeshkhind Fruit Research Station, Pune in 1979 a few tomato plants of var. Pusa ruby showed extensive abnormal growth with apical proliferation. The new leaves arising from the axillary buds gave closely crowded bunchy appearance. The leaflet margins curled towards the undersurface, the tips frequently twisted downwards and the surfaces showed a puckered condition. Necrosis of the leaves and stems also were characteristic symptoms. The diseased plants had a few flowers with 1-2 very small sized fruits. These types of diseased symptoms on tomato plants were new to the locality. The nature of the disease was studied and the findings reported here.

Under glass house tests, the transmission studies revealed that the disease is readily transmissible through sap on the healthy tomato seedlings. Before extraction of the juice, the diseased leaves were kept in deep freeze for a few minutes. Extraction of the sap from the diseased leaves was made in phosphate buffer at pH 7·0 (0·01M) and was inoculated to the celite dusted test plants.

The inoculated tomato seedlings, after 3-4 weeks, produced small curled or rolled leaves and the plants were stunted. Further disease development revealed veinal necrosis of leaves and occasionally of stems too. However, ultimately a large number of small leaves were formed giving a bushy appearance to the plants (figure 1).

The host range studies indicated that *Solanum gilo* Raddi ; *S. melongena* L.; *S. nigrum* L.; *S. tuberosum* L.; *Nicotiana tabacum* L. var. White Burley; *N. glutinosa* L. and *Petunia hybrida* Vilm. are symptomless carriers of the virus and was confirmed by back inoculations to tomato.