

## ABNORMAL FRUIT TYPES IN THE AVOCADO



**C. A. Schroeder**

*Associate Professor of Subtropical Horticulture, University of California (Los Angeles).*

Frequently avocado fruits are observed to be irregular in form, color, or structure. Such abnormalities occur in all kinds of fruits and are of interest because they may suggest certain aspects of the fruit morphology which are otherwise difficult to ascertain. Double avocado fruits, distortions of various types, sectorial chimeras, and woody fruits have been described previously<sup>2, 4</sup>. Monstrosities such as these frequently are found in the packing house cull bin and are noted by an observant person occasionally in the orchard. The cause of such aberrant forms is unknown. Double fruits (figure 2A) are the result of multiple parts in the flower, a condition which is observed frequently<sup>3</sup>. An occasional double fruit will contain two normally formed seed. Usually only a single seed develops, the second seed becoming withered or aborted.

The avocado fruit sometimes is marked by a longitudinal groove or ridge of various degrees of development (figure 2E). This may represent the failure of the single carpel to completely develop around the ovule during its younger stages; hence a line of fusion is quite evident. Longitudinal grooves may be the manifestation of virus infection, however, such as is observed in the sun-blotched fruit. In this latter case the depressed area results from a modification and partial destruction of the vascular tissue deep within the fruit wall. The depressed spots and grooves of sun-blotched fruits generally are yellow in color.

Insect injury or sting during the early stages of fruit development probably are the cause of many types of irregular fruits (figure 2D,F). Injury of this nature is thought to cause some types of fasciation or flattened and irregular growth (figure 1A) and woodiness of the fruit (figure 1B-E). Woody fruits actually are of wood structure; the normally soft parenchymatous ovary wall is displaced by a stem-like structure which may bear occasional small cauliflower-like appendages or excrescences suggestive of highly modified leaves. Such abnormal structures would suggest that the fruit may involve some stem tissue in its evolutionary development, although other evidence does not support this speculation. Evidence that the woody fruit actually develops from a floral structure is apparent from figure 1A, which shows the normal fruit and a woody fruit borne in comparable positions, namely, on the peduncle of the inflorescence.

