Are We Having Color Pattern Problems?

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Because we judges in the orchid world currently are charmed with splashed petals, stripes, speckles, and a variety of new colors, shapes, and patterns, our color pattern terminology needs attention. We're having enough trouble describing and naming the colors, let alone standardizing the color arrangement patterns in the flowers. These kinds of terminology problems often involve our perceptions, followed then by aesthetic decisions, and they do not lend themselves completely - or even at all - to regimentation. But there are certain general points we should begin to follow or at least to talk about.

A very short discussion of orchid pigments will give a primary knowledge of how the flowers get to be the colors they are. The fat-soluble chlorophylls give green colors, and these are found in internal cells, usually not in surface cells of the sepals or petals. The other fat-soluble plastid pigments are yellow or orange and are called the xanthophylls and carotenoids, respectively. They are found in the chloroplasts with the chlorophylls, or they may be located in their own tiny microbodies in the cells. They may be uniformly or variously distributed, according to the particular flower. They are found especially in vein areas or in the "eyes" of a labellum pattern, or all over in the case of orange or yellow flowers. In the early bud stages of flower development, the greens of chlorophyll tend to dominate. But with continued exposure to light, the greens disappear, and the other plastid pigments develop and appear to the eye. In reverse instances, we keep looking for a good green color that does not fade with the maturing and aging of the flower and recommend shading the plant to get the best green.

The other classes of pigments are water-soluble molecules, and they occur in the cell vacuoles, not in discrete plastid bodies. These are the anthoxanthins (yellows) and anthocyanins (blue, red, pink, purple). Anthoxanthins are pale or colorless under most circumstances, and we know little about them. Anthocyanins, on the other hand, are common, variable, and numerous and usually occur together in combinations in the flowers or leaves. Pigmented flowers and pigmented vegetative parts of the same plant aren't necessarily related, which indicates that genes controlling pigments in leaves can be different from those that operate within the flower. Again, we know little of these matters, but we always try to take advantage of possible pigmentation correlations when selecting seedlings. Is it true that only the red-leaved seedlings will produce darker-colored flowers? I don't believe so. But certainly when alba forms of flowers are desired, the plants usually have light green vegetative parts without pigments to accompany them. In some flowers,

there may be only one or two of these pigments present (the pink of Cattleya mossiae is a single one, for example, or the blue of various cattleyas), but ordinarily there are from three to five pigments mixed together. In some modern polyploidy hybrids, there may be as many as six or seven pigments, although not all are in all cells.

Superimposed on the effects of the pigment genes are intensity genes which control the amounts of pigments that form. Lips, with their important natural role in attracting pollinators, not only have a greater number of pigments than the other segments of the flower, but they also have greater amounts of the pigments in their cells. The various surface and internal layers of the lip may each have different pigments present, so pattern genes are also involved.

It is no wonder that it is impossible for us to match flower colors printed on paper with the real thing, even with infinite gradations or using various systems for color combinations. Opaque printed paper can never duplicate the layered pigment arrangement of living tissues nor the translucence and reflectance of cell walls and intercellular air spaces that produce the sparkle of many petals.

In judging, our subjective word evaluations will probably remain the rule. Although various color systems have been proposed over a long period of time for artists, fabric and yarn dealers, printers, horticulturists, and others concerned with color, no naming system yet devised has worked beyond a point. Past history with orchid judging and award descriptions shows we are no different from others in our collective experience. Nor are we likely to become much more efficient. The group opinion of a judging team agreeing upon an award description is about as accurate as it can be and from a practical viewpoint probably works as well as any other system of notation - if the judges will only read the description after it's written and not just leave it to one or two student judges!

We know so little about the complicated genetics of color and pattern inheritance in the orchid flower, and yet we are dealing constantly with the results. We try to produce green flowers without the red surface pigments that turn them muddy, or yellow flowers without the green that will make them less brilliant. We want orange, red, or yellow carotenoids without the purple or magenta of anthocyanins - or the bronzing that comes when greens and purples are both added to them. In judging, when we look for the least obtainable qualities (or so it always seems), the more intense and purer the color, the better it is, and the harder it is to find. The in-between colors and patterns are most often thought of as wishy-washy in spite of such euphemisms as "sunset colors," "pastel," or "art shades." Such colors, in days of Latin names, were indicated by the suffix -escens (flavescens, albescens, etc.), which means "approaching."

