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ORCHID CONSERVATION 97, A PREVIEW

JOHN T. ATWOOD

Marie Selby Botanical Gardens, 811 S. Palm Avenue, Sarasota, FL 34236

Traditionally, orchids are viewed as rare, although different concepts of rarity have been applied to the family. Consider the following examples: (1) Rarity in cultivation. Many species are little known in cultivation, although they may be quite common in the wild. (2) Rarity of beauty. Flowering *Cattleya skinneri* possesses a rare beauty enhancing its demand in cultivation, yet it is occasionally seen nearly covering the trunks of its host. (3) Rarity in the wild. The real issues with orchid conservationists rest clearly in this category, but how do we recognize and distinguish the rare orchid?

Part of our concept of endangered species stems from popular views expressed as recently as 1969 (Brieger 1969) that the orchids have reached an evolutionary dead end. It follows that such plants live a precarious existence requiring assistance by man. Ames (1948) questioned this view which prevailed until at least the 1950's: "When we attempt to analyze the evidence brought forward to prove that the orchids are . . . a group that has become so specialized that its members are unable to carry on a successful struggle for existence in the ordeal of biological rivalry, we find our knowledge sadly incomplete." Among other facts, he noted that 15 years after the total destruction of Krakatau four orchid species were among the 17 plant species that had colonized from neighboring islands. The other pioneer species included eight composites and five grasses, i.e., species from families we consider 'weedy.' Is this how biologically precarious species should behave?

Because orchids have such specialized relationships with their pollinators, some orchids have very different rates of fruit set affecting the minimum population size required to maintain the gene pool. *Cypripedium acaule* has low rates of fruit set that may require large population sizes for even a few individuals to participate as parents in the next generation. Others, such as *Paphiopedilum rothschildianum* have high rates of fruit set, and may require much smaller population sizes. Are particular orchid species endangered or have they inherited biological attributes that allow them to exist as hard-to-find (rather than as truly rare) plants? What exploitation can they withstand without eroding the gene pool? When and how should orchids be rescued (if at all) when they face imminent elimination? Orchids play a numbers game by producing a few hundred to 5,000,000 usually dust-sized seeds per successful pollination event. As shown by Ames, some of these seeds can establish new colonies in habitats several miles away. Dispersal is clearly a much greater problem for certain animal dispersed plants. The calabash (*Crescentia* spp.) is now a common pasture tree where fruits are ingested and seeds dispersed by large farm animals. This service was once presumably provided by certain extinct Pleistocene megafauna (Janzen and Martin 1982).

Orchid species have been placed on regional endangered species lists where they occur near the edges of their ranges. *Amerorchis rotundifolia* was once thought to be endangered based on populations in the US, but is much more common in Canada and Greenland. *Cypripedium reginae* is viewed as endangered in New Hampshire, a state with underlying, acidic, granite rock, yet in neighboring Vermont it is widespread and locally abundant where calcareous soils predominate. Much has been made of the rarity of *Cypripedium calceolus* in England, where a mere handful of ramets and few genets are known, yet it is locally common and broadly distributed in Eurasia.

The Convention on International Trade of Endangered Species (CITES) includes a few orchid species on Appendix I. This document, originally drafted to protect animals, does not serve plants especially well, in part because of the very different reproductive potential of animals, particularly of large mammals. *Cattleya trianae* can be vegetatively propagated by division every two to three years and mass-produced through tissue culture. Rather simple technology exists to produce thousands of new clones from the seeds obtained from a single capsule. How many Jaguars can one have through a natural birth? Through tissue culture? How many can you get by dividing one in half? Aren't plants and animals fundamentally different requiring different definitions of rarity? The Orchidaceae is biologically diverse, hence species lists that make few distinctions among its taxa aside from placement on two different appendices fail to reflect reality. The regulation of these plants should perhaps be eased or elim-

inated altogether, especially the majority which have little popular interest.

