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Peninsular Malaysian Gingers: Their Traditional Uses

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Abstract

Zingiberaceae is readily differentiated from the other families in the order Zingiberales by its aromatic property and is the most diverse in terms of its utilization. Out of more than 300 species reported for Malaysia, at least slightly more than 10% are utilized traditionally for various purposes. Among the most common species include, *Alpinia galanga, Curcuma domestica*, *Kaempferia galanga* and *Zingiber officinale*. This paper attempts to describe the numerous traditional uses of gingers from Malaysia, as observed in cultural practice and culinary exotics. Some of the interesting applications of gingers in traditional medicine will also be illustrated.

Introduction

Zingiberaceae represents one of the largest families in the order Zingiberales and the most diverse in terms of utilization. Zingiberaceae forms a conspicuous feature of the ground flora of the Malaysian rainforest and is readily differentiated from the other families within Zingiberales by its aromatic property. Although Zingiberaceae inhabit a wide range of habitats ranging from the lowlands to the upper montane regions, quite surprisingly only a small percentage of the more than 300 species estimated for Malaysia are cultivated or domesticated. Probably slightly more than 10% are utilized traditionally for various purposes and these are mainly species which are introduced.

The traditional exploitation of zingiberaceous species in Malaysia depend on the general lifestyle of the people in a particular state or district. Culture and traditional beliefs are eminent in areas which are remote and away from western influence. Often when hospitals are not available or situated quite a distant away from their homes, village folks are forced to turn to alternatives such as the traditional medicine. Even up to this day these practices still prevail in such remote areas. Similarly in isolated villages, vegetables are obtained from the home gardens and nearby secondary forests. Many of the fresh vegetables or salad derived from wild species or even weeds are unknown to the people of urban areas. In many instances some of these fresh vegetables are not palatable to the modern generation.

Figure 1. Young inflorescences and rhizomes of gingers and other plants eaten raw as fresh salad.

The utilization of zingiberaceous species is mainly centered on the genera *Amomum* , *Curcuma*, *Zingiber*, *Alpinia* and to a lesser extent *Boesenbergia*, *Kaempferia*, *Elettaria*, *Elettariopsis*, *Etlingera* and *Hedychium*. Members of the genus *Globba* (Globbeae) are not used in food at all except for a few species which are infrequently used in traditional medicine.

This paper attempts to illustrate some of the traditional uses of Malaysian gingers as observed in food, cultural practices and traditional medicine.

Uses

1. Spice/flavouring

Zingiberaceous species were first known as spice, condiments and flavours chiefly because of their aromatic oils. Of these, *Zingiber officinale*, the ginger of commerce is perhaps the most extensively used. Obviously the important attributes of these spices are their flavour and pungency. Ginger is widely used for culinary purposes in meat, poultry dishes, curries, soups, cakes, biscuits as well as beverages. It is also one of the most extensively used spices in Chinese cookery.

Curcuma domestica, commonly known as turmeric, is native to South-East Asia and has an extremely long history of use by the Malays of Peninsular Malaysia. The plants can grow easily in all parts of the country. Several races of this species are known in India, however, these races may be rare or unknown in Malaysia. Its greatest demand is as one of the principal ingredients of curry powder. Both ginger and turmeric are two of the earliest oriental spices known to Europe and are still in great demand today.

Rhizomes of turmeric and *Alpinia galanga* are utilized by

the Malays as spice and flavour in several traditional meat and poultry dishes. In northern states of Peninsular Malaysia, rhizomes of *Alpinia conchigera* are used as a substitute for *Alpinia galanga* as spice and flavouring. Rarely, rhizomes and tubers of *Boesenbergia rotunda* are utilized as a spice in selected dishes. Very young leaves are sometimes used as an alternative.

Another well known spice of the East is cardamom, which used to be an article of trade in Europe and India. The true cardamom is the dried fruits of *Elettaria cardamomum*, a mountain species, native to South-West India. The true cardamom is relatively expensive and considered to be superior because it is less pungent but the plants of *Elettaria cardamomum* are difficult to grow and in Malaysia appear to survive only in the highlands as observed in the Cameron Highlands. Substitutes for the true cardamoms, better known as the inferior cardamoms, can be obtained from fruits of *Amomum compactum*, *A. kepulaga* (native to Java and imported into Malaysia), *A. aculeatum*, *A. lappaceum*, *A. ochreum*, *A. subulatum*, *A. testaceum*, *Alpinia galanga*, *A. conchigera* and *Aframomum* sp. (Africa).

