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PURSUING A PURPLE PASSION—CAUCAEA: A PERSPECTIVE FROM GREENHOUSE AND FIELD

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When considering *Caucaea olivaceum* (formerly known as *Oncidium cucullatum*), the question arises, are there the many species suggested by John Stacy (1975) and echoed by Eric Christenson (2000), or do only a few species exist with many geographic varieties? If you think I know either as fact, I do not, but I tend toward a few species.

Based on the 15 years I have spent collecting, growing, studying, and illustrating *Caucaea* plants and their flowers from many areas of Colombia, Ecuador, and Peru, I am familiar with *Caucaea olivaceum* plants and their remarkably beautiful flowers in all hues of purple—a color beloved since my childhood. These diverse colors suggest to me that the plants might very well be a singular species with varieties.

Not being a taxonomist, I am bothered by the number of named species based on minor differences. I have been informed that the lip callus is not a definitive feature in defining a species (M.W. Chase pers. comm.). Although the callus can be different in *Caucaea olivaceum* flowers in Colombia and Ecuador, and the color, size, and form can vary from plant to plant in different locations, they share undeniably similar characteristics (FIGURE 1).

DNA analysis may provide the answer. Since the laboratory equipment needed for DNA analysis of *Caucaea* is available at the Jodrell Laboratory, Royal Botanic Gardens, Kew, I placed 14 different *Caucaea* specimens (flowers or leaf parts) in sealed bottles with silica gel and applied for a CITES (Convention on International

Trade in Endangered Species of Wild Fauna and Flora) permit. My application was refused by the CITES officer in Ecuador, but I will appeal the decision. Oddly, cut flowers can be taken across international borders without a problem.

DNA sequence analysis by Norris Williams, Mark Whitten, and Mark W. Chase (2001) has demonstrated that *Caucaea* does not differ genetically from other species in the *Cucullatum* section of *Oncidium*. Since *Caucaea* is the older genus name, it has priority.

Although Lindley described and named *Oncidium cucullatum* in 1838, an older name for this species, *Oncidium olivaceum*, was published by Kunth in 1816 for a plant collected by Humboldt and Bonpland.

As a grower, I suspect that the genus is limited to no more than the seven species listed below. It is possible that more species will be discovered and described in the future, and it is also possible (even probable) that with molecular studies, we might learn that some of the plants that are today called species will turn out to be geographic varieties.

- *Caucaea radiata* (Lindl.) Mansfield is a rather small plant with diminutive white and brown flowers. Found in Colombia at 2400 m, it is a cool-growing epiphyte that blooms in spring and early summer.
- *Caucaea olivaceum* (Kunth) N.H. Williams & M.W. Chase, synonym *C. cucullata* (Lindl.) N.H. Williams & M.W. Chase, is a widespread group of populations that occur primarily in Colombia and Ecuador. Having had so many

