followed by the addition of 2 ml. each of casein solution (2%, w/v, prepared as described by Balls and Lineweaver[5]) and phosphate buffer at pH 7. The mixture was well stirred and incubated at 37–38° for the desired length of time. After incubation the reaction was stopped by the addition of trichloroacetic acid (4 ml., 0·25 m), allowed to stand for 10 minutes at room temperature and then spun. The precipitated undigested protein was discarded and proteolytic activity was determined in the clear supernatant.

0·1–1·0 ml. of the supernatant was diluted to 2 ml. with distilled water and α-nitroso-β-naphthol in ethanol (0·05 ml., 1 mg.%, w/v) was added to it followed by a solution of ferric ammonium sulphate (2 ml., prepared by mixing 5 parts of saturated solution of ferric ammonium sulphate and 1 part of concentrated nitric acid, sp. gr. 1·42). The mixture was carefully brought to boiling and allowed to stand for one hour at room temperature. The colour developed was read in a Bausch and Lomb Spectronic 20 colorimeter at 400 mμ against a blank identically treated from the supernatant of the control. The amount of tyrosine released was calculated from a calibration curve prepared earlier by measuring the optical density of standard tyrosine at different concentrations. The proteolytic activity was expressed in terms of mg. of tyrosine liberated by 100 mg. of latex at pH 7.

The results obtained as represented in Fig. 1 evince that of the five latices tested, the latex

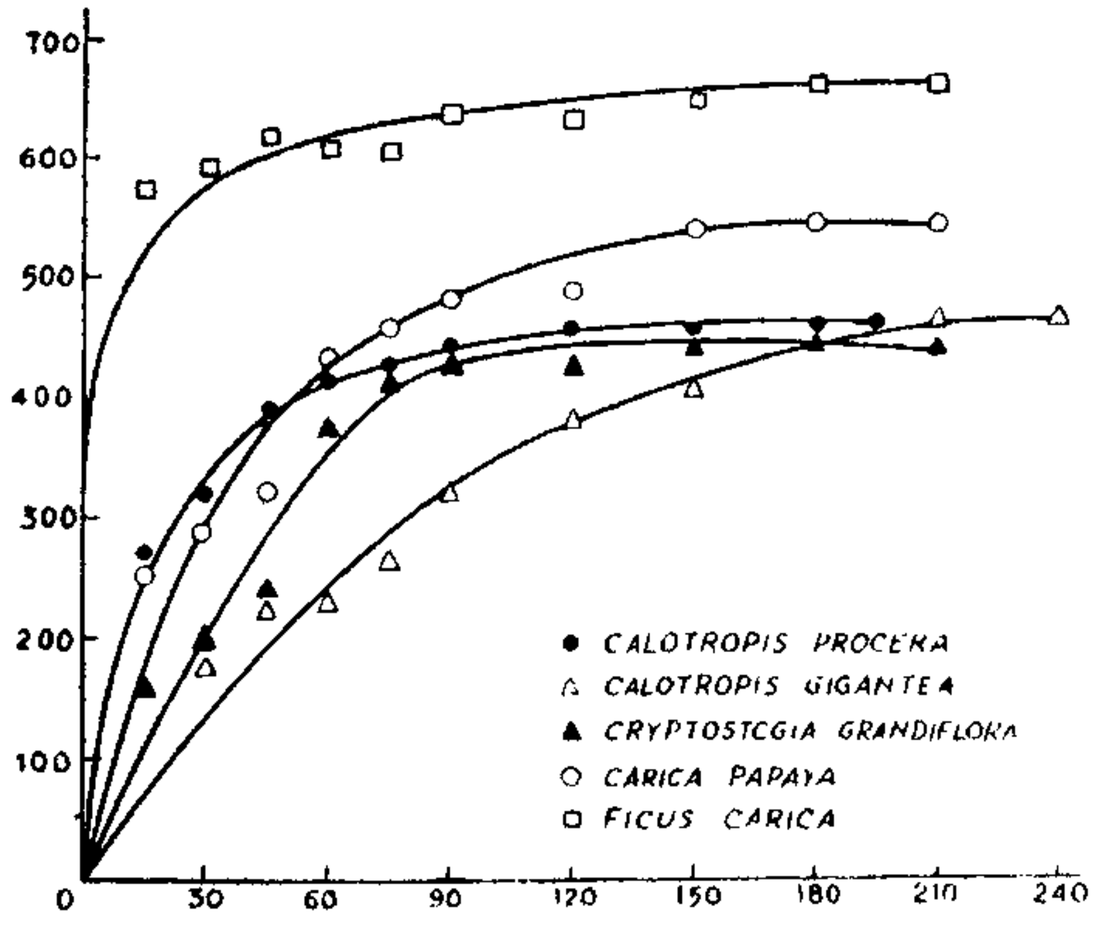

FIG. 1. Effect of time variation on the proteolytic activity of plant latices.

of *Ficus carica* possesses the maximum activity, the optimum being 45 minutes. In the case of *Calotropis procera, Cryptostegia grandiflora, Carica papaya* and *Calotropis gigantea* the optimum time observed was 75, 120, 150 and 210 minutes respectively.

