the bud progeny from the normal branches were variants.

The presence of nucellar embryony in citrus provides a method of recovering or separating one or more types occurring in a chimera. Since the nucellar embryo arises from a single maternal cell without union with a male cell, only one type of tissue will be included in any one nucellar seedling. Such a technique is now being employed with such important but ever-sporting varieties as the Ovale of Italy, in an attempt to isolate the desired Ovale type.

Three strains of Satsuma orange which differ in several characteristics were established by Dr. H. B. Frost from nucellar seedlings from a single parent, indicating that the parent may have been a chimera. Or possibly the bud variations might have occurred just prior to the formation or at the time of formation of the nucellar embryos. However, this latter possibility would necessitate a rather high rate of production of variation.

Nucellar progeny from some citrus also indicate that some bud variations are due to genetic instability of some kind. Six nucellar offspring of one Valencia orange tree bear fruits that are partly "solid-dry". The fruits of these trees vary from a condition of abnormal firmness to complete absence of juice. Not only do the fruits on each tree differ greatly among themselves but the trees affected differ greatly in the average amount of dryness. Nucellar progeny of the Ruby orange, a variety with red pulp and rind, behaves in this same manner in regard to the red coloration.

Even if the variation within each tree in such cases can be explained as the result of a chimeral condition, rather frequent genetic changes within cells seems to be indicated. Since each nucellar embryo originates from a single cell, each variant embryo probably has undergone at least one change of genetic type in order to become a chimera.

The possibility of virus diseases producing changes that will be mistaken for bud variations should be considered. Some viruses have been demonstrated to produce changes in fruit shape. Other virus diseases such as Triztesa will produce tree stunting when the scion is grown on certain rootstocks.

Reported variations must be constantly screened to determine if they are advantageous and if they are heritable changes. It is particularly difficult to detect bud variations affecting such characters as yield or quality. Such variations usually cannot be expected to be detected until they exist as entire trees as the result of propagation. It is then difficult to determine if the differences observed are the result of particularly favorable environmental conditions the tree has enjoyed or if it is the result of bud variation. Only progeny testing of such trees can supply the answer.

Breeders and Testers

We shall periodically add to the list of fruit breeders and testers originally published in Vol. 9, No. 1 and supplemented in Vol. 9, No. 3 of FRUIT VARIETIES and HORTICULTURAL DIGEST. Our current additions are as follows:

Barker, G. N., Littleton, Mass.—grape, plum.

Isbet, A., U.S.D.A., King's Hall, U.S. Virgin Islands—Annona, avacado, citrus, guava, lime, mango, papaya, passiflora, sapodilla, West Indian cherry.

Janick, J., Purdue Univ., Lafayette, Ind.—apple, pear.

Tukey, R. B., Purdue Univ., Lafayette, Ind.—apple, pear, peach.