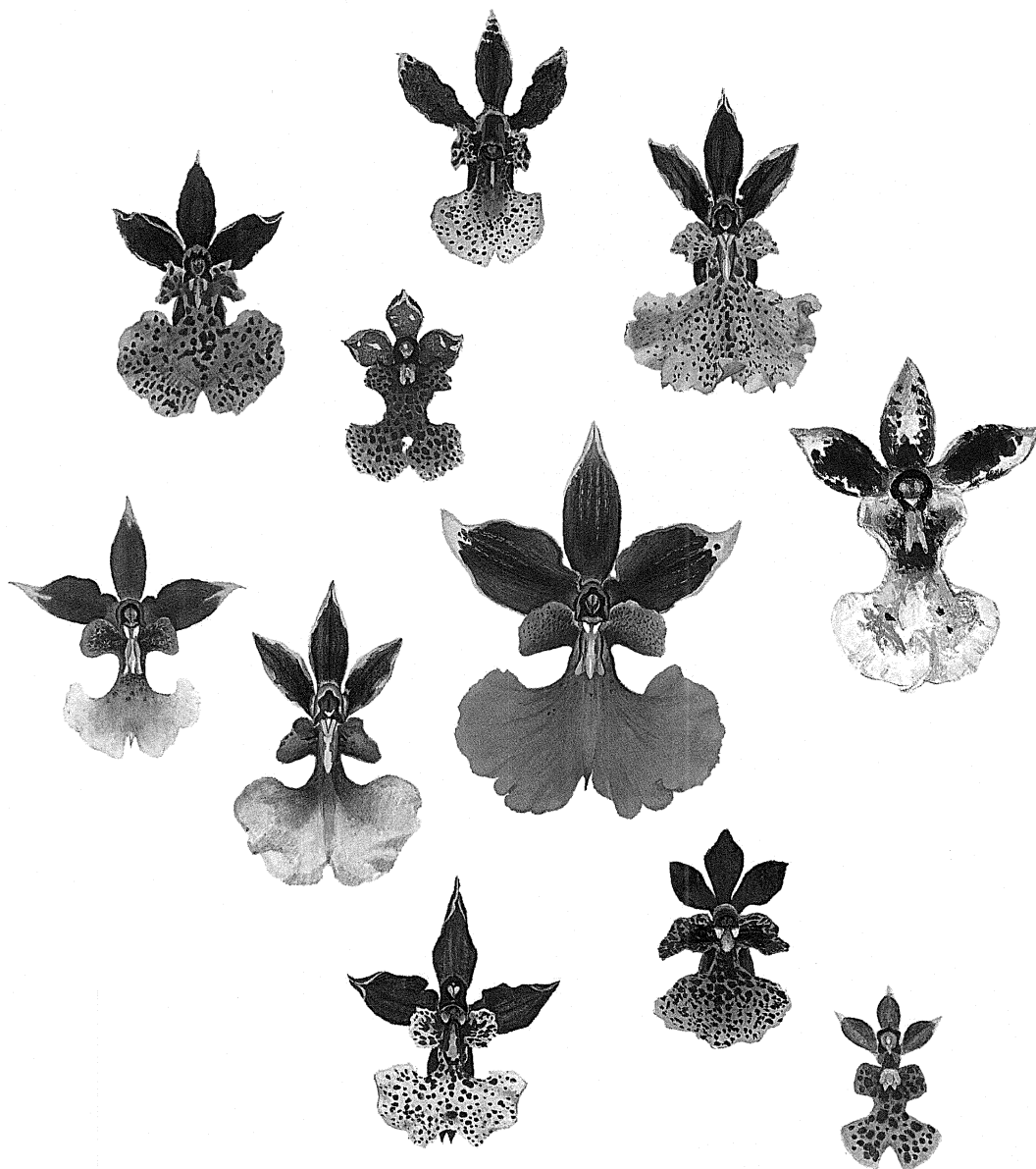


FIGURE 1. Paintings of *Caucaea* flowers by Harry Zelenko from *Orchids: The Pictorial Encyclopedia of Oncidium* (Zelenko et al. 1997).

specimens in cultivation from different locations over the years, and despite their differences in color, pattern, size, form, and callus, it is my opinion that, for the most part, they are simply varieties. In his monograph, Stacy (1975) listed *Oncidium olivaceum* as a synonym to *O. cucullatum* subvar. *olivaceum* based on a slight dimensional difference of the callus, noting that he had "not seen any material of this species outside the Cauca area

in Colombia." He gave species status to *Oncidium olivaceum* var. *gigantium* but then qualified it, stating that when more information becomes available "It may prove to be a distinct species." On the basis of callus differences and flower part measurements, he has given species status to *Oncidium kenedyi*, *O. cucullatum* var. *dolabratum*, *O. cucullatum* var. *macrochilum*, and *O. rhodostictum*. At the time that Stacy visited Ecuador and

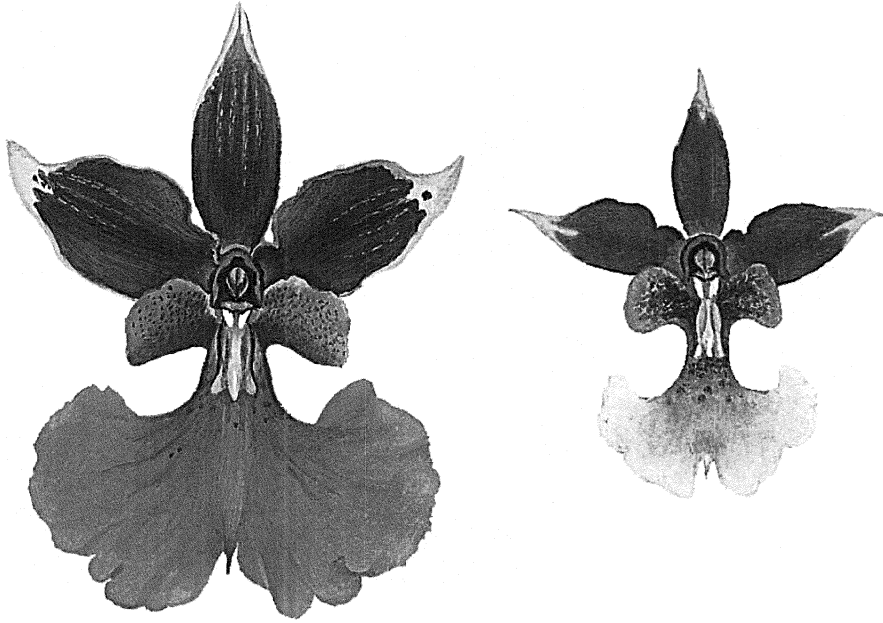


FIGURE 2. A large flower drawn to the size it was found in the field. When the plant was brought into cultivation, a smaller flower opened on a secondary inflorescence on the same spike. This flower, about half the size of the original flower, is sometimes called "*Oncidium kennedyi*."

