tionships to the other elements, (a dotted tie-line leads to a C group) so that such valences as Ce^{+4}, Pr^{+5}, U^{+3}, and Yb^{+2}, appear logically to be expected.

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Dry Mounts of Amphibian Cleavage Stages

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Use of dried vertebrate embryological materials for demonstration has recently been reported (*1, 2*). Such methods have been rather widely used but not always reported in the literature.

The use of formalin-preserved amphibian cleavage stages in embryology presents certain difficulties in handling and orientation, especially for students in large classes, and when there is lack of adequate dissecting scopes or light. The method to be described is simple and has proved helpful in the study of amphibian cleavage by classes at Duke University.

FIG. 1.

Formalin-preserved material, previously fixed in Smith's fluid or 10% formalin, is washed in tap water for 2 hr. Jelly and vitelline membranes are then removed by rolling on paper towels. Complete removal of vitelline membranes is important in order to avoid many surface reflections. Bleaching is helpful, and is the next step in the method. Standard techniques such as use of hydrogen peroxide, Javelle water, or hypochlorite solutions are satisfactory. Bleaching is followed with washing in tap water for at least 1 hr and dehydrating through a series of alcohols going from absolute alcohol to xylene, where the material may be stored (or it may be stored in 85% alcohol). The material is put on a paper towel and air-dried for 5 min. It is then ready for mounting or storage.

There are several methods for mounting, but we have found that fastening the material to the tips of paper or clear plastic triangles by means of household cement is successful. The triangles are first pierced with insect pins in a manner similar to that used in gluing small insects. Plastic triangles have the advantage of being usable again in case the specimen breaks.

Some of our dried mounts prepared in this way have been in use for 4 years and show no sign of change. They can be stored in insect boxes while not in use. With a minimum of light and low magnification, the cleavage furrows stand out clearly (Fig. 1). To facilitate handling, the pins can be placed on pieces of balsa or cork when in use. Hemisections of blastulae can be mounted in the same way as cleavage stages.

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Rooting of Haden Mango (*Mangifera indica* L.) Leaf-Bud Cuttings

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One of the factors retarding the development of a large scale mango industry in Florida is the lack of knowledge concerning the theoretical aspects of mango propagation and selection. The present paper introduces a new method of propagation which may be helpful in elucidating these problems.

At present, the varieties of mangos grown in this state are propagated by graftage, inarching, and, rarely, by air-layering (marcottage), of scions of known varieties on seedling rootstocks of unknown parentage (*1, 3, 13, 16*). The lack of uniformity in these stocks—some of which are grown from polyembryonic seeds, turpentine, apple, and No. 11 being the commonly used varieties; and others from monoembryonic seeds, such as Haden and Saigon—may be a contributory factor in the tendency toward biennial bearing and other deleterious characteristics apparent in most grafted plants regardless of variety (*1, 3, 16*).

In Florida, the chief emphasis in mango propagation has been on selection of new varieties from chance seed-

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lings of trees of known worth (*17, 25, 33, 34, 43, 44*), and in the development of methods of graftage and budding to supplant the slow, costly inarching procedure, which is still being used to some extent (*1, 4, 18, 22, 23, 24, 29, 30, 37, 38, 42, 45*).

Little progress has been made on the problem of clonal selection of mangos for two reasons, the absence of serious incompatibility problems due to graftage, using seedling stocks (*13, 20, 29*), and the difficulties encountered in propagating clones on uniform rootstocks (*22–24, 37*). Air-layering, although one of the common older methods in the East Indies, has been used sparingly in Florida for quantity production. The literature on mango propagation since 1900 attests the paucity of successful plants grown from cuttings (*3*). In 1940 Guha-Thakurta and Dutt published the results of their treatments using 1% indoleacetic acid on cuttings from juvenile growth of seedlings (*9*). Although this work was a step in the right direction, it had little practical significance for clonal rootstock selection purposes until means could be found for rooting cuttings taken from mature, bearing trees of known characteristics. The reports of Guha-Thakurta and Dutt (*10, 11*), Gardner and Piper (*8*), and others (*39–41*) indicate that very low percentages of rooting with stem-cuttings or gootes (marcottes) from mature trees were obtained.

The problem of rooting of cuttings is discussed in a general way for pome fruits by Cooper and Stoutemeyer (*5*), and by others (*12*). The rooting of stems of young seedlings of woody plants suggests that all seedlings pass through distinct juvenile and mature growth phases. In buddings or inarches of trees, the scion is ordinarily made from wood of shoots in the mature growth phase, and in a number of species it is impossible, or possible only under certain circumstances, to induce juvenile growth on the scions. The mango obviously belongs to this group (*8, 10, 11, 39–41*). The new shoots found along the margin of wounds on limbs and stems broken or damaged by hurricanes in Florida, however, resemble in their external characters those exhibited by seedling stems in their juvenile stages. Furthermore, cases are known in the Haden and other commercial varieties where such shoots developed roots from the callused wound margin from which they had sprouted (*36*). Whether these shoots arise from adventitious or latent buds is not known. These discoveries encouraged experimentation with this type of new growth. The vertical or near vertical growing parts of these regeneration shoots were chosen for study. It seemed undesirable, however, to use stem cuttings, since relatively few could be made, owing mainly to the fact that the shoots developing from wounded limbs tend to put out laterals very quickly. The success of other workers with rooting leaf-bud (mallet) cuttings suggested the possibility of using this method (*2, 5, 14, 28, 31*).