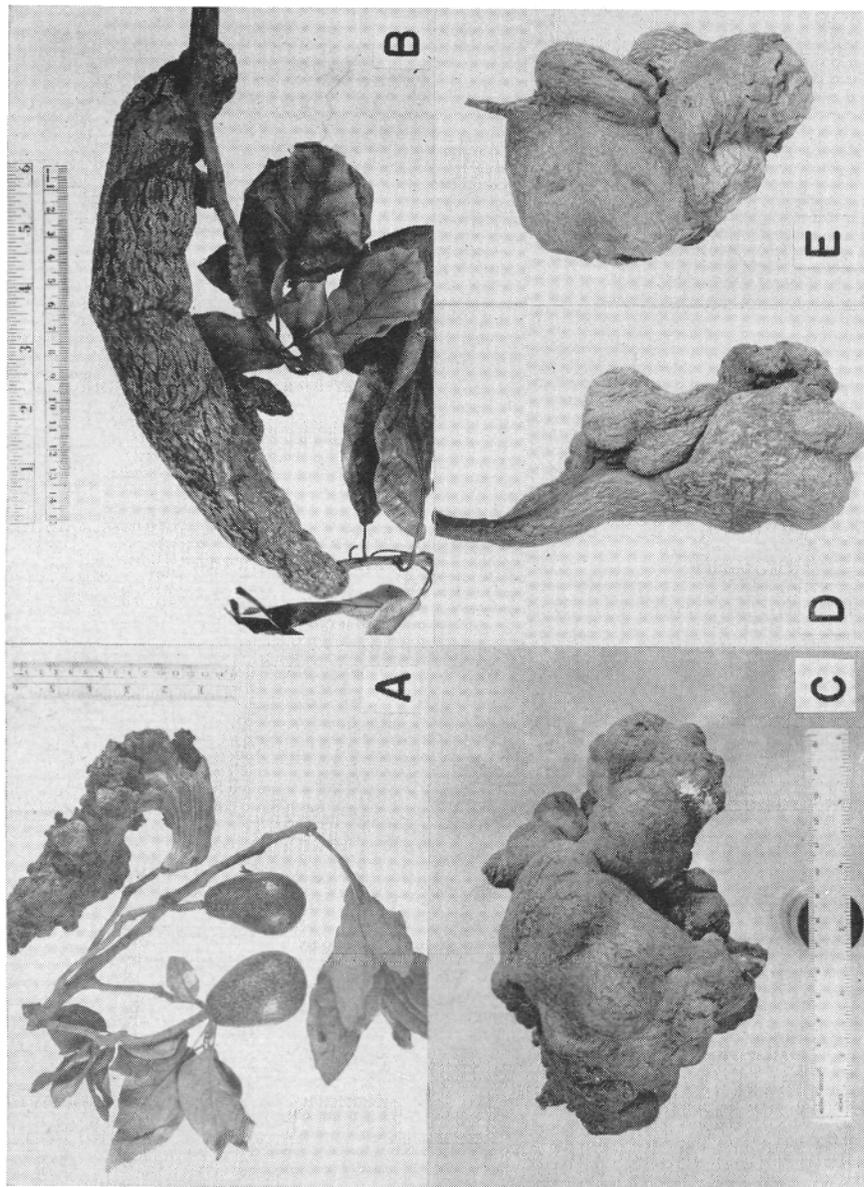


Fig. 1. *A.* Normal and woody, fasciated Fuerte fruits attached to fruiting branch. *B.* Long, cylindrical woody avocado fruit. *C.* Large, distorted, woody avocado fruit. *D-E.* Woody avocado fruits.

