The authors are grateful to Shri S. V. Srikantia, Sr. Geologist, GSI, for the collection and supply of the SK samples, and to Dr. S. Balakrishna, Dy. Director I C, NGRI, for his interest and permission to publish the results.

High Pressure and Rock Mechanics Laboratory,
National Geophysical Research Institute,
Hyderabad 500 007,
*June* 11, 1979.

K. V. L. N. S. SARMA.
B. S. GOGTE.
Y. V. RAMANA.

1. Ramana, Y. V., *Annual Report, NGRI*, 1975–76, p. 32.
2. Reddy, P. V., Seshagiri Rao, T. and Ramana, Y. V., *Curr. Sci.*, 1977, 46, 742.
3. Ramana, Y. V. and Sarma, L. P., *Phys. Earth and Planetary Interiors*, 1979 (In press).
4. Gansser, A., *Jour. Geol. Soc. India*, 1979, 20, 277.
5. Ramana, Y. V. and Gogte, B. S., *Abstract—Himalayan Geology Seminar*, 1976, p. 105.
6. Baldridge, W. S. *et al.*, *Proc. 3rd Lunar Sci. Con.*, 1972, 3, 2599.
7. Gogte, B. S., Sarma, K. V. L. N. S. and Ramana, Y. V., *Jour. Geol. Soc. India*, 1979, p. 20.
8. Nur, A. and Simmons, G., *Int. J. Rock Mech. Min.*, 1970, 7, 307.

## THE ALAKNANDA THRUST

THE Alaknanda Thrust is referred to as a fault by many workers and recently by Kumar and Agarwal[1]. The thrust is exposed at 8 km north of Rudraprayag along the Rudraprayag–Kedarnath Motor Road, at 13 km northeast of Rudraprayag near Saterakhal, at 13 km east of Rudraprayag near Gholtir and Nagrasu, at 24 km east of Rudraprayag near Chatwapipal, and between Karnprayag and Nandprayag near Langasu and Kaleshwar (Fig. 1). The thrust is traced for more than 45 km in length with a variable width of 1/2 to 2 km. There is a wide zone of crushing all along the thrust. The Alaknanda Thrust abruptly cuts through all the earlier structures and is the latest structure of the area (Rawat and Varadarajan[2]). From the following points it becomes clear that the Alaknanda Fault is a thrust :

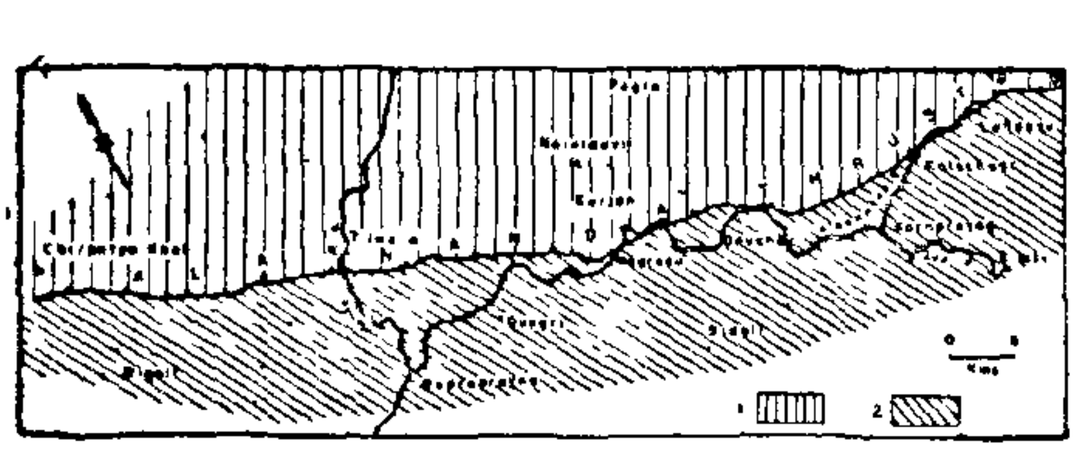

FIG. 1. Generalised litho-tectonic map of the area (modified after Kumar and Agarwal, 1975) to indicate the position of the Alaknanda Thrust, 1—Naini Group (metamorphics with intrusive Naini Granite and metabasics) and 2—Garhwal Group (unmetamorphosed sediments with basics).