The leaves of turmeric are frequently used to provide a certain flavour to several traditional dishes and the rhizomes pounded with salt, ginger and chilies are made into a paste for seasoning fish or meat prior to roasting or frying. Some village folks sometimes use leaves of *Kaempferia galanga* to flavour rice.

The young inflorescence (actually the inflorescence bracts) of *Etlingera elatior* (formerly known as *Phaeomeria* or *Nicolaia speciosa*) is used to flavour various traditional curries (meat, poultry, fish) and is also a prominent ingredient of a noodle dish known as "laksa" (Ibrahim, 1991). This noodle dish is popular throughout Peninsular Malaysia and differs only in the preparation of its gravy from state to state. The leaves of *Elettariopsis curtisii* are used to flavour fish in the east coast of Peninsular Malaysia. The fruits of *Amomum lappaceum* and *Amomum uliginosum* are collected by natives for food flavouring and seasoning. However, in some remote areas, people have tried using *Zingiber spectabile* (the wild torch ginger) as flavouring (Burkill, 1966).

2. Fresh vegetables/salad

Asian people, especially Indonesians and Malaysians have been adventurous in their selection of fresh vegetables termed as "ulam", and in the process, have accumulated a large variety of these "ulam" derived from various plant species including weeds. Perhaps due to their aromatic property, the young rhizomes of some zingiberaceous species namely ginger, turmeric, *Alpinia galanga*, *Curcuma mangga*, *Etlingera elatior*, *Boesenbergia rotunda*, *Kaempferia galanga* and *Zingiber zerumbet* are consumed as salads together with rice. Young inflorescence of turmeric, *Alpinia galanga*, *Etlingera elatior* and *Zingiber officinale* are dipped in a special chili sauce or fish sauce and then eaten raw with rice (Figure 1.).

3. Food wraps

The fragrance of turmeric leaves is sufficiently mild and pleasant hence it is most preferred for wrapping fish prior to roasting to give it a slight fragrance. Very rarely people use leaves of other zingiberaceous species for this purpose.

4. Colouring/natural dye

During the days when artificial dyes were not readily available, turmeric was used in several countries as a dye for cloth (China, Borneo, Malaysia, Africa). Turmeric has been associated with saffron in terms of its utilization as a natural dye and it is preferred because it is cheaper than saffron (Burkill, 1966). With the development of artificial dyes, Malaysians now are not inclined to use turmeric to dye materials. Nevertheless turmeric is preferred as a yellow colouring for a number of rice dishes served during festivals or

The Purpose of HSI

The purpose of HSI is to increase the enjoyment and understanding of Heliconia (Heliconiaceae) and related plants (members of the Musaceae, Strelitziaceae, Lowiaceae, Zingiberaceae, Costaceae, Cannaceae, and Marantaceae) of the order Zingerberales through education, research and communication. Interest in Heliconia and information on the cultivation and botany of these plants is rapidly increasing. HSI will centralize this information and distribute it to members.

The **HELICONIA SOCIETY INTERNATIONAL**, a nonprofit corporation, was formed in 1985 because of rapidly developing interest around the world in these exotic plants and their close relatives. [See Purpose.] We are composed of dues-paying members. Our officers and all participants are volunteers. Everyone is welcome to join and participate. HSI conducts a Biennial Meeting.

Membership dues are: Individual, $35.00; Family, $40.00; Student, $10.00; Contributing, $50; Corporate (Company or Institution) $100.00; Sustaining, $500.00; Libraries, $25.00. Membership fees constitute annual dues from 1 July 1992 through 30 June 1993. All members receive the *BULLETIN* (usually published quarterly), the Membership Directory, and special announcements. Please send all inquiries regarding membership or Bulletin purchases to: David Bar-Zvi, HSI Vice President For Membership, Fairchild Tropical Gardens, 10901 Old Cutler Road, Miami, FL 33156-4296, Phone (305) 667-1651, Fax (305) 661-8953. Back issues of the Bulletin are $25.00 per volume.

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weddings as well as sticky rice which is sometimes served for cultural and ritual purposes. On rare occasions other species of *Curcuma* may be used as a temporary substitute for dyeing cloth.