Our thanks are due to the Council of Scientific and Industrial Research, New Delhi, India, for financial assistance and a research assistantship to one of us (S. C. S.).

Biochemistry Section, RADHA PANT.
The University, S. C. SRIVASTAVA.
Allahabad, *July* 27, 1965.

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IDENTIFICATION OF MUSTARD OIL AND CASTOR OIL IN OTHER OILS BY PAPER CHROMATOGRAPHY

IN examining edible oils for adulteration, the analyst is sometimes called upon to identify the constituents of a mixture of oils. Specific identification tests are available only for sesame oil and cottonseed oil. The presence of other oils can only be inferred from a collation of analytical data such as the refractive index, iodine value, Bellier test, etc. Mustard oil and castor oil differ from other oils in that they contain the unsaturated fatty acids, erucic acid and ricinoleic acid respectively. We have found that separation of these acids by reverse phase chromatography and their identification with iodine offers an easy and reliable method of identifying mustard oil and castor oil when present to the extent of 5% or more in other oils. The method we have used is briefly reported below.

The mixed fatty acids are prepared as in the well-known titre test. Strips of Whatman No. 4 paper, 25 cm. × 25 cm., are prepared by dipping them through a solution of 10% liquid paraffin in ether and drying in air. About 50 microgram of the mixed fatty acids in the form of a chloroform solution is spotted. We have used the ascending technique. After trials with various solvent combinations, the following solvent, not so far reported, was found to be well suited for routine analysis: Acetic acid 6, water 2, amyl acetate 2, saturated with medicinal liquid paraffin. Satisfactory separation results in about 16 hours. The developed chromatogram is air-dried and the unsaturated fatty acids are located by exposing the paper, rolled

in the form of a cylinder, to iodine vapour in a closed jar for 2 to 3 minutes. The unsaturated acids appear as brown spots on a pale yellow background. (The unsaturated acids can also be located, along with the saturated acids, by immersing the chromatogram in 0·2% copper acetate solution, washing with water, drying, and dipping in 0·03% dithio-oxamide in 95% ethanol.)

The chromatogram of the unsaturated acids from the common oils and from sesame oil admixed with 5% mustard oil and castor oil, respectively, are illustrated in Fig. 1. The un-

