

# Virus Diseases of Orchids

## transmission of the virus and observation of leaf and other symptoms reveal rare diseases in California

D. D. Jensen

An article on *Cattleya Flower Breaking* and *Cymbidium Mosaic* was published in the January, 1952, issue of *California Agriculture*.

**Rare orchid diseases**—discovered in California in isolated cases—were found to be of virus origin.

Virus infection is suspected when leaves show lesions, partial or complete rings of lighter or darker color, mottling, streaking, or yellowing. In some cases the leaves become malformed and die, the plant may become stunted, or the color of the flowers may break.

In several instances the virus origin was proved by experimental transmission of the disease to healthy plants.

One of the mosaic diseases, apparently caused by virus, was found in California in *Dendrobium nobile*.

The normal color of the green leaves is broken by chlorotic areas ranging from small spots to large mottled patches. Some of the spots appear as small yellow rings with green centers. The younger leaves tend to have smaller and more scattered chlorotic markings; in the larger, older leaves the mottle is of a coarser type. Small necrotic spots are also scattered over the leaves.

*Laelia anceps* etch was found in *Laelia anceps* plants, in central California.

The symptoms consist of brown to necrotic lines, and partial or complete rings, primarily on the distal half of affected leaves. The necrotic tissue is usually somewhat sunken. The center of the rings varies from light green to pale yellow. Flowers produced on diseased plants are normal.

*Laelia anceps* virus was transmitted by juice inoculation to one out of two *Cymbidium* seedlings tested. Definite mottle symptoms appeared in *Cymbidium*, 36 days after inoculation. The relationship of this virus to *Cymbidium* mosaic virus has not yet been determined.

Lycaste mosaic was observed on some plants of *Lycaste aromatica* in central California. Mosaic symptoms on the leaves suggested virus origin.

The symptoms consist of narrow, longitudinal streaks on leaves of irregular color varying from very light to dark green. The disease has not yet been produced experimentally in healthy plants.

Miltonia diamond spot was found on several *Miltonia roezlii* plants in central California. Leaves showed necrotic lesions of typical diamond shape. A few lesions are necrotic throughout but most of them enclose green tissue. Flowers produced by diseased plants appear to be normal.

This disease has not been transmitted experimentally but its symptoms suggest virus origin.