Colombia to research his 1975 monograph, very few roads existed, compared with today. New roads now provide access to previously unexplored areas, and new populations of *Caucaea* have been and are, even now, being discovered. Cultural conditions vary from valley to valley and mountain to mountain; and when a population is isolated over many generations, details of the flowers can vary from population to population. With the lip callus not a definitive element in determining a species, we all know that flowers can vary in dimension from plant to plant and even on the same inflorescence (FIGURE 2).

- *Caucaea sanguinolenta* (Lindl.) N.H. Williams & M.W. Chase is a species from Colombia and perhaps Ecuador with colors that range from white with pale pink spotting on the lip to a deep rose/magenta with purplish spotting. The method of inflorescence of these plants differs from that of *Caucaea olivaceum* in that the flowers emerge from an undeveloped new growth, while *C. olivaceum* flowers emerge from a mature pseudobulb. Stacy, however, had a limited view of populations in the field and had not grown either plant. Although their calluses vary, it remains to be seen if the two are different genetically.
- *Caucaea mimetica* (Stacy) N.H. Williams & M.W. Chase is a species from Colombia that

also occurs in Venezuela. *Caucaea mimetica* has a different shape and callus from those of *C. olivaceum*. Again, defining the difference by callus alone may not be valid. Flowers of *C. mimetica*, however, seem to differ in shape from *C. olivaceum*. The callus structure appears to be similar to *C. sanguinolenta*. We know with other orchids that flower shape can vary from population to population within a singular species, and thus the question arises about *C. mimetica* as well. DNA analysis might meld them into one species, or else define the difference between them.

- *Caucaea nubigena* (Lindl.) N.H. Williams & M.W. Chase is primarily from Ecuador. It has widespread populations and has been given a number of different species names. All of the populations I have observed, however, seem to me to be a single species, though they are extremely variable in color and shape, not unlike *C. phalaenopsis*. Stacy gives measurements of flower components, yet, as noted above, every grower knows that dimensions of flowers and their petals and lips can vary within any species of orchid. I therefore suggest that what Stacy calls *C. alticola*, *C. tarquiense*, *C. aequinoctiale*, *C. erosilabium*, and *C. chimborazoense* should be treated as synonyms of *C. nubigena*—geographic varieties again.

- *Caucaea phalaenopsis* (Linden & Rchb. f.) N.H. Williams & M.W. Chase from Peru and southern Ecuador is an extremely variable species, exhibiting variation in shape, lip size, color, and pattern from flower to flower. This species includes unusual and distinctive color forms, including some with chartreuse sepals and petals, pink lips, and no spotted pattern. Most of the flowers I have seen, however, have purple and/or magenta spotting on the tepals and lip. Just because flowers from different areas (or different trees) have different markings, and no two are exactly alike, we cannot put species names on the hundreds (perhaps thousands) of color and pattern variations. In his monograph, Stacy (1975) notes in the botanical key to species that *Oncidium dayanum* and *O. spathulatum* differ from *O. phalaenopsis* with suggested differences in their calluses. With other taxonomists holding that the callus is not a defining characteristic in itself insofar as distinguishing a species, I doubt Stacy's contention. With other growers in Ecuador, I believe that what Stacy listed as *O. dayanum* and *O. spathulatum* are simply synonyms of *C. phalaenopsis*. Stacy has included *O. tripterygium* in his lexicon of species, although he admits only seeing a single pressed flower "in a rather poor state of preservation," again claiming the callus differs from *O. phalaenopsis*.
- *Caucaea andigena* (Lindl.) N.H. Williams & M.W. Chase is a small yellow-flowered species from southern Ecuador. Stacy notes seeing only one flower on a type sheet in addition to John Day's painting. He failed to note that this is the only *Caucaea* having almost all yellow flowers with a touch of lavender. He did note, however, that the callus is similar to that of *C. sanguinolenta*. This may be a color variety and not a separate species. According to Dodson, *Caucaea sanguinolenta*, although known from Colombia, is also found near Cuenca, Ecuador.