Many of the so-called variety names of the older named species and early hybrids were designated by Latin or Greek color terms. Today, clones with these colors should bear their

color designations as form or cultivar names and not have varietal status because of that alone, but that's another problem. Some of these names in their combining forms are shown in Table 1. These words have distinct meanings that we should acknowledge.

Table 1. Latin and Greek prefixes indicating colors.

Latin	Greek	English
albo-	leuco-	white
virido-	chloro-	green
flavor-	xantho-	yellow
roseo-	rhodo-	red
nigro-	melano-	black
purpureo-	porphyro-	purple
viola-	iono-	violet
aureo-	chryso-	gold
vini-	oeno-	wine

The major discrepancy in this acknowledgement comes in the Paphiopedilum alliance where green and white flowers are called "alba" forms, as also are other flowers that are only white. The absence of the normal anthocyanin pigmentation by itself does not necessarily produce an all-white flower, as the alba designation should imply. If the usual pattern is there, although without the usual color except for the green, a new descriptive term is necessary. "Chlorophyllous" or some such term could be used to distinguish properly between the two categories, green and white versus truly white, if we would only agree upon the designation. In fact, the Paphiopedilum names in past times were so twisted about that they had to designate the normally colored form of Paph. Maudiae as var. 'Coloratum,' a 180-degree reversal of usual procedures. In any case, an alba should be all white and nothing else!

What is proper terminology for oncidiums or odontoglossums lacking the normal anthocyanin markings but still showing a pattern in a two-toned yellow flower, such as Oncidium papilio var. 'Latour'? Xanthotic is the term used particularly by Odontoglossum fanciers who wish to refer to a yellow flower lacking normal dark pigmentation. But when referring to all white forms of Odontoglossum crispum the term alba is used! In other

words, the background color makes a difference in what term may be specific for a given situation. The situation seems a little anomalous because we are emphasizing more what a flower lacks than what it may have.

A fairly common form of Cattleya skinneri is called variety alba but has purple in the throat, in contrast to true albas that also exist. In such situations, the alba is not a true cultivar designation because it refers to a color class for several different white-flowered clones of that species. Each really deserves its own clonal name, preferably a descriptive one that indicates its color. Other examples might be Cattleya intermedia var. aquinii or Laelia purpurata var. werckhauseri. Not only are there the various original clones of each of these color forms, but there are also many new ones produced by selfings or sibling pollinations. The names originally were used for a single plant, but after others with the same color pattern were found, the original clonal names became group names, and no longer designated a specific plant.

Many, or even most, of the alba cattleyas have yellow patches or yellow veining in the throat of the labellum. We should, to be accurate, call such flowers alboflavous or leucoxanthous with albaplena reserved for the completely, truly whites. The terms, as I've said before, should reveal what the flowers are, not what we wish they were!

Self-color or concolor are terms that should refer to uniformly pigmented flowers, one color throughout. Again, lip veining patterns are often superimposed in a contrasting color, or there is a spot or marking at the tip of the lip, so that the use of concolor is really compromised if it is not qualified. There are, of course, truly concolor flowers, especially some of the yellow or orange cattleyas or laeliocattleyas.

Thirty years ago, before many of the currently popular color combinations were known or appreciated fully, white cattleyas with purple lips were all the rage, and it was Dr. Gustav A. L. Mehlquist in 1954 who proposed the term "semi-alba" to describe the pattern. At the same time, we have never said "semi-flava" or "semi-xanthous" when faced with a yellow example. We always said, "yellow with a red lip." A "semi-verdant" could be a green with white or red lip, but a "semi-purple" that we accept as "normal" isn't even thought of in these terms. The "semi" terminology indicates a differently colored labellum, as well as the general color of the rest of the flower, and it is no longer sufficient in its present form to indicate all the possible combinations we have today. Perhaps "bicolor," after Cattleya bicolor, would be a better designation when the lip is a contrasting color - if we could agree with that meaning of the term.

