5 Contact Dermatitis from Orchids

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Orchids are more common than you think. There are approximately 25,000 species, with new ones being discovered or "invented" (hybridized) each year. The appearance of the plant and flowers varies so dramatically from species to species that, in many situations, it is difficult to believe they are related. Orchids (Figs. 1-6) are the objects of hobbyists and large-scale commercial greenhouses, so that individual exposure to these plants is common. The purposes of this paper are (1) to introduce you to the incredibly beautiful world of orchids and (2) to review the problems of contact dermatitis caused by these plants.

Orchids As Species

The recreational and commercial use of orchids is more common than you probably imagine.[1] The plants occur widely in nature and are not limited to warm, moist, tropical jungles. *Cypripedium acaule* (lady slipper orchid) is the official flower of Prince Edward Island, Canada, and *Cypripedium reginae* is the state flower of Minnesota. Some orchids are large and showy, others almost microscopic. Most are epiphytic, clinging to the sides of trees, rocks and cacti; but others are terrestrial, such as the members of the genus *Cypripedium* ("lady slippers"). Many corsages, so common at spring proms, on Easter Sunday, and Mother's Day, are made from cattleya, cymbidium, and dendrobium flowers.

Try growing a plant or two and you will perhaps find yourself captivated by their variety, charm, and beauty. Should you choose orchids as a hobby—and a growing number of people are—you will find yourself in a most fortunate situation. Plants are readily available and relatively inexpensive; you may have a large-scale grower in your community. If not, mail order plants can be easily obtained throughout North America. Hybridizers have produced many beautiful orchids suitable for windowsill growing and, with careful selection, you can have blooming plants all year. Orchid horticulture is reasonably well understood and most plants do not need an exotic, jungle-like environment. To understand the impact of this on professional and amateur orchid handlers, let me give you a little of the history of orchid growing throughout the world.

As European explorers adventured through North and South America, Australia, India, and the Orient, botanists eagerly searched out new forms and kinds of orchids. Aristocratic collectors soon developed an orchid mania that increased the competition for the collection of native plants. This demand put a great strain on the supplies of wild plants. Unless one could obtain divisions of plants, there was no other route open to a collector except procurement from the wild. This is because orchid seed is difficult to grow in its natural habitat, and while millions of seeds are produced, only a few plants could be obtained from any one seed pod.

A revolution in the techniques of growing orchids from seed was introduced by Professor Lewis Knudson of Cornell University in 1922.[1] He found that the tiny orchid seed, which lacks nutrients to sustain its early growth, could be maintained on an agar medium to which sugar had been added. This medium is similar to that used in the culture of bacteria and fungi. Once it was found that orchids could be produced in large numbers from seed, growers excitedly crossed orchids from many different species to produce new hybrids.

The second great expansion in the culture of orchids coincided with the development of meristeming. The undifferentiated cells of the growing stem tip (the meristem) contain pleuripotential germinal tissue that, when subdivided into small particles and nurtured upon agar medium, will produce hundreds and even thousands of genetically similar copies. Meristem culture was originally undertaken by George Morell as a means of ridding potatoes of fungal infection which had, in the past, been responsible for the "potato famines" of Ireland. Morell's theory was that the undifferentiated meristem was often free from the pathogen that infected the rest of the plant because these cells multiplied so rapidly that they continued to be a step ahead of advancing viral infection.[1]

Meristem culture of highly desirable plants now enables the amateur orchidist to obtain incredibly fine genetic copies of award-winning plants from around the world. It also has reduced the cost of owning awarded orchids to reasonable levels, so that amateur collectors can obtain beautiful plants.

Structure of Orchids

There are two basic structures of orchids based primarily on the pattern of deployment of new growth: sympodial and monopodial. Sympodial plants form new growth from the base as a foot-like outcropping similar to a rhizome. Each "rhizome" in turn makes its own set of roots, stems, leaves, and flowers. Sympodial growth is, therefore, basically horizontal. Monopodial growth literally means one-footed and implies that the new growth is in a vertical fashion, occurring from a main upright stem that grows taller each year, adding new leaves to the top, but not making any new growths from its base. Cattleya, cymbidium, and oncidium all feature sympodial growth, while monopodial growth is found in phalaenopsis (moth orchids) and vanda.

