tests indicated a variation in variety susceptibility to a storage disorder similar in appearance to Jonathan Spot. This variation seemed to be related to the intensity of the red skin color of the fruit. Gallia Beauty appeared to be the most susceptible to the disease, and Rome Beauty and Ohio Red Rome, the least. The disorder was first noted on Gallia Beauty after the fruit had been in storage at 45°F for approximately three months. However, the same variety did not show any symptoms of the disease even after four months at 32–35°F. In fact, all five varieties were in excellent condition after four months at 32–35°F.

To summarize, preliminary observations in 1953 under Pennsylvania conditions showed Gallia Beauty to be a superior red sport of Rome Beauty. The red color of the Ohio Red Rome was not better than that of the standard variety. The fruit of the tested sports were equally good in storage quality at holding temperatures of 32–35°F. However, the redder colored ones seemed more susceptible to a disorder similar to Jonathan Spot at a storage temperature of 45°F.

Nature of Thornless Blackberry Sports

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Thornless sports of blackberry first became prominent between 1911 and 1918, when the name Cory Thornless Blackberry was trademarked for a thornless sport of Mammoth by W. C. Cory in California; and tip-rooted plants of Cory were sold. In 1929 E. L. Pollard, of Chino, Calif., found that one of six thornless sports of the Young he was observing was very productive. This was introduced in 1930 and patented as Thornless Young. It was widely disseminated as were other productive sports of the Young. In 1931 the writer called attention to a productive thornless sport of the Evergreen blackberry, found and propagated by Philip Steffes, of Oregon, about 1926. This has, since then, steadily replaced the thorny Evergreen in Oregon, Washington and New Jersey. In 1934 the Bauer Thornless Logan was patented and introduced. It was described as differing from Logan in being both earlier and thornless. In 1943 the Bowenberry, apparently identical with Cory, was patented. Thornless Boysen plants have been sold by the trade, but all seen by the writer are identical with Thornless Young.

Of the four thornless blackberries mentioned, the Thornless Evergreen is now widely grown in New Jersey, Oregon and Washington; several hundred acres of the Thornless Logan are raised in California; few plants of the Cory, or Bowenberry, and very few of the Thornless Young are raised. Except for lack of thorns, the Thornless Evergreen, the Thornless Logan, and the Cory seem identical with and fully as productive as the original thorny varieties. The Thornless Young, however, differs somewhat from the original thorny Young in its leaf shape, and its leaf seems more subject to powdery mildew. In general, the Thornless Young has not been as productive as the thorny parent and is little grown.

A few sterile and nearly sterile thornless sports of the Logan, several Boysen, possibly 100 Young, and a

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few Evergreen have also been found. Apparently most thornless sports are sterile and productive ones are rare. The three productive ones, however, have been consistently productive with little or no tendency to sterility.

When thornless sports are propagated by tip-rooted plants, all propagations are thornless, but when they are propagated by root cuttings all the new plants are thorny. All seedlings from these thornless varieties, so far as known, are thorny. This is fully understandable in the case of the Thornless Evergreen, which is apomictic like the thorny Evergreen, the seed developing from nucellar or other L–II (interior) tissue. Cory Thornless, Thornless Logan, and Thornless Young are hexaploids and not apomictic. They are of amphidiploid origin and their use in breeding needs further study. If these three breed as thorny parents the interior layers of tissue, L–II and L–III, must be genetically thorny, and the epidermis, L–I in origin, must be thornless. These thornless sports are apparently all chimeras with a thornless layer of tissue overlying layers that are of the original genetically thorny variety.

One other possibility remains. When a sport occurs in a hexaploid, a gene in only one of the six corresponding chromosomes would normally be affected and there are still 5 other chromosomes like the original ones. Apparently it is possible for the gene for thornlessness to appear even though 5 chromosomes carry genes for thorniness. On selfing, thornless seedlings may rarely appear, or the thornless condition may be lethal.

At one time it seemed possible that a search among fields of Thornless Evergreen might reveal occasional thornless suckers coming from roots where thornless L–I tissue had replaced both L–II and L–III. Such shoots should give information on the association of thornlessness and sterility. No such sports were found. Unfortunately, no way has been found to use thornless sports in breeding for thornlessness.

These thornless sports should be distinguished from three named varieties, Austin Thornless, Burbank Thornless, and Merton Thornless, which are genetically thornless and which can be used in breeding thornless varieties. None of these 3 varieties is grown commercially in the United States at the present time, but Austin Thornless is being used extensively in breeding by C. F. Williams, at Raleigh, North Carolina, and Merton Thornless by D. H. Scott, at Beltsville, Maryland, and G. M. Waldo, at Corvallis, Oregon.

FIG. 1. Thornless chimera sport of the Evergreen blackberry.