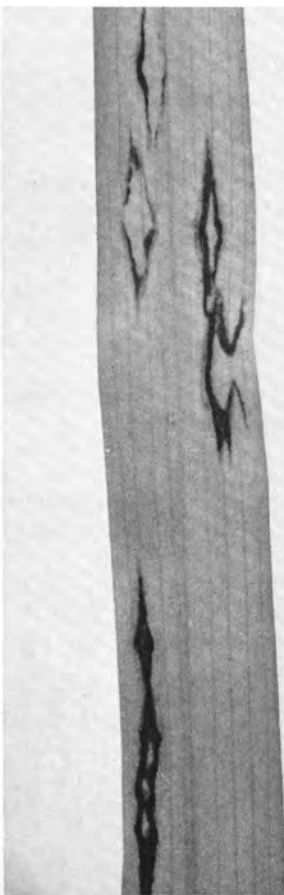
### Odontoglossum Ringspot

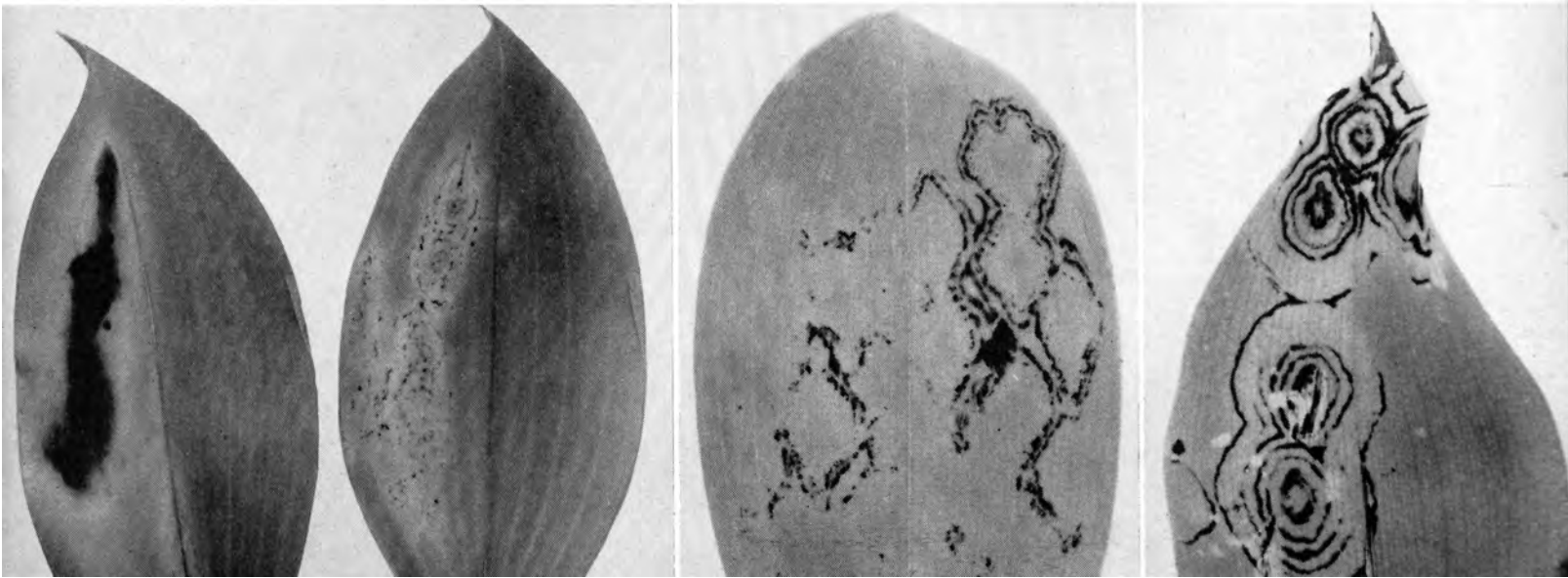
A virus disease of *Odontoglossum grande* is characterized, in advanced stages, by single or concentric necrotic rings on the leaves enclosing tissue varying from normal green to black.

The first symptoms usually develop about two weeks after infection and appear as small necrotic spots or rings on the older leaves or as light green to pale yellow, circular, oval or diamond-shaped areas, usually on the younger leaves. The

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Left: *Lycaste* mosaic on *Lycaste aromatica*. Center: *Miltonia* diamond spot on *Miltonia roezlii*. Right: *Stanhopea* ringspot.





From left to right: Virus-caused mosaic symptoms on *Dendrobium nobile*, *Dendrobium superbanum*, *Oncidium altissimum*, *Oncidium flexuosum*, *Oncidium rogers*, and *Lelia anceps* etch symptoms on *Lelia anceps*.

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ringspots may be isolated from each other by normal tissue or may overlap or coalesce to form larger compound patterns.

The first leaves to show symptoms are usually more severely affected than later leaves and some turn yellow and drop within two or three months. Other leaves with lesions may persist for several months.

Ringspot virus causes an initial shock in the plant, producing severe symptoms; later the virus may be carried by the plant with few if any visible symptoms. However, active virus in symptomless leaves can be demonstrated by inoculation into healthy plants.

Ringspot virus was successfully transmitted to all *Odontoglossum grande* plants inoculated with freshly expressed juice from diseased plants and to a single plant inoculated with purified virus preparation. In most plants the first symptoms appeared in about two weeks. An insect vector has not yet been demonstrated.

In the electron microscope, ringspot

virus particles appear rod-shaped with a tendency to slight curvature. They vary in length from less than 50 to more than 600 millimicrons, the most common length being 280 millimicrons. The particles are uniformly about 24 millimicrons in width.

Ringspot disease of *Odontoglossum* is recorded only from California where it was found on two separate occasions in single plants.

Preliminary experiments indicate that the virus causing ringspot symptoms in *Odontoglossum* may be the same as or closely related to viruses causing atypical mosaic symptoms in *Cymbidium* and some breaking in the flowers of *Cattleya*. If these diseases are caused by the same virus its distribution will probably prove to be extensive.

Twenty species of plants representing 18 genera in 10 families of plants were mechanically inoculated with express juice from ringspot diseased plants. Only zinnia became infected, developing inconspicuous and fleeting symptoms of breaking in the maturing petals.

*Odontoglossum grande* also reveals symptoms of a mosaic virus disease. The leaves are stunted and have light and dark

green mosaic symptoms. The virus has been transmitted experimentally.

## Other Orchid Viruses

A severe type of mosaic streaking in *Oncidium rogers* and *O. concolor* was found in one single locality in California. The symptoms are conspicuous, irregular chlorotic spots and streaks in the leaves. The effect of the virus on the flowers is not known.