1. The Alaknanda Thrust is a reverse fault with varying angles of dip, ranging from 30° (at Saterakhal) to as high at 70° (at Gholtir) towards north or northeast. It is a sub-vertical reverse fault which flattens to form a thrust or low angle reveres fault at places.

2. The structural set-up of the two regions in the south and north of the Alaknanda Thrust is quite different. This is evidenced by the contrasting strikes of the two areas. The strike of the rocks in the area south of the Alaknanda Thrust is NE–SW (Rawat[3]), while north of this the strike is NW–SE (Rawat and Varadarajan[2]).

3. The northern part is more intensely deformed and metamorphosed than the southern part with respect to the Alaknanda Thrust. The sediments in the northern part are regionally metamorphosed and intruded by Naini Granite, while those in the southern part are unmetamorphosed.

4. The northern part exposes the rocks of the Chail nappe (Valdiya[4]) or the Naini Group (Rawat and Varadarajan[2]), while the rocks in the southern part belong to Garhwal Group (Berinag nappe with quartzites, equivalent to Chamoli or the Haryali Quartzite or the Nagthat Quartzite). The Alaknanda Thrust separates the two groups from each other. This indicates that the older Naini Group is thrust over the younger Garhwal Group. It is also noted by the authors that no rock unit of the northern region repeats itself south of the Alaknanda Thrust thereby confirming the thrust.

In the Kumaun and the Garhwal Himalaya, Saxena[5] and many others have noticed that the Main Central Thrust, which is the southern tectonic unit of the Central Crystallines, does not appear to be a sharp tectonic line but consists of several parallel faults. These parallel faults appear to be the surface manifestation of a series of *en-echelon* reverse faults. The Alaknanda Thrust is one such reverse fault parallel to the Main Central Thrust, and represents one of the youngest tectonic features of the area.

One of the authors (RSR) is grateful to Sri. S. P. Nautiyal, President and Dr. S. C. D. Sah, Director, Wadia Institute of Himalayan Geology, Dehra Dun, for the encouragement and facilities to carry out the work.

Wadia Institute of Himalayan Geology, Dehra Dun, U.P., and
Department of Geology, Delhi University, Delhi–7,
*March* 10, 1979.

R. S. RAWAT.
S. VARADARAJAN.

1. Kumar, G. and Agarwal, N. C., *Him. Geol.*, 1975, **5**, 29.
2. Rawat, R. S. and Varadarajan, S., *Ibid.*, 1978, **9** (In press).
3. —, *Ibid.*, 1978, **9** (In press).
4. Valdiya, K. S., *Indian Journ. Earth. Sci.*, 1978, **5**, 1.
5. Saxena, S. P., *Int. Him. Geol. Seminar*, New Delhi, Sept. 1976, Section II (A), p. 89.

## SOYBEAN AND GREENGRAM AS LOCAL LESION ASSAY HOSTS FOR SUGARCANE MOSAIC VIRUS

STUDIES on the development of quantitative assay of plant viruses have attained importance after the findings of Holmes[1]. Several studies have shown that the sap transmission of plant virus can be effected by providing suitable conditions. The work of Pleu *et al.*[2] led to the study about the development of the suitable assay host.

In the present investigation, soybean (*Glycine max*) UGM 20 and greengram (*Vigna radiatus*) Co. 1, Co. 2 and Co. 3 seedlings were used for local lesion assay. Prior to inoculation, the plants were kept in darkness for 24 h. Sugarcane mosaic virus sap (SMV) extracted with 0·1M potassium phosphate buffer at pH 7·3 was rubbed on the cotyledonary leaves of 12–15 days old seedlings, after dusting with 600 mesh carborundum. After the inoculation, the leaves were wahed with water and the plants kept in darkness for another day, after which they were exposed to mercury vapour lamp illumination continuously. The local lesions could be seen on the second trifoliate leaves within two days in greengram (Plate 1) and five days in the case of soybean (Plate 2). On the inoculated leaves of greengram, only one or two lesions appeared after 2–3 days. The lesions in greengram were irregular and purple, while in soybean they were well defined and necrotic. The lesions were designated as Translocated Necrotic Local Lesions (TNL). Back inoculations to sugarcane were carried out and these were positive indicating that these lesions are the result of infection with SMV.

