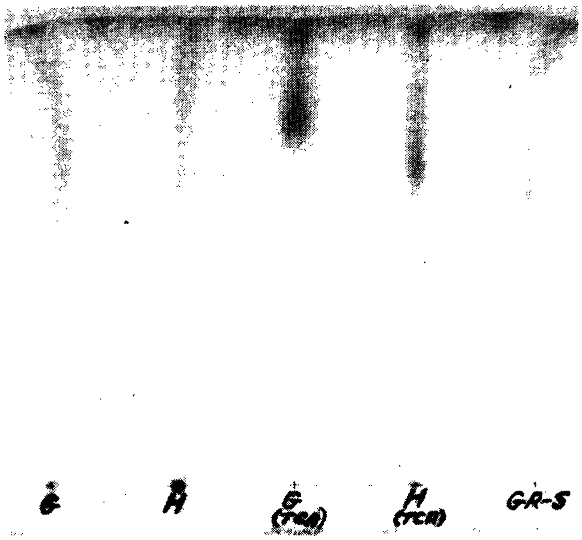

FIG. 2. Chromatograms of several types of elastomers on silicone-treated paper with cyclohexanone for solvent; guayule, Hevea, guayule (cont. 1% trichloracetic acid), Hevea (cont. 1% trichloracetic acid), GR-S.

color conferred to the rubber with this stain remain unsurpassed, to date, by any of the other means found for detecting the partitioned rubber. These other means include the use of Sudan III and Sudan IV (*7*), fluorescein-bromine spray (*8*), modified by the use of isopropanol as a wetting agent, and a spray or dip with .5% neutral aqueous potassium permanganate solution. Although all these reagents are of some value for the detection of rubber on untreated paper,[3] only oil blue NA has given consistently good results with silicone-treated papers. The hydrophobic character of these treated papers probably accounts for their decided "inertness" and lack of response to many of the familiar chromogenic sprays.

By means of the technique outlined above, differential migration patterns have been obtained for several natural and synthetic rubbers. In Fig. 2, where cyclohexanone was used for the mobile phase, comparisons are shown between Hevea (No. 1 smoked sheet), guayule (Salinas), and GR-S (standard). A definite resemblance may be seen in the migration behavior of Hevea and guayule. The somewhat greater mobility of guayule probably attests to a lower mean molecular weight, and a much smaller proportion of the poorly soluble gel fraction. The well-known effect of trichloracetic acid in dispersing the gel and otherwise decreasing solution viscosity is clearly demonstrated in this same chromatogram. The relatively lower mean molecular weight of GR-S is also reflected in its faster migration.

A chromatographic demonstration of the physical breakdown which results from the milling of crude rubber is shown in Fig. 1. A sample of high-quality acetone-deresinated guayule rubber (*9*) was systematically broken down by milling on closely set rolls. Samples were taken at the time intervals indicated, while the viscosity of the rubber was being reduced from an initial Mooney value of 95 to a final value of about 15. Taylor and Veith (*10*) have shown that for rubber broken down in a Brabender plastograph the Mooney viscosity is a semilogarithmic function of the masticating time. The differential migration patterns of Fig. 1 suggest that a similar relationship exists between polymer mobility and milling time.

The results presented here are intended mainly to demonstrate several ways in which partition chromatography can be a useful tool for the study of elastomers. The work is being continued and will be reported in greater detail at a later date.

[3] With untreated paper, much of the rubber either moves with the solvent front or remains at the origin. Migration in this instance is probably governed more by rate of dissolution than by partition.

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Splash-Cup Dispersal Mechanism in *Chrysosplenium* and *Mitella*[1]

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Upon reading the stimulating account by Brodie (*1*) of the splash-cup dispersal mechanism in the Nidulariaceae and other groups of plants, the writer recalled looking down upon fruiting plants of the arctic golden saxifrage, *Chrysosplenium tetrandrum* (Lund) Th. Fries, at Chesterfield Inlet, Keewatin, and thinking how closely the erect, open capsules resembled the gemma cups of *Marchantia*. Examination of specimens collected at that time confirmed that the open capsule formed a deep cup with a flaring lip. Several plants were sent to Brodie, who agreed that the form of the cup appeared to be suitable for splash dispersal of the seeds.

