AN APPLE FRUIT DEFORMITY OF UNKNOWN ETIOLOGY [1]

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Fluted, somewhat egg-shaped fruits of the 'McIntosh' variety were sent from Collingwood, Ontario to the Research Station at St. Catharines in August. Fluting was most pronounced at the blossom end but depressed lines often extended more than half way up the fruits (Fig. 1a). The stem cavity was full or even built-up rather than depressed. The similarity to 'flute fruit' (1) was so obvious that the orchard was visited in September.

Fluted and otherwise deformed fruits were observed on 6 varieties. 'Golden Delicious' was the least affected and showed only slight distortion, mostly at the blossom end and with the stem end normal (Fig. 1b). 'McIntosh', 'Cortland', and 'Jonadell' were all affected to about the same degree with severe distortion at the blossom end (Fig. 1c). Fluting extended 2/3 or more towards the stem end. Some 'McIntosh' fruits were flattened laterally and had a full stem cavity, thus making them somewhat egg-shaped. 'Red Delicious' showed pronounced fluting and distortion at the blossom end. Also, the stem cavity was often filled with a proliferation of the stem into a thick, knobby structure. 'Cox's Orange Pippin' was the most severely affected variety. Fruits were fluted at the blossom end and the stem ends of many were drawn out into short, thick, somewhat curved, pear-like necks. The stems were thickened as in 'Red Delicious' (Fig. 1d).

Some of the varieties listed were examined on two or even all three of the common rootstock types, standard, dwarfing and semi-dwarfing. Distorted fruits were found on all types. The condition, therefore, could not be correlated with rootstock. Also, the occurrence of the condition on nearly every tree of all varieties, on all rootstocks, ruled out the probability of a virus as being the cause. Spray injury was considered as a possible cause but the condition was observed in two adjacent orchards where different fungicides had been used. Also, one grower had used a chemical thinner but the other had not. The topography of these orchards was gently rolling, consisting of knolls with long slopes in many directions forming irregular, broad, shallow valleys. It was not possible by observation to determine where frost pockets might develop or what the air drainage might be. However, trees on the higher land were the least affected while those on the lower slopes carried the *most* deformed fruits.

Very similar conditions have been reported from British Columbia, New Brunswick and Nova Scotia this year. Affected orchards in British Columbia have a history of frost injury[a]. Damaged fruits from New Brunswick appeared similar to those from Collingwood. Deformed 'McIntosh' fruits with full stem cavities and an elongate pear-shape have been reported from Nova Scotia[b]. In Nova Scotia only the 'king' fruits were affected. No such correlation existed at Collingwood as all fruits in some clusters were distorted. The Nova Scotia report, which refers only to 'McIntosh', states that 19% of the crop was affected. In the orchards observed at Collingwood at least 50% of the 'Red Delicious' and 'Cox's Orange Pippin' fruits were deformed. Other varieties were affected to a lesser degree, probably in the 15 to 20% range. However, this condition was not reported from any other part of Ontario *so* the overall damage was minimal.

The observers were not able to determine the exact cause of this condition. However, the symptoms certainly suggest some type of hormone imbalance. Low-temperature injury at some very early stage in the development of the fruits, perhaps even in the bud stage, seems to be a plausible interpretation. Such injury could conceivably cause a disturbance in some hormone system and produce the symptoms seen. The differences in syrnptoms as seen in various regions could be caused by slight differences in the physiological time at which injury occurred.

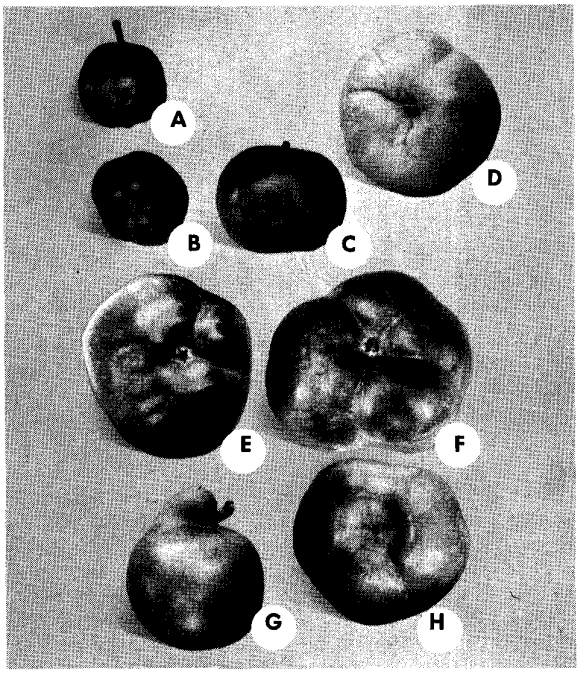

Fig. 1. *A, B,* 'Fluted McIntosh fruits from Collingwood, with normal fruit, C. D, Distorted Golden Delicious fruits. E, Distorted McIntosh fruits. F. Distorted Cortland fruits. G, Distorted Cox's Orange Pippin fruits. H, Distorted Jonadell fruits.

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[a] Personal communication with Dr., M. F. Welsh.

[b] Dr. R.P. Longley, Press releases, Can. Dept. of Agriculture, Oct. 1965.

Literature cited

1. Welsh, M.F., and F.W.L. Keane. 1961. Diseases of apple in British Columbia that are caused by viruses or have characteristics of virus diseases. Can. Plant Dis. Surv. 41: 123-147