BROMELIADS Part One
Geography, Morphology, Taxonomy and Light Requirements

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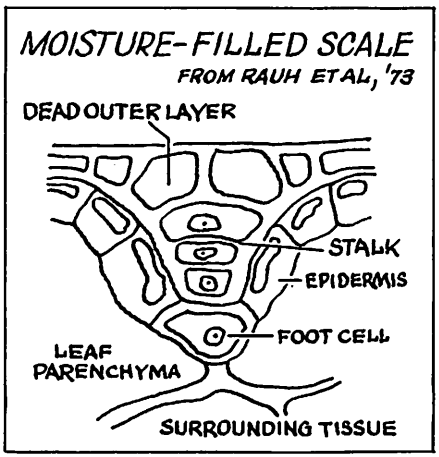
All bromeliads belong to the Pineapple Family or Bromeliaceae. Among families restricted to the tropical Americas, it is the largest with species' number comparable with Cactaceae (Good 1964). However, there is one species in West Africa. The range of the group extends from coastal Virginia down along the Gulf to lower California, then south to Chile and Argentina. Bromeliads are found in many habitats while heaviest concentrations occur in rain forests on mountain slopes. Most ornamentals are indigenous to Eastern Brazil.

A family of short-stemmed herbaceous plants with tightly-spiralled leaves forming a rosette, the Bromeliaceae possesses two unique features, a thorough understanding of which will be helpful for proper culture. These are "scales," and modified roots.

Trichome Pumps



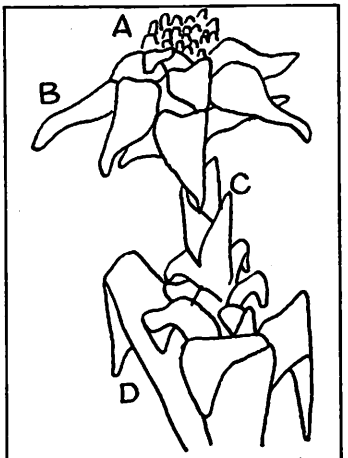
Easily recognizable in Tillandsia usenoides (Spanish Moss) is the grey scurf, which is a dense aggregation of specialized trichome scales. Unlike the scales of other plants which simply prevent loss of moisture, those of bromeliads are agents of absorption. The mechanism of these 'trichome pumps' (Rauh et al., 1973) involves a dead outer layer of cells and lumens of which are filled with air when the atmosphere remains dry. Under these are living 'stalk' cells which connect to 'foot' cells imbedded in the leaf parenchyma. When moisture becomes available, the outer cells expand like accordians, acting as filter paper in absorption. Osmosis then operates to transport water through the stalk, from where it is pumped by foot cells into the surrounding tissue and from here is translocated to storage tissue. To a greater or lesser degree

all bromels are equipped with these water-conserving, peltate scales and all feed partly or entirely through these structures (Smith 1969).

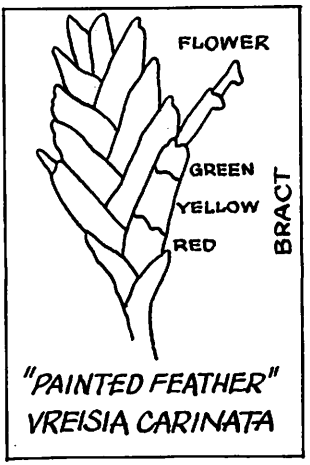
The patterns seen on Aechmea fasciata are horizontal bands of scales. Longitudinal stripes as well as mottled designs also occur. Other mottling may be caused by virus. Since large numbers of scales frequently exist on the upper sides at the bases of leaves (in the rosette 'well'), watering may be a simple matter. Perhaps an evolutionary counterpart of large numbers of scales, these species have some or all of their roots modified as 'holdfasts.' Epiphytes often have a mass of these tough, clinging roots. No parasitic function is served by these wiry fasteners. Soft, moisture and food-absorbing roots are also found to predominate in terrestrial species.

Bracts and Flowers

Bracts of three types are recognizable (Wilson and Wilson 1963), any of which may comprise what the casual observer would reckon to be the flower. Scape bracts clasp the lower part of the flower spike from the point of peduncle emergence to the base of the flower head. Inflorescence bracts are located at the base of the flower head. The yellow-tipped scape bracts of Guzmania lingulata var intermedia subtend the flashy elevated rosette, which is itself a collection of inflorescence bracts. The painted feather of Vreisia carinata is a shingling of floral bracts. When the flower protrudes as it does in Tillandsia cyanea these bracts display exquisite color complementation. The bracts of the bromeliad group are often of riotous color and last longer than the flowers.