The propagation frames used in the experiments reported here consisted of aluminum trays (24 in. × 16 in. × 6 in. deep) with drainage holes in the bottom. These were filled with sieved coconut husk compost (a material commonly used for the purpose in the Netherlands East Indies), placed in an open propagation bench at the University of Miami main campus, and kept under constant spray from fan-shaped nozzles.

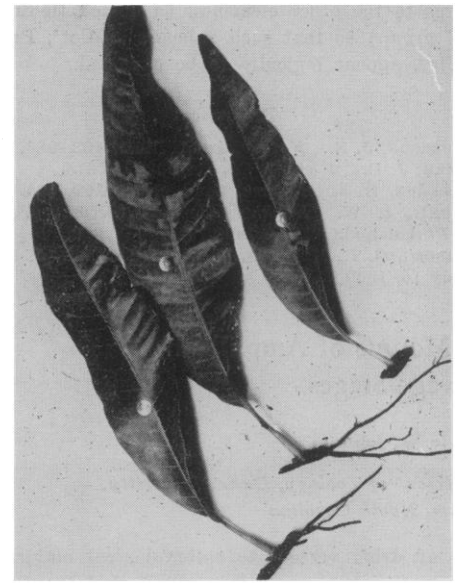

FIG. 1. Leaf-bud cuttings of the Haden mango, treated with indolebutyric acid 10,000 ppm, showing various stages of root development. Bottom leaf-bud cutting shows callusing and first root development. The middle and upper ones show activity of the dormant axillary bud. Photo by Fred B. Fleming, University of Miami photographer.

From Haden mango trees, leaf-bud cuttings from the firm green part of wound shoots were made in June, 1949, care being taken to see that a chip of wood remained attached to the underside of the bud. The cuttings were washed in running water 30–45 min to remove exudate from the cut edges of the bark. Immediately thereafter the mallet portion of the cuttings, including the axillary bud, was immersed for 5 sec in an indolebutyric acid solution (10,000 ppm in 50% methanol). The cuttings were then superficially planted in the propagating trays. There was full morning sun with light shade the rest of the day. No precautions were taken to screen the trays from high winds or torrential summer rains. The continuous water spray served to reduce transpiration and to lower the temperature of the rooting medium; it seldom exceeded 27° C even during dry hot days (*7, 8, 32*).

After 6 weeks in the rooting medium the cuttings were examined for sign of roots. Of the treated ones, 75% were rooted or had started to root, with buds also showing signs of growth (Fig. 1). Many of the roots had grown through the drainage holes in the trays and were broken off upon removal. With an untreated control series, most of the cuttings had died and of those alive, none showed signs of root formation when examined at the end of 6 weeks.

Additional experiments are now in progress to determine the influence of time of year and cold shocks on the rooting of cuttings similar to those described, the hardening off of rooted cuttings, the optimum conditions for transplanting, and the behavior of varieties other than the Haden mango.

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Niacin Content of Waxy, Sugary, and Dent F_2 Segregating Kernels in Corn[1]

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The existence of a direct relation between sugary endosperm and high niacin content of the corn kernel has recently been confirmed by Cameron and Teas (*3*), after having been suggested by several other workers (*1, 2, 4, 5*). It has been indicated (*6*) that there may also be a relationship between waxy endosperm and high niacin content, but no data have been presented to support this suggestion.

As part of a study of the inheritance of niacin content in corn, waxy, sugary, and dent F_2 segregating kernels of a cross between a high niacin sugary line (mean niacin content 48.3 μg/g) and a low niacin waxy line (mean niacin content 18.0 μg/g) were analyzed. The data obtained appear to be of value in clarifying the relationship between endosperm type and niacin content in corn, and are therefore presented in this paper.

Eighteen self-pollinated ears from F_1 plants of the waxy-sugary cross were available for analysis. The F_2 kernels on each ear were separated according to their endosperm type. Counts showed a close agreement with the expected segregation ratio of 9 dent: 3 waxy: 4 sugary. Fifteen kernels of each endosperm type were taken from each ear. An effort was made to select kernels of uniform size within each sample. The 15-kernel samples were then assayed for niacin content.

Niacin determinations were made by the microbiological method of Snell and Wright (*7*) after hydrolysis of samples in 1 *N* H_2SO_4 for 30 min at 120° C. Hydrolyzates were adjusted to pH 6.8, filtered, and assayed in the conventional manner. All results are given on a moisture-free basis.

Table 1 shows the mean niacin content of the waxy, sugary, and dent kernels, as well as the range in niacin content found among ears within each endosperm type. The average niacin content of the sugary kernels was about 23% higher than that of the waxy kernels, while the waxy kernels in turn were about 18% higher in niacin than the dent kernels. Differences in niacin content between each of the three endosperm types greatly exceeded those required for statistical significance at the 1% level. It is also significant that in each of the 18 ears sampled, dent kernels were lowest, waxy kernels intermediate, and sugary kernels highest in niacin content. Mean niacin content of individual ears also differed significantly, although the differences between ears tended to affect

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