Stacy described separate species partly based on the type of inflorescence . . . a plant with a straight raceme became one species, a zigzag raceme another, and branched still another. I find this rather difficult to believe, because, in my greenhouse, I have had a large plant of *Caucaea olivaceum* with all three of these forms of inflorescence. This is what triggered my questioning the number of different species that have been described in the past. Also, within a single population of *C. olivaceum* found near Machachi, Ecuador, all three forms of inflorescence occur.

We know that in cultivation, and in the field, a flower can vary in size, even on the same in-

florescence; and when plants are moved to a new environment, emerging flowers may also change in size because cultivated plants obviously do not receive the same conditions that nature provides. Some of the *Caucaea* plants I currently am growing from high elevations produce smaller flowers when moved into our greenhouse. Ultra-violet deprivation caused by the plastic roofing may be the reason, even though the plants get better general care in cultivation than in the field. We have moved some of the plants out-of-doors and are waiting to see whether the flowers will be larger, as they were when these *Caucaea* plants were collected.

The question remains; how does one define a species? If flowers in a population have varied colors, shapes, patterns, callus sizes, and fragrances, and if the inflorescences vary, what then is the definable difference? Christenson (2000) has quoted much of Stacy's monograph with little original taxonomy and states that *Caucaea* are all small plants. I am growing *Caucaea olivaceum* plants with pseudobulbs measuring nearly 5 inches in height with leaves nearly a foot in length.

According to Christenson, the callus, along with the number of leaves to the pseudobulb, the dimensions of the lip, the color schemes of the flower, and the overall measurements of the floral segments are the elements. Not being a taxonomist, it is difficult for me to refute his list of criteria; but having spent time in the field and grown so many *Caucaea* plants, among my favorites in *Oncidium* (because of their purple color), I have seen almost all of Christenson's criteria vary from flower to flower and plant to plant, even within the same population. For instance, I have grown a *C. olivaceum* with flowers that had a "double" callus. Despite this aberration, this flower was identical to others collected from the same population at the same time in all other aspects. I don't think such an aberration makes a new species any more than a person born with six fingers is no longer *Homo sapiens*.

I am, to say the least, confused by the existing taxonomy on *Caucaea* and think DNA sequencing will provide answers to some (even most) of the current questions. With the addition of field observation, we may learn more about this beautiful group of orchids rather than having to rely on the guesswork and intuition of armchair taxonomists.

CULTIVATING/RESCUING CAUCAEA

A move from New York City to Cumbaya, a suburb of Quito, Ecuador, located at 2300 m, provided advantages for the growing of or-

chids—no more heating and no more air conditioning (Sorry, Con Ed). The night temperatures here in Cumbaya, where we grow many *Caucaea* plants, average 50°F; and the day temperatures usually peak in the low 80s, sometimes higher; and, of course, lower when the day is gray. This area of Ecuador really has only two seasons—wet and dry. The Quito area is rather dry, so I water almost every sunny day. Otherwise, an automated fogging system compensates for dryness by emitting clouds of humidity every few minutes during the day. Humidity, of course, rises naturally at night. The greenhouse, designed for high-elevation plants, remains open with “walls” of nylon netting stretched on frames around the perimeter to keep out insects and provide natural temperature and air circulation.

The roofing material is a special double-wall plastic called Sun Stop, claimed by the manufacturer to block ca. 40% of the heat and light of the sun (which is extremely strong here on the Equator). Additional shading is provided for *Caucaea olivaceum* plants, because in their natural habitat, they were shaded by the leaves of their host trees. We grow them in pots or baskets or on cork slabs or logs with sphagnum around the roots. Many varieties of *Caucaea nubigena* and *C. phalaenopsis* also are in cultivation. I try to replicate natural conditions for them, based on my field observations. My wife Rosemarie and I must be doing something right, because the plants are growing well, and some remain in flower for months at a time.

Some people have questioned us about collecting plants from the field. Formerly, we took only one or two specimens, leaving the population to continue in nature; however, we have seen more than one forest here in Ecuador with

trees that housed orchids become depleted and even disappear over a period of a few years (or less), because of slash-and-burn agriculture. When we see this happening, we rescue as many plants as we can carry. This has happened with one large population of *Caucaea olivaceum* that we are now cultivating. When trees are cut to make space for a potato field or to feed a few cows on secondary growth for a limited period of time, thousands of orchids (even millions) can be destroyed. I believe it is time to get government involved in convincing poor farmers that they may be able to earn more money by means of eco-tourism by leaving orchid-laden trees rather than by chopping them down to clear short-lived cropland.

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