The orangish-yellow colour of turmeric is due to a group of phenols called curcuminoids. Curcumin is the principal colouring material. Our studies showed that the % of curcumin is highest in *Curcuma domestica* (turmeric), followed by *C. xanthorrhiza*, *C. zedoaria* and *C. mangga*. Very little curcumin is detected in *Curcuma aeruginosa* (Mohamad, 1990).

5. Cultural practices/rituals

Even though Malaysia can be considered to be a fast growing developing country, there are still quite a number of village folks who believe and practice traditional culture and rituals. One of the long lasting traditions is seen in our elaborate wedding ceremonies which in some states may last for as long as three days. Not to mention the traditional wedding festivals among the various tribes of East Malaysia which are rich in culture and unique rituals.

The importance of turmeric in cultural practices and communal rites lies in the symbolic value placed on the yellow colour that it produces. Yellow is symbolic of royalty as well as religious and sacred rites. It is a prominent colour used in weddings, births and sometimes funerals. In Peninsular Malaysia, turmeric is used to dye glutinous rice which is molded to form a yellow base where decorated boiled eggs are arranged on vertical spikes. These are placed on the platform where the bride and bridegroom are exhibited (a custom believed to be inherited from India). Yellow wedding clothes are frequently favoured for the bride and bridegroom which is symbolic of the King and Queen. In Malacca especially, the bride is required to drink a cup of concentrated turmeric juice prior to the wedding day with the belief that it will enhance her beauty and radiance on the wedding day.

Particularly in remote areas, a small piece of turmeric is suspended by a string round the neck or hand of a child or even adults as a charm or talisman for protection against evil spirits. Sticky rice dyed with turmeric is also used in rituals involving evil spirits. Apart from turmeric, mature rhizomes of *Curcuma aurantiaca* and *Curcuma zedoaria* have been known to be used as a talisman.

Ritual healings are not really things of the past. Many plants are selected either in mixtures or on their own for these rituals. Mature rhizomes of turmeric and preparations of mixtures involving rhizomes of *Curcuma xanthorrhiza* are examples of zingiberaceous species used for this purpose.

In isolated or secluded villages, old folks still perform certain ceremonies and rituals dealing with spirits. The act of exorcising spirits involves the usage of selected plant and animal specimens. Among these are included several Zingiberaceae species such as: *Alpinia galanga*, *Curcuma domestica* and *Amomum* spp. These are employed separately or together with other plant or animal specimens. The utilization of zingiberaceous species in such rituals may be attributed to the fragrance emitted by these plants.

Although of minor importance, the author would like to include the traditional preparation of cosmetic powder ("bedak sejuk") which consist of rhizomes of *Curcuma zedoaria* and *Kaempferia galanga* mixed with glutinous rice, 100 types of flowers and several other aromatic plants (East coast of Peninsular Malaysia - Ong et al, 1991). In India, however, *Curcuma zedoaria* is traded for perfumery.

6. Traditional medicine

An estimated 30-40 zingiberaceous species have been exploited for their medicinal value . Of these, perhaps slightly more than 50% are still in use. This may be due to the availability of modern medicine or the lack of knowledge of the traditional medicine preparations. Such knowledge perishes with the death of the old traditional healers and perhaps the species may have become extinct too.

Many of the medicinal gingers are used in relation to women. Among them is included the herbal mixture termed as "Jamu". "Jamu" is consumed essentially for health care and beauty. Many women, however, consume it after childbirth so as to be fit and trim. "Jamu" originated from Indonesia in ancient times and only the privileged royal ladies of the Javanese kingdom had access to the various kinds of "Jamu" for the promotion of health and beauty. It was the belief of the old Javanese tradition that the best is meant only for the royal family. Time has changed customs and ideals and now "Jamu" is readily available under different brand names competing in the market. "Jamu" products are a flourishing industry in Indonesia and now are penetrating the Malaysian market too. Although "Jamu" is also prepared in Malaysia, it is mainly on the level of a cottage industry. Almost all "Jamu" contain turmeric and ginger. Examples of some common gingers used in "Jamus" and traditional cosmetics include *Boesenbergia rotunda*, *Curcuma domestica*, *C. xanthorrhiza*, *Kaempferia galanga*, *K. rotunda*, *Zingiber cassumunar*, *Z. officinale*, and *Z. zerumbet*. Of these, *Curcuma xanthorrhiza* has been claimed to be a cure for acne problems (Ibu Mooryati, 1989).