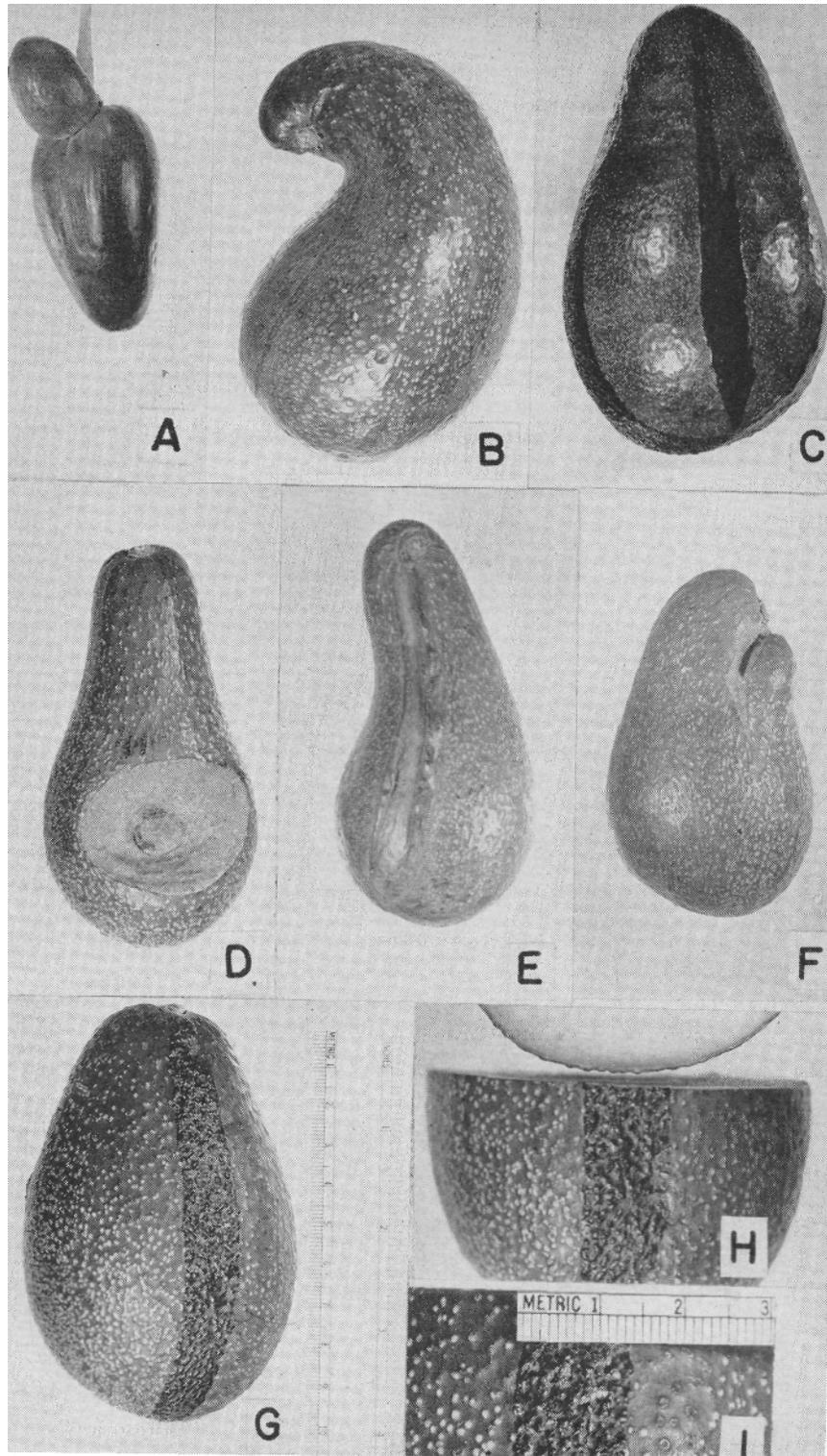


Fig. 2. *A.* Double Mexican fruit. *B.* Crook-necked Fuerte with sectorial chimera. *C.* Fuerte with dark green sectorial chimeric streaks. *D.* Probably insect injury on Fuerte. *E.* Ridged fruit. *F.* Possible insect injury on Fuerte. *G.* Sectorial chimera on Fuerte. *H-I.* Detail of latter fruit showing extent and nature of mutant tissue.

One of the most interesting and unique types of fruit variation is that of the sectorial chimera (figure 2B,C,G), which is manifest by longitudinal stripes of abnormal tissue of variable width and extent. These stripes may be of black color on a green fruit or of lighter or darker green color compared to the normal. The abnormal section frequently is of different texture. The Fuerte specimen shown in figure 2G has a black chimeric section extending from apex to base. The surface of the black section is pebbled much like that of the typical Hass fruit (figure 2H,I). Such a chimera probably is the result of a mutation within a group of cells during the early development of the fruit. The mutant tissue extends through a portion of the skin and involves only a few cell layers immediately beneath the epidermis. Such mutations frequently occur in the flower bud and are manifest only in the single fruit which develops from that flower, hence cannot be propagated. If the mutation takes place in woody tissue lower in the stem, which stem section will bear buds, flowers and fruits, then it sometimes is possible to propagate the bud sport if the mutated tissue is sufficient in extent and stable in character. Trees with such mutations or bud sports should be avoided when selecting buds for propagation of the variety. Bud sports generally are inferior compared to the original variety, although in some fruit plants certain bud mutations have proved to be of great importance. The Department of Subtropical Horticulture will appreciate having its attention called to such bud sports or chimeric fruits of avocado so that further studies can be made on their occurrence and development.

#### **LITERATURE CITED**

1. Hodgson, R. W. An avocado monstrosity. *Heredity* 8:557. 1917
2. Hodgson, R. W. Avocado fruit abnormalities. *Calif. Avocado Soc. Yrbk.* 1935:108 - 109.
3. Schroeder, C. A. Floral abnormality in the avocado. *Calif. Avocado Assoc. 'Yrbk.* 1940:37 - 39.
4. Schroeder, C. A. Woody avocado fruits. *Calif. Avocado Soc. Yrbk.* 1942: 54 - 55.