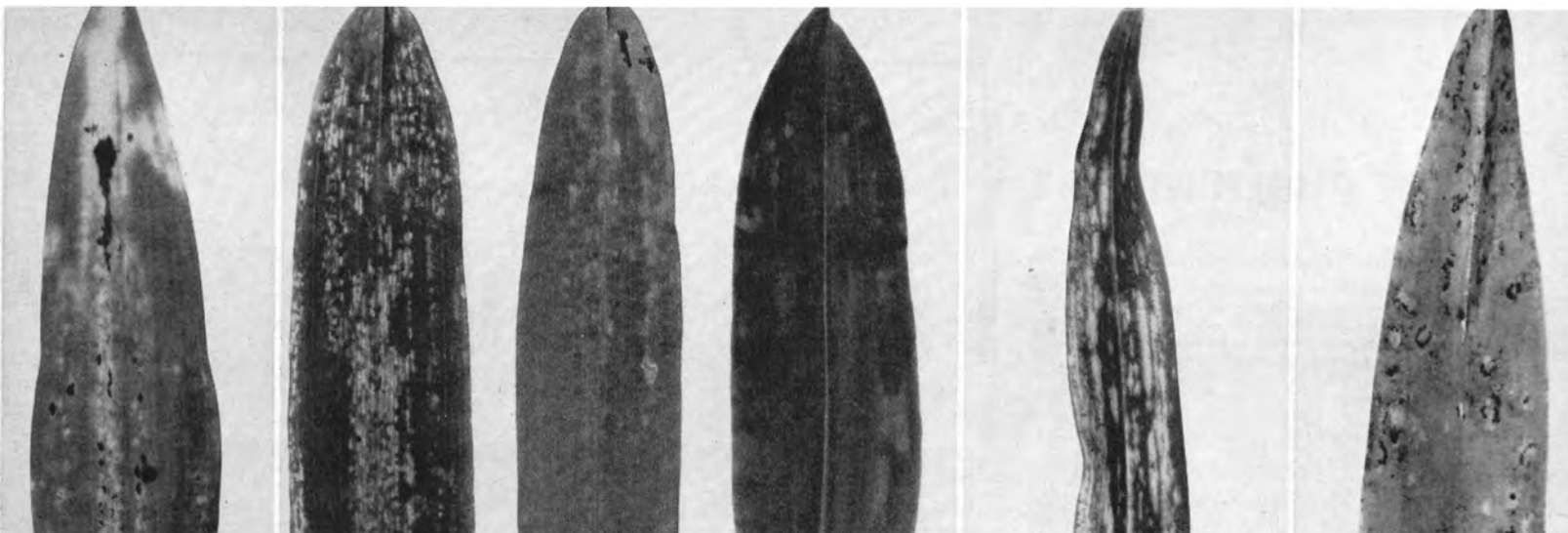
The virus was transmitted experimentally to *Cymbidium* seedlings by mechanical inoculation of fresh juice from a diseased *O. rogers*. The incubation period of the disease in *Cymbidium* was about three months and the symptoms consisted of severe mosaic mottle similar to that caused by *Cymbidium* mosaic virus.

*Oncidium flexuosum* leaves were found with streaks made up of a combination of spots ranging from light green to necrotic.

*Stanhopea* is infected with a striking ringspot disease probably caused by a virus. A single lot of 20 *Stanhopea* plants, believed to be imported into California from South America, had conspicuous

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Various stages of *Odontoglossum* ringspot on leaves of *Odontoglossum grande*.



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leaf symptoms which were absent in plants from other sources.

The symptoms consist of numerous yellow spots and rings which stand out sharply against the normal green tissue. Some of the spots enclose green tissue and may show a concentric pattern varying from circular to diamond shaped. Symptoms do not become evident until the new leaves have grown for a month or two. The chlorotic spots are very faint at first but soon acquire sharp definition. No information is available on the effects of this disease on the flowers.

Vanda ringspot was found in a single large *Vanda caerulea* plant in Berkeley. On some leaves the concentric pattern of the yellow rings closely resembles the growth rings of a tree in cross section. On other leaves the concentric chlorotic symptoms appear as spots or as a band composed of parallel lines extending over much of the leaf especially along and near the leaf margin. Symptoms occur in the mature leaves rather than in the newer growth. The disease has not yet been experimentally transmitted.

*D. D. Jensen is Assistant Professor of Entomology, University of California College of Agriculture, Berkeley.*

*H. Earl Thomas, Professor of Plant Pathology, University of California College of Agriculture, Peter A. Ark, Associate Professor of Plant Pathology, University of California College of Agriculture, and A. Herbert Gold, Instructor in Plant Pathology, University of California College of Agriculture co-operated in parts of this study.*

The above progress report is based on Research Project No. 1365-C.



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