Science has not always contributed to an accurate picture of endangerment of orchids. Rescue and replanting efforts from areas of habitat alteration by proactive conservationists are seen by some as harmful to populations; even cross pollinations by the human hand are discouraged where pollinators are absent. Is human meddling with nature less severe by abandoning plants to certain destruction? Stochastic models predicting extinction based on deforestation rates are refuted in Veracruz, Mexico where every species of orchid continues to survive despite 90% deforestation (E. Hágsater, pers. comm.). Isn't something missing from the models? Population bell curves almost always show declines, but how can one locate that single founder or its few progeny at the initiation of the curve?

While there is legitimate concern for many orchids that require stable habitats of primary forest, some orchids require disturbance. *Cypripedium acaule,* often a colonizer of old farm sites is one of the most common wild flowers in the eastern United States, yet it is virtually impossible to transplant except by the most skilled hands. *Cypripedium candidum* grows in periodically burned wet prairies, but is also well adapted to railroad right-of-ways. Photographs of dwarfed forms of *Cypripedium pubescens* growing in the crushed limestone substrates of road beds and lawns in northern Michigan do not support our image of endangered plants. Habitat disturbance is also associated with various tropical slipper orchids. *Phragmipedium longifolium* in El Valle, Panama occasionally grows among the grasses and sedges in bulldozed sites as well as on road cuts. *Paphiopedilum philippinense* can grow abundantly in areas burned during an El Niño where the forest canopy is removed providing light for the plants below. Similar anecdotes can be recounted in Florida where *Zeuxine strateumatica* and various species of *Spiranthes* regularly invade lawns. In Florida we now face a population explosion of the African *Oeceoclades maculata.* Is this characteristic of rare plants? Clearly, many orchids like some kind of disturbance, even when man-made, and to restrict disturbance may cause local extinction. The role of disturbance needs to be carefully considered in any conservation effort.

There are accounts of *Paphiopedilum rothschildianum,* a rare species by all three designations of rarity given above, eliminated in one of two known habitats which subsequently burns. Although the collector of such plants is a villain for taking them, is he also a hero for 'rescuing' them? Does the perception of this as a rare orchid based on its unusual attractiveness actually contribute to over-collection? Would a name such as *Paphiopedilum vulgare* have better fostered its protection?

Probably no one would deny that some orchids are truly endangered, especially those in areas of severe habitat degradation, and few countries, tropical or temperate, are spared such destruction. In developing areas, should the remaining plants be left to the fate of further habitat destruction in the hope that a few will survive, or should material be rescued for propagation in horticulture? Who should make the decisions, especially when bulldozers are poised for quick annihilation? Widely cultivated *Laelia milleri,* apparently now extinct in the wild, is a horticultural success story, perhaps the product of unintended rescue efforts.

Every orchid-lover plays a part in the loss of orchids, mostly indirectly by purchasing products that lead to habitat destruction. Similarly, we also have a role to play in the solution. It is commonplace to blame commercial growers who have eroded the gene pool by over-collecting. Yet it is also the commercial grower who has developed a system for species propagation and distribution through the free market. Mass propagation of superior strains of Brazilian *Laelia purpurata* in the country of origin, thus diminishing motivation for collection of wild plants, is particularly impressive. Clearly, commercial growers can be part of the answer for effective protection.

The conference, *Orchid Conservation 97* planned for 6–8 June 1997 will create dialog about appropriate conservation measures that are being taken. The Orchid Specialist Group of the World Conservation Union has formed a context for our conference by publishing a *Status Survey and Conservation Action Plan* (Hágsater and Dumont 1996). Three notable recommendations are (1) to establish and support ex situ propagation units in countries with high orchid diversity; (2) to encourage the adoption of measures allowing supervised salvage of plants from areas slated for massive disturbance, closely followed by artificial propagation and distribution; and (3) to establish regional seed exchange programs, and sharing of plants and pollen among orchid growers and botanical gardens. *Orchid Conservation 97* should improve our understanding of how these recommendations can be carried out, as well as serve as a platform for new ideas for conserving species in this, the largest family of flowering plants.

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