Chrysosplenium americanum Schwein. was found in fruit some miles from Ottawa on June 4, 1952, a few hours after a heavy thunderstorm. The fully expanded

[1] Contribution No. 1198 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.

capsules were all empty, but those only partly expanded had the full complement of 6–8 seeds attached to the two parietal placentae. Some of these plants were brought into the laboratory and placed in shallow water. After 24 hr, water drops falling from 3 ft caused seeds to be thrown horizontally up to 16 in. Some seeds had not completely abscissed, the plants were less turgid than in the field, and some difficulty was experienced in keeping the capsules as strictly upright as they are when growing naturally; otherwise it is probable that seeds would have been ejected for greater distances. *Chrysosplenium* should be easily grown in the greenhouse and would serve well to demonstrate the mechanism to students.

Chrysosplenium is well suited to this dispersal mechanism since it grows frequently in the splash from waterfalls, below moist cliffs, or in swampy woods where even a drizzling rain will fall from the trees in large drops.

On June 18 it was noticed that all capsules of *Mitella diphylla* L. that were approaching maturity had become vertically oriented even on a plant whose stem had been bent to the horizontal. Changed orientation of capsules on plants brought into the laboratory indicated that the vertical disposition is due to a phototropic response. Although the mature capsule of *M. diphylla* is somewhat flattened, rather than circular, in plan view, it has the form of a deep cup with a widely flaring lip and appears well adapted for splash dispersal of the seeds, which are held in clusters at the two ends of the cup. The seeds were all firmly attached at this time and no test could be made. It was not possible to visit colonies of this plant again until July 4. Heavy rain had fallen most of the preceding night, and the majority of capsules were empty. Plants with some immature capsules were collected and kept in water for 48 hr. The capsules were then subjected to water drops falling from distances of 3 ft 4 in. to 3 ft 8 in., depending upon the position of the capsules on the stalk. Although some capsules shriveled without the seeds abscissing, seeds were ejected from several of them, to distances of 4–29.5 in., the average distance being 11.6 in. With a free fall from the canopy of the mature deciduous woods in which *M. diphylla* commonly grows the seeds are presumably thrown appreciably further.

In the writer's experience the capsules of *Mitella nuda* always become erect at maturity, and this fact is borne out by examination of herbarium specimens ranging from Alberta to Nova Scotia. Less abundant material of *M. breweri, M. ovalis,* and *M. pentandra* suggests that the same is true of these species. The mature capsules of all these species have much the same form as those of *M. diphylla,* and it is probable that they function similarly.

Examination of available herbarium material indicates that in some species of *Heuchera* (e.g., *H. americana*) the mature capsules are more or less erect, whereas in others (e.g., *H. glabra*) they are not. In all species the capsules open apically but with a constricted throat, resulting in a deep vessel that probably functions as a very inefficient splash cup even when it is suitably oriented. It is probable that in the Saxifragaceae the splash mechanism originated in *Heuchera*. In the related *Tolmiea menziesii* the capsules are more or less erect but are more poorly shaped than those of most *Heuchera* spp. In *Saxifraga* the mature capsules are generally erect and form a somewhat better cup with less constriction at the throat, but too broad at the base for high efficiency. From *Heuchera* or *Tolmiea* there appear to have been two evolutionary lines: one leading to *Saxifraga* and related genera with axile placentation, but poorly developed splash cups; and one, perhaps through *Tellima,* to *Mitella* with parietal placentation, but efficient splash cups. *Chrysosplenium,* also with parietal placentation, has perhaps been derived from the latter line, but it is so reduced and specialized morphologically that its affinities are obscure.

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Iron Content of an Insect Virus[1]

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Glaser and Chapman (*1*) reported that polyhedral bodies of *Bombyx mori* L. (silkworm) contained .496% iron, at a time when the nature of the polyhedral bodies and their relation to the virus itself were unknown. Bergold (*2*) first isolated and demonstrated the virus particles and showed that the polyhedral bodies of *B. mori* consist of about 95% noninfectious, homogeneous polyhedral protein with a molecular weight of about 378,000, and about 5% infectious virus material. In view of these findings it seemed of interest to investigate the distribution of iron in the polyhedral bodies.

The quantitative determination of iron was difficult since only small quantities (1–3) mg of virus were available. Comparison of the numerous methods described in the literature was undertaken, and finally the *o*-phenanthroline method of Saywell and Cunningham (*3*) and a wet-ashing procedure[2] were adopted. The following procedure was developed: To samples (up to 20 mg) containing 0.1–1.5 μg Fe, 2 ml of 9 *N* H_2SO_4 is added and dried for 5 hr at about 150° C. They are incinerated at 210° C for 3 hr, or until colorless (up to 7 hr), adding a total of 4–10 drops of

[1] Contribution No. 75, Division of Forest Biology, Science Service, Department of Agriculture, Ottawa, Canada.

[2] A procedure for dry-ashing will be described by the senior author at a later date.