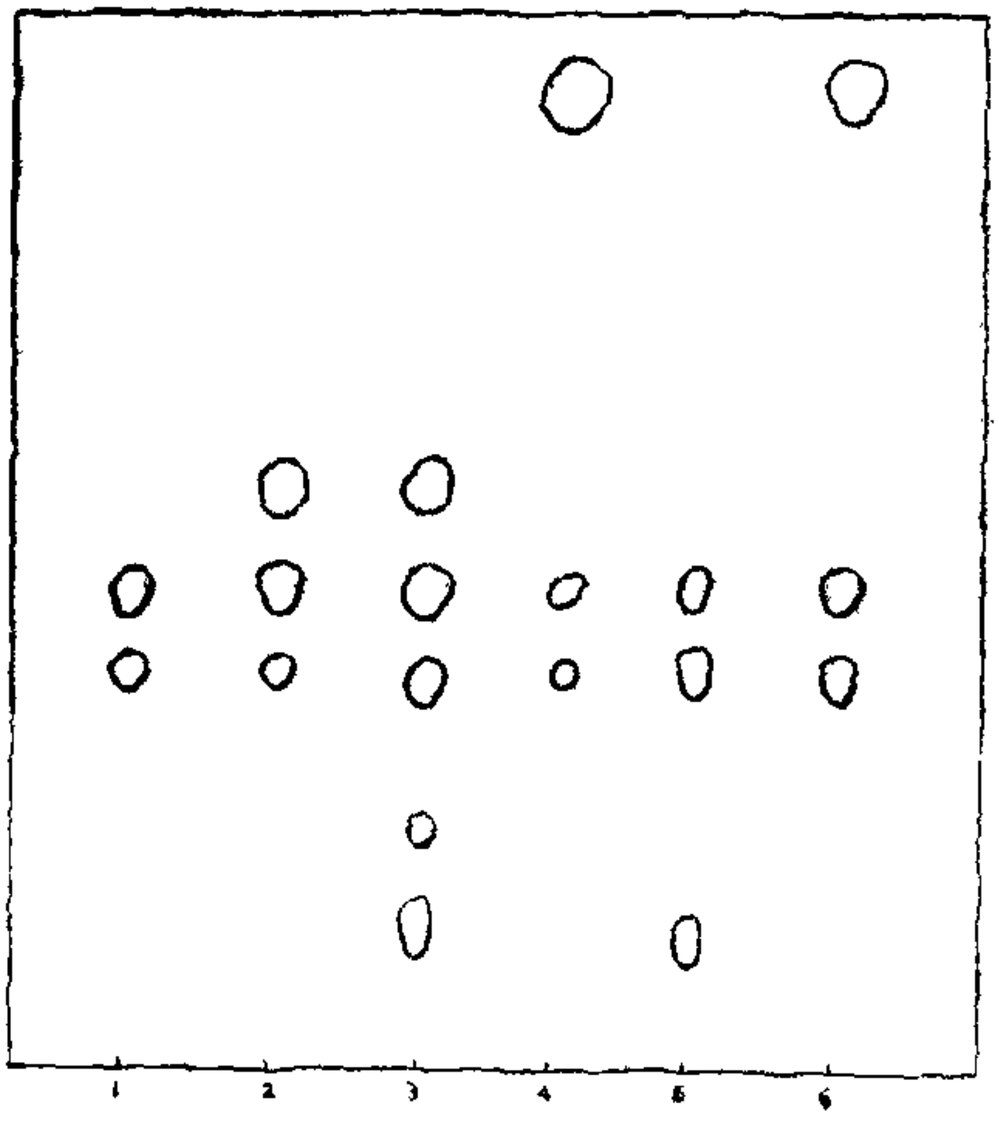

FIG. 1. Chromatograms of the unsaturated acids of common vegetable oils. (1) Sesame, groundnut, cottonseed, safflower, coconut and mahua oils. (2) Linseed oil. (3) Mustard oil. (4) Castor oil. (5) Mixture of Sesame and Mustard oils (95 : 5). (6) Mixture of Sesame and Castor oils (95 : 5).

saturated acids of sesame oil, groundnut oil, cottonseed oil, safflower oil, coconut oil and mahua oil separated into two zones with R_f values 0·38 and 0·46, the intensity of the zones varying with the oleic and linoleic acid content of the oils. Linseed oil gives rise to three spots with R_f values 0·38, 0·46 and 0·54. In the case of mustard oil five unsaturated acids are distinguishable, with R_f values 0·14, 0·23, 0·38, 0·46 and 0·54, the spot with R_f value 0·14, due to erucic acid, being very marked. Castor oil shows three spots, those with R_f values 0·38 and 0·46 being faint and that with R_f value 0·94, due to ricinoleic acid, being conspicuous.

The zone with R_f value 0·14 is characteristic of mustard oil. It is not given by any other oil, but is obtained when 5% of mustard oil is present in any other oil. Similarly the zone with R_f value 0·94 is peculiar to castor oil. It is absent in the case of the other oils, but is clearly distinguishable when 5% or even less of castor oil is present in any other oil.

The method offers a simple and reliable means of identifying mustard oil and castor oil when admixed with other vegetable oils.

We thank Sri. K. Narayanaswamy, Government Analyst, for permission to carry out this study.

Government Analyst's Laboratory, Madras, *November* 12, 1965.

P. S. NATARAJA SARMA.
V. V. NITHYANANDAN.

A NOTE ON THE RELATIONSHIP OF BUNDELKHAND GNEISS OF RAJASTHAN WITH THE SURROUNDING SEDIMENTS*

A. M. HERON considered the granite occurring in the area adjacent to the Berach river in the Bhilwara and Chittorgarh districts of Rajasthan as the basement over which the surrounding Aravalli rocks were deposited. Based on the physical and mineralogical resemblance, he correlated this granite with that of the Bundelkhand area in Uttar Pradesh and thus, referred to it as "Bundelkhand Gneiss" in his publications. B. C. Gupta, who mapped the eastern part of the area, where the granite is exposed, agreed with Heron. E. H. Pascoe referred to this granite as Berach Granite.

The granite is generally medium to coarse-grained, equigranular with pink feldpars (orthoclase and microcline), albite, perthite, opalescent quartz and a few grains of biotite or hornblende. Epidote, magnetite and apatite are the minor accessories. At the contact with the quartzites, at places, a larger proportion of irregular grains of quartz are seen in the granite. Near the contact with slates, the rock becomes greenish and is enriched in chlorite. Gneissic foliation is common towards west, where it is noticed to merge with the gneisses.

The exact contact of the granite with the quartzites is exposed at a few places and these have been interpreted as sedimentary by Heron. Closer examination reveals sinuous and irregular contacts, the orthoquartzites showing enrichment felspar at the contact with the granite thus becoming friable there. Near Putholi, north of Chittorgarh, the granite has eaten up a part of the quartzite and the contact is highly irregular. Thin strips of quartzite are also seen in the granite. Further west, a number of xenoliths of slates are noticed in the