When it comes to peloric flowers, rapidly becoming our latest craze, the two petals duplicate the labellum pattern and shape to varying degrees from just partial to nearly complete. These color patterns are usually termed flares or splashes, the latter term being the one most commonly used. Splashes vary from only a bit of color at the tip of the petal

midrib to a nearly full duplication of the lip configuration. In the latter situation, as the popular Slc. Empress of Mercury 'Gwo-Luen' demonstrates, only by looking at the sepals can one determine the true base color of the flower. Such flowers are not bicolors but full splashes, completely peloric. We could indicate by some fraction the degree of splashing from only the tip involvement to a full splash. In addition, we need to indicate by unicolor, bicolor, or tricolor the number of lip colors on the petals. We started out with the unicolor partial splashes of Cattleya intermedia var. aquinii 'Vinicolor', but now the tricolor full splashes are becoming the fad.

Regardless of the lip color, there is now no way to designate sepals of one color and petals of another if they are not splashed. Such variations begin to occur in hybrids, and we cannot use the bicolor term because it already means a lip color that is different from all the rest of the flower segments. If we used a qualifying adjective, such as sepaline bicolor, it might be a useful way to go.

Picotee patterns may be partial or complete and may be superimposed, or not, on the splash pattern. These markings form an ornamental edging along the rim of the petals. The term was first used in horticulture many many years ago to indicate cultivars of pinks or carnations with such patterns. Because these markings may occur in orchid flowers without any splashing, we know they are controlled by separate color pattern genes and, therefore, should have a separate terminology. There is little debate on this pattern because it easily is recognized and turns up mostly when Rhyncholaelia (Brassavola) digbyana is in the lineage.

Stripes only in the midribs of sepals and petals are, however, not to be confused with flares or splashes, and although comparatively unusual at this time, do occur. An overall striping pattern is more usual and is readily accepted for many flowers, especially in phalaenopsis, vandas, dendrobiums, and cymbidiums. Striping patterns are produced by the enhancement of pigmentation in the vein areas, including the midrib, of the petals and/or the sepals, and this makes the veins stand out. If the interstitial or background color is too much like the vein coloration, splotchy colors can result, a feature that affects most of us negatively. An even worse combination comes from the vein color being lighter than that of the intermediate areas. When only the main veins or the midrib are involved, the stripes are clearer. When the cross veins are also included in the pigmentation pattern, the term "tessellation" becomes appropriate. Tessellated patterns are typical in vandaceous hybrids, particularly with Vanda coerulea as a parent, and they often are present in Phalaenopsis hybrids as well.

In Phalaenopsis flowers particularly, the veining color patterns may be produced by series of small spots, or there may even be a spotting pattern superimposed on the striping. The spotting may not only be over the veins but also in between, and the spots may blend into

larger spots, blotches, or bars. One recent hybrid appeared as a uniform dark red, but on closer examination it was seen as completely covered by coalesced spotting. In judging, careful descriptive terms are necessary to describe such complicated patterns accurately for comparison with future flowers that may be considered for awards.

Split lateral sepal patterns are also no novelty today in Phalaenopsis or Vanda hybrids, and split petal patterns are no news in various Paphiopedilum flowers. But now, I've seen one split lateral sepal pattern in a Cattleya - a two-tone yellow combination. We've also seen Cymbidium Cleo's Melody 'Freakout' from Adelaide Orchids. That has the lip pattern repeated on the medial halves of the lateral sepals! This pattern is especially unusual from a developmental point of view and cannot as easily be explained as can the peloric splashes.

Who can know what otherwise recessive traits may turn up as we continue hybridizing? Or what will become popular? These color traits correspond to the so-called somaclonal variations that readily can be produced in various crop plants such as potatoes or sugar cane when propagated by tissue culture techniques from single cell cultures. We already are experiencing various changes in colors or color patterns, as well as ploidy, in many mericlone propagations, sometimes so different that a new cultivar name must be used to indicate the change.

Do we have a color pattern problem in judging orchids? Could we all agree on some pattern terminology? The more that variations occur, the more our descriptions will have to be standardized and accurate for all.