

## Orchid Research Benefits All Plants

by Dr. H. Marc Cathey

**W**E LIVE IN AN age where advances in plant science are allowing breeders to create an amazing variety of new hybrids, colors, and forms of all kinds of plants. Breakthrough micropropagation techniques such as tissue culture permit millions of plants to be propagated rapidly from only a few parents. And with the advent of new genetic screening measures, scientists can now cleanse plants of viruses and other diseases.

One group of plants that has particularly benefited from these advances is orchids, which are fast becoming the most popular house plants in the world (for more on this, read the article on growing windowsill orchids starting on page 27).



### OVERCOMING CHALLENGES

It was not always this way. In the early 1700s, when orchids first began to make their way to Europe from colonial outposts in the tropics, they were so rare that only the wealthy—who could afford both the expense of orchids and a special hothouse to grow them—owned them.

Even when orchids started becoming more accessible, their spread to a wider audience was slow because they proved demanding to propagate. Dividing plants was the most successful propagation method, but it often took years to produce enough units of a single plant for commercial sale. Growing orchids from seed was next to impossible at the time—it wasn't until the early 1900s that researchers discovered orchid seeds needed specific fungi present in the growing medium in order to germinate.

In the 18th and 19th centuries, the only way to satisfy the growing demand for orchids was to collect new plants from the wild and ship them back by boat. Because few people had the means or knowledge to offer orchids a suitable growing environment—English botanist and plant explorer Sir Joseph Dalton Hooker called 19th-century England a

“grave for tropical orchids”—thousands perished and many unique species were undoubtedly lost to posterity.

### AMATEURS AND PROFESSIONALS UNITE

The development of successful micropropagation techniques for orchids in the 1950s and '60s, owes much to the work of hobbyists, who aided professional scientists in unraveling the mysteries of orchid biology. Writing in the *Botanical Journal* of the Linnean Society in 1996, biologists Joseph Arditti and Abraham Krikorian documented the scientists (56) and published studies (568) that comprise the many contributions to the realization of this research.

The studies recounted by Arditti and Krikorian did not focus exclusively on micropropagation of orchids; indeed, many of the experiments they cited were performed on a wide variety of plants. Researchers tested many different growing mediums and additives—such as sugars, proteins, charcoal, auxins, cytokinins, gib-

berellins and abscisic acid—in a wide range of concentrations.

Some of the research was based on the keen observational skills of amateurs and hobbyists, whose work appeared in amateur plant publications. Other research was the result of scientifically quantified studies published in juried scientific journals.

As noted by Arditti and Krikorian, three different lines of research came together to establish micropropagation methods for orchids. These were:

- In vitro propagation—in which plant stem tips are placed in an artificial growing medium, often in a test tube, for the regeneration of plantlets.
- Production of disease-free, genetically identical organisms (clones).
- Clonal propagation—in which genetically identical descendants of a single cell are generated by asexual reproduction.

The end result of all this groundbreaking research is that we can now take a single cell of almost any plant and generate millions of genetically identical cells. We have the means to clean up any plant, freeing it of viruses or other disease-causing organisms. Last but not least, the application of these processes in the production of plants does not involve introduction of foreign DNA, climate controls, or use of hazardous chemicals.

And, most excitingly, it's an area where amateur gardeners and plant breeders can still play a major role. Despite all the advances that have been made, there is still so much more to do!



Orchids such as these hybrid phalaenopsis are now readily available for even casual growers.

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