Similar observations were reported by Yoshii[3] in the case of TMV or the Japanese strain of turnip yellow mosaic virus on *Chenopodium album* and *C. amaranticolor* in Japan.

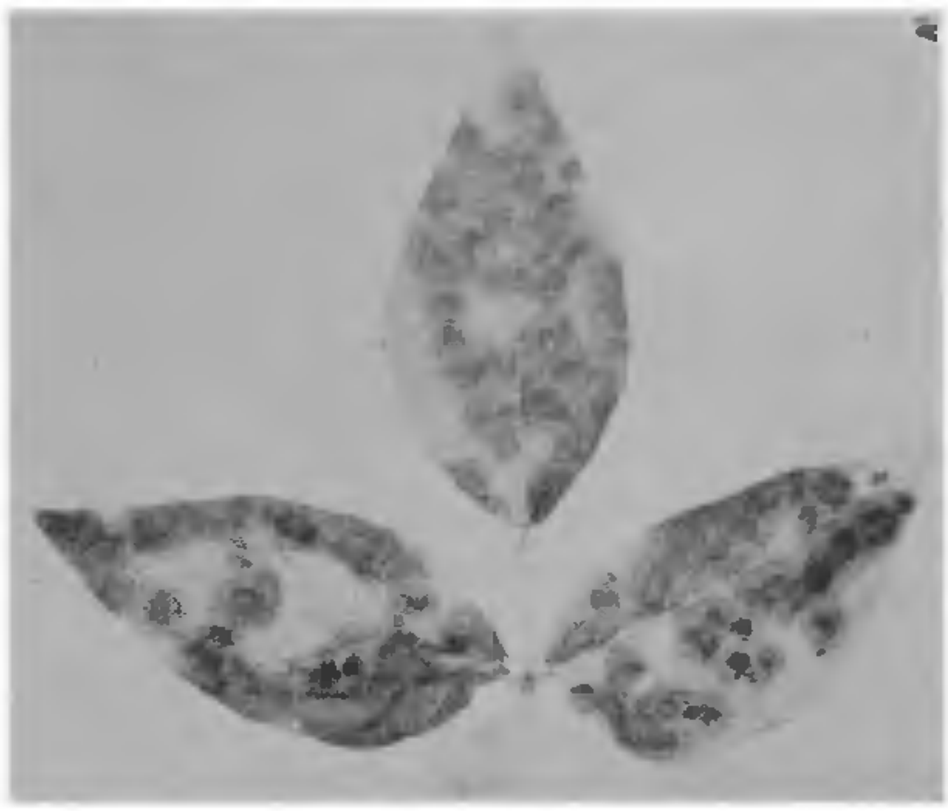

PLATE 1. Translocated local lesions on greengram *Vigna radiatus*.

PLATE 2. Translocated local lesions on *Glycine max*.

The above finding, *viz.*, the formation of local lesions on a dicotyledonous host plant by a virus infecting a graminaceous host is the first record of its kind.

Dept. of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore–3,
*February* 16, 1979.

S. H. FARRAG.*
T. K. KANDASWAMY.

* Present address : Sugarcane Section, Agricultural Research Centre (P.O), GIZA, Egypt.

1. Holmes, F. O., *Botan. Gaz.*, 1929, **87**, 29.
2. Pleu, C. W. A., Ellsy, A. M., Koot Gonsveld and Lous Van Vlatendating, *J. gen. Virol.*, 1977, **35**, 593.
3. Yoshii, H., *Ann. Phytopath. Soc. Japan*, 1969, **35**, 194, *R. P. P.*, **49**, 76 (Abst.).