Post-partum traditional medicines comprise several Zingiberaceae species which are consumed either on their own or in mixtures with other plant species by mothers in confinement either to regain their energy or for general health. This traditional treatment comes in the form of decoctions, tonic or fresh rhizomes which are taken orally. Usually the rhizomes or rhizomes and roots are used, such as: *Alpinia melanocarpa*, *Boesenbergia rotunda*, *Curcuma domestica*, *C. zedoaria*, *Elettariopsis curtisii*, *Zingiber cassumunar*, or *Z. officinale*. Some village women resort to taking fresh rhizomes of turmeric and *Kaempferia galanga* for family planning (Ong et al, 1991).

Another type of post-partum medicine is chiefly for external application and prepared as pastes or poultices to be applied on the abdomen, whole body or parts of the body primarily for health care. These species include: *Alpinia conchigera* (leaves as poultice), *Boesenbergia rotunda* (paste rubbed on the body), *Curcuma domestica* (mixed with lime juice and slaked lime, paste rubbed on abdomen), *C. domestica* (mixed with *Zingiber zerumbet* poultice applied on breast to improve milk flow), *C. xanthorrhiza* (paste rubbed on abdomen), *Zingiber cassumunar* (poultice on body), *Z. officinale*, red variety (rhizome rubbed on body), *Z. ottensii* (rhizome/leaves - poultice - body).

A special traditional practice for Malay women in confinement is the warm aromatic bath termed as "mandi teresat". Leaves of *Alpinia galanga* (sometimes leaves of

Amomum kepulaga), turmeric, *Pandanus odorus* and *Cymbopogon nardus* (closely allied to lemon grass) are boiled together and the woman is bathed with this aromatic warm water for at least 2 weeks or for the whole period of the confinement.

As for the other traditional medicine treatments, the author has selected several examples as follows:

Stomachics - *Amomum kepulaga*, *A. uliginosum*, *Alpinia mutica*, *Zingiber officinale*.

Carminative - Juice of: *Alpinia galanga*, *Curcuma domestica*, or *Kaempferia galanga*.

Coughs - *Amomum kepulaga*, *Boesenbergia rotunda*, *Curcuma aeruginosa*, *Kaempferia galanga*, or *Zingiber officinale*.

Wounds - Rhizomes of: *Curcuma domestica* (applied on circumcision), leaves of *Etlingera elatior* or *Zingiber zerumbet*.

Anti-inflammatory - *Kaempferia galanga*, *Zingiber cassumunar*, *Z. spectabile*, or *Z. zerumber*.

Skin fungal infections - *Alpinia conchigera* (rhizome rubbed on infected parts).

Burkill (1966) assisted by Haniff in his survey even recorded that *Hedychium longicornutum* and *Zingiber cassumunar* were used to treat syphilis and gonorrhea, respectively. The validity of these cures or treatments is questionable. Cineol is known in western medicine to be of medicinal value as an antiseptic. Cineol is characteristic of the genus *Alpinia* but may be present in various quantities in many other zingiberaceous species. For instance, when sores or wounds are poulticed using leaves or rhizomes of selected zingiberaceous species, the possible antiseptic effect could be attributable to the cineol that may be present in the species concerned .

It is also interesting to note that, in the olden days, plants were selected for medicine through trial and error. However, sometimes certain guidelines were set, for example, the use of *Hedychium longicornutum* as a vermifuge was guided by the fact that its roots resemble worms. Nevertheless, much as we are excited about the effectiveness of these traditional medicines, a lot of work still needs to be carried out in the modern laboratory to justify their uses or to test their toxicity. In the meantime one can only observe and document these traditional uses of the Malaysian gingers and regard them as an invaluable heritage that may fade with time.