Orchid flowers have a common structure of petals (2), sepals (3), a lip, and a column containing both pollen and ovary. Insects play a major role in fertilization, carrying pollinia from plant to plant.

Medical and Economic Uses

Even though orchids are thought of as exotic plants, they commonly are found in the United States. While some occur naturally, most are grown in greenhouses throughout the world, constituting a major source of cut flowers. As an example of how widely distributed orchid blossoms are, I took an informal survey of approximately 200 flower arrangements on our inpatient dermatology service during a 1-month period. Orchids were found in 10% of these bouquets.

In addition to their value as cut flowers, probably the only other important economic use of orchids is as the source of the flavoring agent, vanilla. This flavoring is prepared from the dried seed capsules of *Vanilla plani-*

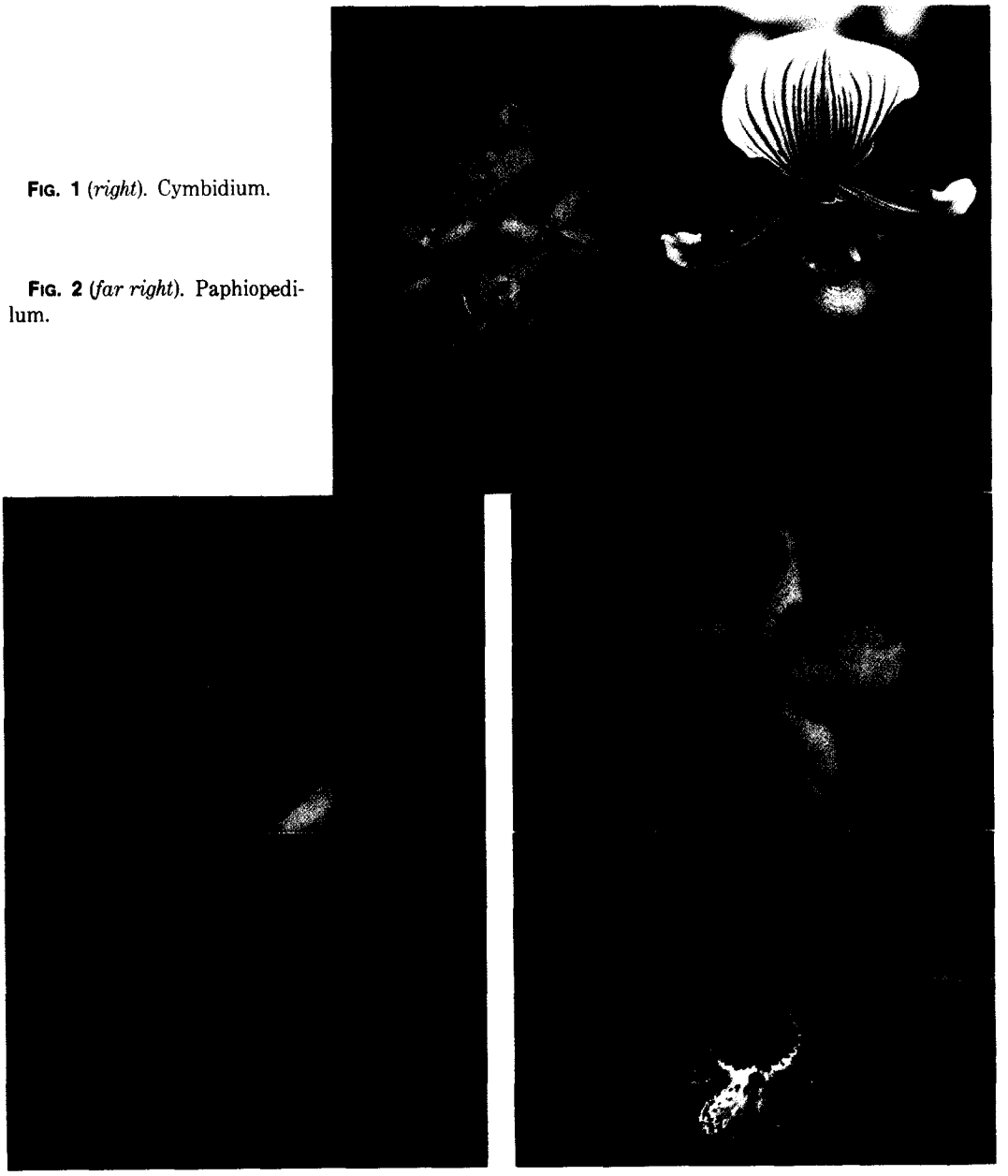

FIG. 1 (*right*). Cymbidium.

