

ml of absolute ethyl acetate, and the mixture was set in the refrigerator overnight.

The crude gutta which separated was filtered with suction on a Büchner funnel and rinsed twice with 100-ml portions of ethyl acetate. Yield of crude gutta was 219 g or 13.7% of starting chicle.

This gutta was extracted in a Soxhlet apparatus with acetone for 24 hr to remove waxy and resinous impurities. The acetone-extracted material was then extracted for 24 hr in a Soxhlet apparatus with peroxide-free ethyl ether. The insoluble extracted gutta was air-dried to constant weight. Gutta obtained by this procedure was found to melt at about 69°–71° C (the melting point varying slightly from sample to sample) and is believed to correspond to the α -form of gutta from gutta-percha or balata. A lower melting form (mp 64°–66° C) may be obtained by melting this gutta and cooling rapidly or by recrystallizing from petroleum ether or other solvents.

The caoutchouc-type polymer was precipitated from the filtrate after filtering off the crude gutta, by addition of 5,000 ml of acetone, with stirring, to the clear benzene-ethyl acetate solution. The polymer began to precipitate immediately, and was separated, after 24 hr of standing in the refrigerator at 5° C, by centrifuging. Addition of a small amount of electrolyte (KI) to the mixture results in more complete precipitation of the polymer and allows it to be separated from the supernatant mother liquor simply by decanting. Yield of crude caoutchouc-type polymer was 76 g or 4.8% of starting chicle.

This polymer was purified by a 24-hr extraction in a Soxhlet extractor with acetone, and then it was dissolved in benzene (by standing overnight), filtered through filter paper, and reprecipitated with acetone. Supernatant mother liquor was decanted from the precipitated polymer, which was then rinsed with acetone and dried in a vacuum desiccator.

Osmometric molecular weight studies on the two types of polymers gave the following figures: gutta, 16,000; caoutchouc, 91,000. Infrared absorption spectrum measurements in the range of 2.5 μ –15 μ indicate that the gutta and caoutchouc isolated from chicle are lower molecular weight equivalents of polymers from gutta-percha (Pahang) and rubber (*Hevea*, pale crepe), respectively. They are also believed to correspond to the cold ether-insoluble and cold ether-soluble hydrocarbons isolated by Prochazka and Endemann (1879), and cited by Schereschewski (?).

The procedure outlined has yielded the two polymeric types when applied to a number of commercial chicle samples obtained from widely separated geographic locations. Samples of chicle before centrifuging have also been found to yield the two types of polymer.

Details of experimental procedures and physical measurements will be published later.

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Several Effects of Maleic Hydrazide on Plants

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Schoene and Hoffman (2) illustrated that maleic hydrazide, applied as a spray at a concentration of 2000 ppm, temporarily inhibited stem growth of tomato, and they reported that plants showing this response resumed growth from lateral buds about two months after treatment. They also observed that some chlorosis appeared and that root growth was inhibited. Temporary stoppage of shoot growth was also recorded for several other species.

The writer began to test the effects of the diethanolamine salt of maleic hydrazide on a variety of plants shortly after the report, just cited, was published. Concentrations of 2,400 and 600 ppm of the active ingredient were arbitrarily chosen for preliminary work. To a water solution of the salt enough of the detergent, Tide, was added to assure satisfactory wetting of leaves. The mixture was applied on warm, sunny days with a 3-gal compressed-air sprayer or with a nasal atomizer. Testing was done both out of doors and in the greenhouse.

Easily visible effects on plants included: (1) a temporary suspension of stem elongation from terminal buds or death of terminal buds and adjacent tissues, (2) expansion of lateral buds some time after the terminal bud had been affected, (3) a transient intensification of green in leaves of stunted plants, (4) a localized accumulation of anthocyanins or other nongreen pigments, (5) narrowing of leaves on both monocots and dicots, (6) several patterns of leaf chlorosis, (7) an interference with water absorption, apparently caused by death of root tips, (8) suppression of nodule formation on bush beans, and (9) total, temporary, or male sterility.

Stunting was common, but not a universal result of treatment. It was soon followed by an unmistakable intensification of green in the leaves of nimblewill (*Muhlenbergia schreberi*), Kentucky bluegrass (*Poa pratensis*) grown in shade, dayflower (*Commelina virginica*), bush bean (*Phaseolus vulgaris*), and two varieties of hybrid sweet corn (*Zea mays* var. *saccharata*).

Crabgrass (*Digitaria sanguinalis* and *D. ischaemum*), one variety of field corn (*Zea mays* var. *indentata*), and hybrid Golden Delicious sweet corn, all of which have the capacity to produce anthocyanins, developed considerable amounts of these pigments in the younger leaves, which had received the higher concentration of maleic hydrazide. The petals of dayflower were about half-normal

size and were deeper blue than normal petals. The common violet (*Viola* sp.) frequently developed a dull purplish pigment in treated leaves.