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Keith Wooliams Awarded

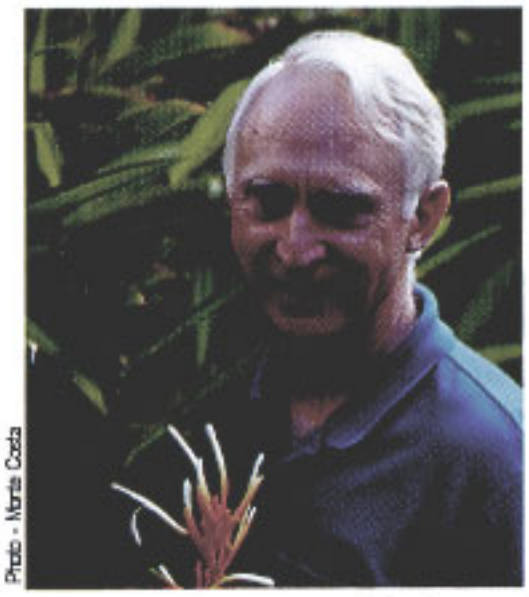

Photo - Monte Costa

The Past-President of HSI, John Kress and former *Bulletin* Editor, Ray Baker presented to Mr. Keith Wooliams, Director of Waimea Arboretum & Botanical Garden of Haleiwa, Hawaii, his Award of Special Merit and Recognition from the Society. The award, made at the HSI International Conference in Frankfurt, Germany in September, 1994 read:

In Appreciation
of His Role
In the Development
Of an Outstanding and Well Documented
Collection of Heliconias and other Zingiberales
At the
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of the
Heliconia Society International

From Neglect To Recognition and Now, Facing Extinction - The *Heliconia* Story

***Sandra Barnes**, Librarian, The University of the West Indies, St. Augustine, Trinidad and Tobago*

(Presented as the Opening Lecture at the VIIth International Heliconia Conference, Frankfurt, Germany, September 29th, 1994).

Abstract:

This paper traces the origin, history and distribution of *Heliconia* (Heliconiaceae) from early botanical references and illustrations in the 17th and 18th centuries, and its ethnobotany in Central and South America and the Caribbean. It discusses the formation of the Heliconia Society International, which has facilitated the development of Heliconia in the Ornamental Horticulture Industry, and the threat of extinction currently facing Heliconia in its native habitats.

Plant collecting for food, medicine, economic or religious reasons dates far back in ancient history. The tales of Plant Hunters are full of daring adventures, discomforts endured, mutinies, diseases and accidents, some of which took their lives. They all had in common a love of plants, so great, that they were

Figure 1. *Heliconia* in Maria Sibylla Merian.

willing to risk everything for something new, rare and beautiful, for the benefit of wealthy Patrons, Kings or Queens or Empire, for cultivation in Botanic Gardens, or perhaps a taste of immortality, in having a plant named after them. It is in their Notes, Journals, Diaries, Illustrations, Botanical Lists, etc. that the early history, origin and distribution of Heliconia is to be found.

Named after Mount Helicon, the most fertile mountain in Greece, and celebrated in classical literature as the favourite haunt of the Muses, Heliconias are native to the American Tropics, from the Tropic of Cancer in Central Mexico to the Tropic of Capricorn in South America, including the Caribbean. They have brilliant colours of red, orange, yellow and pink, and are pollinated by hummingbirds. Another group of Heliconias is to be found in the Old World Tropics, from Samoa to Indonesia. These have relatively inconspicuous, generally green inflorescences and are pollinated by bats. How these plants reached the South Pacific is still a mystery, but it has been suggested that they may have been introduced as a result of dispersal by man, and distributed throughout the region by indigenous peoples, due to the widespread use of the leaves and other parts, in their daily lives.

It is impossible to ignore Heliconia. They grow wild and untamed, with striking colourful bracts, and long banana-like leaves, and many early travelers recorded seeing them in the forests. French settlers in the Caribbean searching for good soil on which to plant Cocoa (*Theobroma cacao*), looked for them, as they knew that the Heliconia plants indicated the presence of water, and also has an ameliorating effect on the soil. Despite this attention, specimens of *Heliconia* are not abundant in the herbaria of the world, and Heliconia has never enjoyed the popularity of Tulips, Orchids or Roses, among botanists, plant collectors or the public. Few plant collectors bothered to carry them on the long journey back home, perhaps because the large inflorescences were too bulky and heavy, and had a high water content, making herbarium specimens difficult, or perhaps digging the rhizomes required special tools which were not easily carried for long distances in the forest. Due to this botanical "neglect", some botanists today believe that the Heliconia is the last plant family to be studied.

If a large, bulky Heliconia plant was impossible to take home, a drawing or painting was not, and it is through early illustrations of Heliconia, done in the 17th and 18th centuries, that we can confirm, not only their existence, but their recognition by botanists. Charles Plumier (1646-1704) was the first to illustrate the Heliconia, after having traveled to the "Antilles", as the Caribbean islands were then called. Plumier illustrated a Heliconia inflorescence, and labeled it "Balisier" which was the French word for "Canna", used by the Indians and French settlers to describe the wild Heliconia, and provided detailed drawings of the flower of "Bihai" in his *Plantes de la Martinique et de la Guadeloupe*, (1680), and later work, *Nova Plantarum Americanarum Genera* published in Paris, 1703.