GUZMANIA LINGULATA
A. FLOWERS
B. INFLORESCENCE BRACTS
C. SCAPE BRACTS
D. LEAF ROSETTE



"PAINTED FEATHER"
VREISIA CARINATA

Flower clusters or inflorescences often consist of many individual flowers as in the giant Puya Raimondii or are infrequently singular, as seen in miniature Tillandsias (Padilla 1973). Arrangement on the stem is usually terminal and may take the form of an open or tightly-compacted spike or a branched raceme or panicle (Padilla 1973). Flowers are located in the axils of bracts, are usually bisexual and may have scales or nectaries within (Lawrence 1951).

Xerophytes and Epiphytes

As a group the bromeliads may be divided roughly into two categories: terrestrial xerophytes and forest epiphytes. Although these categories and others such as tube form and size are useful in acquiring a 'feel' for proper culture, the greenhouse grower may begin by careful observation of leaf characteristics. These include stiffness, texture, spininess, coloration, size and scale density.

Leaf examination may be used to determine optimum light levels. Species with scales retain these structures in response to high light and temperature as well as low water availability. However, due to the high light and elevated temperature of summer greenhouses, several coats of shading should be applied. Bromels 'color-up' better with filtered sun during this season. As a general recommendation, use a light level of 1500 foot-candles (Sheehan and Conover 1973). The stiffer the texture, the more light is needed to bring out the true characteristics of the plant (Padilla 1973). Soft-textured and light-green species do best with shade.

Half-shade or shade:	Average-light lovers	Fall sun plants
Vreisia sp.	Neoregelia sp.	Ananas sp.
Nidularium sp.	Pitcairnia sp.	Bromelia sp.
Guzmannia sp.	Catopsis sp.	Cryptanthus sp.
Ronnbergia sp.	Canistrum	Beuterocohnia sp.
	Quesnelia	Dyckia sp.
	Billbergia	Hechtia sp.
	Some Aechmea sp.	Puya sp.

(Wilson and Wilson 1963)

If a plant becomes limp, with an open flabby appearance, it is most likely the result of overexposure. A yellowish, light-green plant is receiving too little light. Sunburn spots may occur on the uppermost curve, expecially after a drastic change of position. An excellent index to the light requirements of individual species is contained in Bromeliads in Cultivation (Wilson & Wilson, 1963).

Little has been written concerning the photoperiod of bromeliads. As a general rule, however, Aechmea and Vreisia are short-day while Billbergia, Ananas and Neoregelia flower on longer days (Wilson and Wilson 1963). In addition, bromeliads respond well to chemical flower induction permitting the grower year-round sales. More will be written about chemical control in the final article of this series.

Subfamily Pitcairnoideae

Stiffness, spininess and firmer texture of the leaves indicates xerophytism, with the ability to endure higher light and less humidity. Terrestrial and rock loving xerophytes occur in large numbers in the subfamily Pitcairnoideae. Rugged beasts, often defended by spiny margins, only a very few of this group are ever seen commercially. Many small 'cushion-types' exist which would be suitable as houseplants and deserve wider use. The two compact species of Abromeitiella would augment any succulent collection. Tubular flowers protrude, one per rosette-center, from a Haworthia-like clump.

Subfamily Tillandsioideae

In addition to dry-land species covered with scales, the epiphytic subfamily Tillandsioideae contains a more complex plant. Here the leaf sheaths have broadened with their leaf margins forming a waterholding pocket (Smith 1969). The absence of upper scales, with the wider blade channeling water into the rosette, probably evolved in response to the availability of water inside the forest canopy. Surface area then became exposed for greater absorption by chlorophyll of the small amount of light which does permeate (Smith 1969). Roots are of the holdfast type and spines are absent, since no protection is needed for these tree-top residents (Padilla 1973).

Subfamily Bromelioideae

Although most members of the Bromelioideae are epiphytes, they are more robust than the previous subfamily. The Bromelioideae offers endless variety of 'tube' form and size--from the grasslike leaves and slim vases of Billbergia nutans to the pear-shaped reservoirs of stalwart Aechmea sp. Despite their strong holdfast root system, which often embeds itself two and three inches into tree wood (MacWilliams 1968), strong absorptive roots develop permitting successful adaptation to the terrestrial

habit (and pot culture). Berries are produced by this group alone and are often the most flamboyant and durable part of the plant. The intriguing berry-like flower as well as the jewel-like berries will be covered in a later article on houseplant features.

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