Identification of a Cyanogenetic Growth-Inhibiting Substance in Extracts from Peach Flower Buds

Abstract. A cyanogenetic substance capable of completely inhibiting growth of pea sections has been isolated from dormant peach flower buds. This substance was identified as mandelonitrile (*dl*-benzaldehyde cyanohydrin) by infrared spectographic analysis and paper chromatography.

The presence of a cyanogenetic substance capable of completely inhibiting growth of pea sections has been reported to occur in peach flower buds (*1*). Recently, Jones (*2*) followed the level of total cyanide in peach leaves and peach flower buds from July through February. Total cyanide was found to increase rapidly, beginning about the time rest ended, and was highest in buds in the balloon stage. It was proposed that cyanide might be associated with rest in peach flower buds.

Earlier attempts by us to isolate and identify the cyanide compound resulted in failure, primarily because they were directed toward obtaining a sample of pure crystalline material. When it had been determined that the material was a liquid, it was isolated in a relatively pure form by the following method.

Dormant peach flower buds were collected and extracted for 24 hr in two changes of diethyl ether. The ether extracts were combined, and the ether was evaporated off at room temperature. The residue was then dissolved in ethyl acetate and filtered. The material left by the evaporation of the ethyl acetate was picked up in distilled water and filtered. The water fraction, which was extracted with diethyl ether in a separatory funnel, was discarded. Upon evaporation of the ether fraction, a yellow oily liquid remained, which had an odor similar to that of mandelonitrile.

On the assumption that this substance might be mandelonitrile (*dl*-benzaldehyde cyanohydrin), we obtained a sample of the latter, for comparison with the unknown substance, from the K & K Laboratories, Jamaica, N.Y.

The unknown material and mandelonitrile were chromatographed on Whatman No. 1 filter paper in a butanol, ethanol, water solvent (1:2:3). The unknown material had an R_F of 0.95, identical with that of mandelonitrile. Both the unknown material and mandelonitrile gave a rusty red color when the chromatograms were sprayed with sodium picrate solution. Both materials caused complete inhibition of growth of pea sections when the spots were cut out of the chromatogram and used in growth tests. As little as 10^{-3} mole of mandelonitrile was sufficient to completely inhibit growth of pea sections.

Mandelonitrile and the unknown substance were chromatographed in a hexane, ethanol, water solvent (1:1:2). The unknown material had an R_F of 0.78, identical with that of mandelonitrile.

Samples of the unknown material and of mandelonitrile were sent to Sadtler Research Laboratories, Philadelphia, for infrared examination. The spectrum of mandelonitrile and that of the unknown were very similar (Fig. 1). It was proposed that the differences in the spectra might be due to the presence of prunasin (*d*-mandelonitrile glucoside), a closely related compound. Spectographic analysis of a commercial sample of prunasin and of a mixture of prunasin and mandelonitrile indicated that the unknown sample sent in for analysis did contain a small quantity of prunasin. Prunasin is reported to be the first breakdown product of amygdalin, mandelonitrile being formed upon the hydrolysis of prunasin.

The results of these investigations indicate that the cyanogenetic growth-inhibiting substance isolated from peach flower buds is mandelonitrile, a powerful growth-inhibiting substance. To our knowledge, neither mandelonitrile nor prunasin has been previously reported to occur in peach flower buds (*3*).

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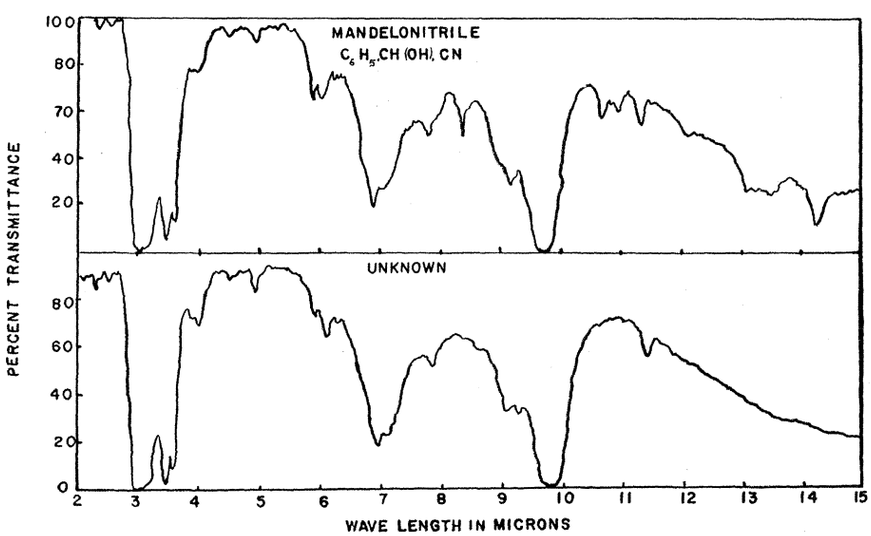

Fig. 1. Infrared absorption spectra of mandelonitrile (top) and of the material isolated from dormant peach flower buds (bottom).

References and Notes

1. M. B. Jones, J. W. Fleming, L. F. Bailey, *Proc. Am. Soc. Hort. Sci.* **69**, 152 (1957).
2. M. B. Jones, *ibid.*, in press.
3. This report is journal series No. 147 of the Agricultural Experiment Station, New Mexico State University.

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Reaction of Human Sera with Mammalian Chromosomes Shown by Fluorescent Antibody Technique

Abstract. Certain human sera, including sera from five patients with lupus erythematosus, react with mammalian chromosomes. If chromosomal preparations are exposed first to the serum and then to horse antihuman globulin conjugated with fluorescein, the chromosomes will fluoresce. Sera having this activity appear to react with all the chromosomes of the cell.

Sera from patients with certain diseases, particularly lupus erythematosus, react with the nuclei of human cells. When serum with antinuclear activity is incubated with human cells, gamma globulin from the serum reacts with the nuclei of the cells. If the cells are then incubated with rabbit or horse antihuman globulin, which has been conjugated with fluorescein, the nuclei will fluoresce under ultraviolet light (*1*). Sera from a number of patients with lupus erythematosus, Sjögren's syndrome, and several other diseases