The first known colour illustration of a Heliconia plant was done, not by a plant hunter, who were always men schooled in the science of botany or medicine, but by a female entomologist and artist. She was Maria Sibylla Merian (1647 - 1717), who in her middle years, traveled to Suriname, then called Netherlands Guiana, in 1699 (Figure 1.). She portrayed from life, and in colour, numerous butterflies and other insects, feeding on plants, one of which was the Heliconia. Her sumptuous folio work, *De Metamorphosis Insectorum Surinamensium* was published in Amsterdam in 1705, with coloured plates which give an unprecedented glimpse of the teeming insect life and exotic plants of tropical South America, drawn with loving attention to detail.

Early travelers to the New World in the 17th and 18th centuries, were fascinated by the wealth of exotic plants, many of which they were seeing for the first time, and closely observed how the natives used them. One of the earliest accounts of the ethnobotany of Heliconia was given by Guillaume Coppier in his work *Histoire et Voyage des Indies Occidentales...*, 1643. Coppier recorded the use of the leaves of *Heliconia bihai* as thatch substitutes, and as an impervious layer between the double baskets that were used for carrying and storage by the Carib Indians of Dominica. Jean Baptiste Labat, a Jacobin Priest who is credited as the founder of the Basse Terre colony of Guadeloupe, also recorded his observations on the social life and customs of the Carib Indians, and provided us with historical and botanical information of Heliconia which he illustrated with the caption "Le Balisier", in his *Nouveau voyage aux isles de L'Amerique...*, published in 1742. He observed that the Indians used this "mysterious plant" in a variety of ways - to wrap food, for medicinal purposes, ornamentally, and even to weave a cloth from the fibres. In the Old World the indigenous uses of Heliconia in traditional life were much greater than in the Neotropics. As in the Caribbean, Heliconia leaves were also used for thatching and wrapping, cooking and storing foods. Additionally, seeds of the Heliconia were boiled and eaten and the leaves used to line pit ovens in the preparation of "mash", a fermented dough made from breadfruit or bananas, which was used as food in times of drought, war, or on long sea voyages

By the 19th century, botanical exploration was linked to botany as an expanding science, largely through Linnaeus's classification of plants in his *Species Plantarum* published in the previous century. The expansion of science led to the appearance of specialized journals of science, normally concerned with a limited field and acting as the means of rapid communication between individual researchers and as the immediate repository of their results. Several of these journals, e.g. *Magazin für die Botanik* (1787), *The Gardener's Chronicle* (1841), *The Journal of the Royal Horticultural Society* (1846) and *Curtis's Botanical Magazine* (1787), were devoted to botanical science, and played a considerable role in the development of botany in this period. *Curtis's* provided accurate illustrations of 'the most ornamental foreign plants', some of which were of Heliconia.

The 20th century saw the introduction and proliferation of plant societies There was an Orchid Society, A Rose Society, A Palm Society, etc. , so in the 1980's the world did not need yet another. However, a group of determined people, consisting of commercial growers, professors, scientists and collectors, held together by their fascination for, and interest in, Heliconia, met in Florida in 1985 and formed The Heliconia Society International (HSI) Their mission statement was "to increase the enjoyment and understanding of *Heliconia* and related plants, through education, research and communication". Just 7 months after the first formative meeting, the first

International Conference was held with 150 people in attendance. Abstracts of the Proceedings were published in their first *Bulletin*, published in 1985. No account of the development of Heliconia in the Ornamental Horticulture Industry is possible without acknowledging the efforts of this group, which included the Caribbean's very own Iris Bannochie. The development of Heliconia as a cut flower began with her, at Andromeda Gardens, when Al Will, HSI's first President, had noticed the wild *Heliconia psittacorum*, commonly called "Cocoa lily", growing at Andromeda. He had little trouble persuading Iris to give him a plant which he took back to Miami in order to conduct research, and as they say, "the rest is history".