FIG. 2 (*far right*). Paphiopedilum.

FIG. 3 (*middle, left*). Cattleya.

FIG. 4 (*middle, right*). Phalaenopsis.

FIG. 5 (*bottom, left*). Odontoglossum.

FIG. 6 (*bottom, right*). A modern hybrid—Vuylstekeara "Cambria Plush."

folia. In the past, vanilla had an exaggerated reputation as an aphrodisiac, but now it has no other role except as a flavoring. Most vanilla used in the United States today, however, is a synthetic product and is not derived from orchids.

Lawler recently has reviewed the commercial and medicinal uses of orchids.[2,3]

Contact Dermatitis

When approaching any patient with suspected plant dermatitis, it is important to realize that the reaction may be due to the plant itself or to some chemical used to control plant disease. It is far beyond the scope of this chapter to discuss allergic reactions from added chemicals or contaminating insects, but some general comments have been given in two recent articles.[4,5]

Orchids are beautiful plants and in widespread cultivation throughout the world; despite their popularity, however, there are only a few reports of contact dermatitis. My impression is that, as commercial culture continues to increase, the number of patients with dermatitis due to orchids also will increase. Hardie and Ragan[6] conducted a survey of orchid growers because of their impression that orchid contact sensitivity was uncommon. The survey was conducted in Singapore, one of the world centers for orchid-growing. They contacted five of the largest orchid farms and surveyed a total of 53 employees. No skin disease was found among the employees and no one had hand dermatitis. Employees and managers, however, could recall short-lived episodes of hand dermatitis that usually coincided with the introduction of a new agent for disease control. It was their conclusion that skin disease attributable to contact with orchids was rare. Since the first description of orchid dermatitis in 1875, there have only been approximately 20 additional references.

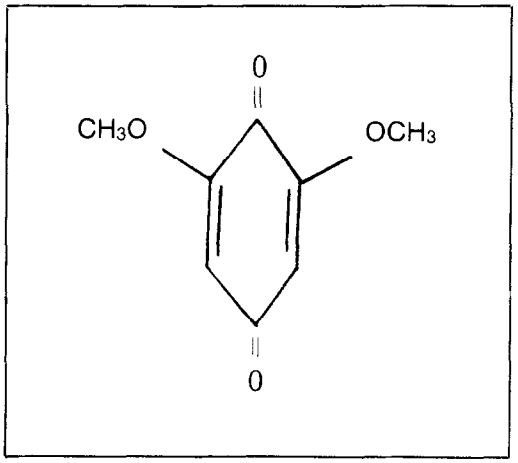

FIG. 7. 2,6-Dimethoxybenzoquinone.

Quinoid constituents are the main cause of allergic contact dermatitis from cultivated orchids. In 1937, Craven[7] used thin-layer chromatography as a screening test for the presence of quinoid constituents. Hausen[8] has noted these constituents in many orchids such as phalaenopsis, paphiopedilum, dendrobium, cymbidium, and cypripedium (lady slipper).

Hausen[9] described an eczematous dermatitis on the arms of an orchid hobbyist, who suffered a severe outbreak when he potted 500 plants of the lady slipper, *Paphiopedilum haynaldianum*. Patch tests were positive to the stem, leaf, and petal of the plant, as well as to several quinoids obtained from an ether extract and identified using Craven's test as a color detection reagent for quinones.

Hausen, Shogi, and Jarchow[10] described a woman who was subsequently shown to have an allergic contact dermatitis to cymbidium flowers. The allergenic properties of this plant were proven by sensitization of guinea pigs. The responsible quinone was demonstrated to be 2,6-dimethoxybenzoquinone (Fig. 7). According to Hausen et al., "the importance of this simple quinone in inducing possible sensitization should not be underestimated as it has been found in more than 50 different plant and wood species."[10] Using a maximization test, Schmalle[11] and co-workers determined it to be a moderately strong sensitizer.

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