Leaves that expanded subsequent to treatment were narrowed on two varieties of sweet corn, one variety of field corn, on bush bean, Kentucky bluegrass grown in shade, crabgrass, sunflower (*Helianthus annuus*), and red coleus (*Coleus blumei*). Several distinctive patterns of chlorosis were observed on these plants.

Interference with water absorption by roots was clearly evident in sweet corn and garden beet (*Beta vulgaris*) sprayed with 2,400 ppm of maleic hydrazide. These crops, grown in the field, in the full sun, wilted severely at the same time that untreated plants in the same rows remained turgid. Plants of field corn grown individually in small flowerpots in the greenhouse were used to observe the effects of maleic hydrazide on roots. In this exploratory test, four plants were treated and four were used as controls. An application of 2,400 ppm to the leaves caused root tips to die and turn brown, and also inhibited the development of additional lateral roots. One month after treatment the total dry weight of new roots on treated plants was one-fourth that of new roots on control plants. If the treated corn plants in the field did not extend their roots into new soil any faster than the treated plants in the greenhouse, they would be expected to wilt (as in reality they did) soon after soil moisture had dropped to slightly below field capacity.

Maleic hydrazide applied at a concentration of 2,400 ppm resulted in total sterility of gladiola (*Gladiolus* sp.), owing probably to proper timing of the spray and to the fact that a gladiola corm gives rise to only one floral axis. Individual flower heads of China aster (*Callistephus chinensis*) were completely sterilized by applying the spray at the young-bud stage. Dayflower treated with 600 ppm of the chemical formed abortive flower buds for a time, but later produced flowers that set seed. Floral axes of nimblewill present when the spray was applied were apparently killed. The production of cleistogamous flowers on the common violet was interrupted for several weeks. Growth of spotted spurge (*Euphorbia maculata*) was checked for a short period but upon resumption of growth the leaves, flowers, and fruits appeared normal. The size of inflorescences and the number of seeds per cluster of crabgrass were greatly reduced for several weeks by the 2,400-ppm treatment. Dayflower, nimblewill, violet, spotted spurge, and crabgrass survived treatment because all of them can extend their vegetative body by growth from lateral buds. Thus, the sterilizing effect of maleic hydrazide was temporary on such plants if they did not die from water shortage after treatment. When sweet corn was treated at a critical stage with 600 ppm, it produced sterile tassels and stubby ears with functional silks. Pollen from control plants produced normal kernels on these small ears. The induction of sterility has not been previously reported for maleic hydrazide (2), but is stressed in a report on the *n*-aryl phthalamic acids (1).

Carrot (*Daucus carota*), cabbage (*Brassica oleracea* var. *capitata*), bearded iris (*Iris germanica*), lily-of-the-valley (*Convallaria majalis*), Jonathan apple (*Malus*

sylvestris), common plantain (*Plantago major*), Kieffer pear (*Pyrus* sp.), and sweet potato (*Ipomoea batatas*) were apparently unaffected by even the higher concentration of maleic hydrazide.

More complete details of tests and a discussion of their possible significance will be published elsewhere.

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A New Microculture Slide

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In recent years the importance of mold taxonomy has increased, and many mycologists have felt the need of a good, inexpensive, versatile, and easily manipulated slide for microscopic examination of fungi. The slide about to be described has been used successfully in our laboratories for some time in both elementary and advanced studies, and has been found excellent for teaching purposes and for photomicrography.

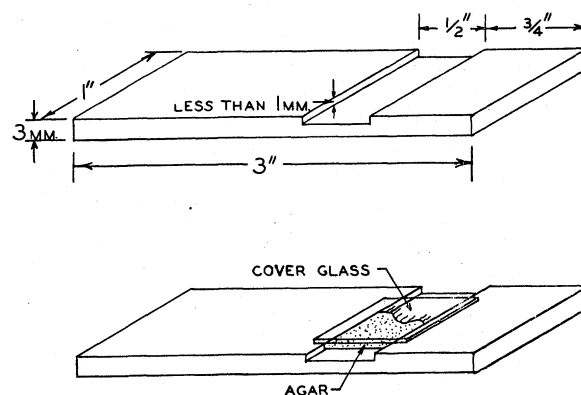


FIG. 1. Microculture slide in use.

The slide, which is used in conjunction with 18-mm cover slips, is a standard 1 in. × 3 in. glass slide, 3 mm thick, with an unpolished channel $\frac{1}{2}$ in. wide and slightly less than 1 mm deep, located $\frac{3}{4}$ in. from one end of the slide (see Fig. 1).

Cover slips and slides are sterilized separately, and immediately prior to use a cover slip is placed over the channel without cement or wax of any kind, thus forming a small open chamber. Melted seeded agar is allowed to flow under the cover slip by capillarity until part of the space is filled. The inoculated culture slide may then be incubated in a moist chamber, such as a Petri dish containing a piece of moist cotton.

This slide makes possible the rapid production of temporary mounts and very satisfactory permanent mounts with little effort and negligible expense.