HSI has held Conferences in Florida, Miami, Costa Rica, Hawaii, Barbados, Trinidad and Tobago, Australia, and now, in Europe. Pre- and Post-Conference Tours have given HSI members the opportunity to observe the commercial growing of Heliconia and other related plants in the field, as well as post harvest handling of the flowers prior to export. There has been an explosion of interest in Heliconia since the 1960's, and the lowly "Cocoa lily" blossomed from a weed, into a million-dollar export market to the U.S., U.K. and Europe, where Heliconia is used not only as a cut flower, but also as a potted plant, and in landscape gardening. In 1989, HSI published a Commercial Sources List, which documented 46 Commercial Growers of Heliconia in Florida, Costa Rica, the Dominican Republic, Puerto Rico, Belize, Guyana, Hawaii, El Salvador, Australia, Dominica, Suriname and Jamaica. Heliconia is also now being cultivated commercially in Europe, and research results of the commercial production of Heliconia in glasshouses in Denmark were presented at the first International Symposium on the Development of New Floricultural Crops held in Faaborg, Denmark in 1988.

With the recognition of Heliconia as a new, exotic cut flower, it quickly became a favourite with florists around the world, especially due to its appearance with other tropical flowers on TV's serial programs. Heliconias provide a dramatic impression, and have a variety of sizes and colours, erect or pendant, to meet the design wishes of customers. Vase life of some Heliconia varieties is, however, a serious problem, but, for the earliest documentation of that, we can again turn to that remarkable Priest, Labat, who in the late 1600's was Heliconia's first recorded florist!: "I have, myself, often used these flowers to bedeck the altar and the doors of Churches on festive days. They present from afar a very good effect, especially when coupled with orange blossoms and leaves. They last for more than 15 days before fading". Nearly 400 years later, The Society of American Florists agreed with Labat. Their estimate of the vase life of Heliconia ranges from 3-4 days (*H. psittacorum* cv Rubra); 10-14 days for several large erect varieties, and 28 days (*H. humilis*). The unique, decorative design of the Heliconia has also been recognized by artists who have used it in some very ingenious ways - on pottery, postcards, postage stamps, note and wrapping paper, posters, fabric, and of course, the ubiquitous T-shirt. Heliconia has also been used as a political symbol in the Caribbean by the French *Parti Progressiste Martinique* (PPM) in Guadeloupe, and the People's Political Movement (PNM) in Trinidad and Tobago. Heliconia symbolizes different things to different people, some see it as "sculpture", others are reminded of "a flight of birds", or an impressionist painting. But not everyone thinks the Heliconia is beautiful. some think they are ugly and grotesque. One botanist who was startled in the forest by the long inflorescence of *Heliconia marie*, remarked that it looked like some wild animal's tail!. Others insist they are beautiful, even in their ugliness!

As education is one of the primary objectives of HSI, the Society has encouraged research on the retrieval and documentation of information on Heliconia, and in 1992 published a Special Double Issue, *"Heliconia* (Heliconiaceae): a bibliography". The bibliography attempts to be comprehensive, and contains 1,336 references from a variety of sources, covering the period from 1645 to the present, and HSI plans to publish annual updates. The bibliography cites the documentation of early scientific research on Heliconia, which had its beginnings in Costa Rica with the United Fruit Company's large banana plantations when the "Surinam Panama Disease", as it was then called, was first observed. This dreaded disease was present in Surinam before the cultivation of bananas for export had begun and has spread rapidly throughout the world. The culprit was the wild Heliconia, which was found growing abundantly on abandoned banana plantations, often remaining as tenacious weeds. It was found to be the host plant of *Pseudomonas solancearum*, the causal agent of Bacterial Wilt (Moko Disease) in bananas, as well as *Fusarium oxysporum* f. *cubense*, which caused Fusarial Wilt (Panama Disease). Later, HSI members T. Broschat, H. Donselman and A. Will, were the first to document research done at the University of Florida, on the cultivation of Heliconias, which greatly assisted the expansion of Heliconia cultivation throughout the world. Additionally, for the purpose of identification, illustration, nomenclature stabilization and information, HSI members Fred Berry and John Kress have described 89 species, 10 hybrids and 101 varieties and cultivars, currently in cultivation, in their book, *Heliconia: an identification guide* published in 1991. It is estimated that there are between 200 and 250 species of *Heliconia* and at least as many cultivars, and with the current research thrust in tissue culture, and the expected expansion in the ornamental industry, (particularly Europe after this Conference), the problem of nomenclature may prove extremely difficult to control.

In the 1600's and 1700's plants were given long descriptive names, known as polynomials, which made communication between botanists and scientists very difficult. *Heliconia* was then called "Bihai amplissimus folius, florum vasculis coccineus". Fortunately for those of us who had dropped Latin way back in the 4th grade, the Swedish botanist Carolus Linnaeus, who is credited with bringing order to the nomenclature of plants, renamed it *Musa Bihai* in his *Species Plantarum*, (1753). His son (Linnaeus fils) renamed it *Heliconia bihai*, which is still used. As knowledge of plants from remote regions were largely dependent on herbarium specimens which were re-hydrated, it is not difficult to appreciate that *Heliconia* has been an unsatisfactory genus to work on, and this has resulted in much taxonomic confusion. Some (*H. triumphans*), were later found not to be a Heliconia at all! Additionally, there are several local names commonly used in those areas where Heliconia is indigenous, e.g. "paka" (Fiji); "lau fao" (Samoa); "platanillo" (Columbia); "lengua de vaca" (New Granada); "hariti" (Arawak Indian name, Guyana);

and "Balisier" in the Caribbean. There are over 450 botanical names for species, varieties and hybrids of Heliconia. Sorting out the synonymous names in the genus, both for horticulturists and botanists, presents a considerable problem. Much of the confusion derives from early misidentification in several standard horticultural books, and the more recent enterprise which has come from the horticultural trade in the naming of the vast array of cultivars, e.g. 'Sexy Pink' (*H. chartacea*). In an attempt to lessen the confusion, HSI has established a Nomenclature Review Panel, which uses the botanical (Latin) names of the International Code of Botanical Nomenclature and makes decisions and recommendations. Additionally the registration of cultivar names was begun at the 3rd Conference in Hawaii, 1987.

It was the English Artist Margaret Mee (1909 - 1988) who first called attention to the destruction of Heliconia, one of her favourite flowers, in the Amazon forests, which she had been documenting since she began her travels in 1956. Thirty two years and 15 epic journeys later, she spoke with authority about the awesome changes she had seen. "The changes have been disastrous, and the destruction and burning of the forests arouse fears for the future of our planet". In his foreword to Margaret Mees *In Search of Flowers of the Amazon Forests* (1989), the Duke of Edinburgh wrote: "The bare statistics about the destruction of the Tropical Rain Forest are simple statements of fact, they cannot hope to convey the full scope of what is rapidly becoming a major global tragedy...It needs the eyes and the talents of an Artist to make that scale of destruction comprehensible to the human mind. Mee's brilliant illustrations of the flowers and plants of the Amazon, together with her acute observations over many years, so contrasts vividly the beauties of a particularly rich natural environment with the horrors of indiscriminate human interference". Unfortunately, the Amazon rainforest is home to several species of Heliconia, many of which we will never see. *Heliconia dasyantha*, *H. episcopalis*, and *H. nickeriensis* have been on the endangered list in Suriname, and HSI Members in the Caribbean have noted the disappearance of *Heliconia* species in Grenada and Trinidad.

For those of us who are aware that "Extinction is Forever", what can be done? One of the main objectives of HSI, is to attempt to provide a solution to the extinction which Heliconia faces, and that is - conservation. As early as 1986, 4 official Heliconia Society Depositories were named by HSI, and 2 more have been added since then. The Depositories are responsible for the collecting and preservation of *Heliconia*, and submit reports and Germplasm Lists which are published in the *Bulletin*. Heliconia has also been recently introduced into Singapore at the Jurong Birdpark, in order to attract birds. HSI members are still hunting Heliconias, in spite of the many difficulties, particularly in Colombia, which is said to have the richest number of species. In his article "New Heliconias" published in the latest issue of the *Bulletin*, Vol.6, no.4, 1994, John Kress described the most recent discoveries: *H. arrecta, H. donstonea; H. terciopela; H. gigantea* and *H. titanum*.

With these new Heliconia plants, the noble tradition of the early plant hunters continues, this time the plants are being photographed in their native habitats, rhizomes sent to the HSI Depositories, and herbarium specimens deposited at the Smithsonian Institution. Heliconia has finally earned its rightful place among the worlds botanical genera, and now, I must tell you that the first illustrator of the Heliconia, Maria Sibylla Merian, was born 347 years ago, right here in Frankfurt am Main, the city which was chosen by HSI for its first European Conference! The circle is finally, complete.

Thank you.

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Advances in the Introduction into Cultivation of Two Wild Species of the Genus *Heliconia, H. marginata* and *H. platystachys* - Ecology, Phenology and In Vitro Regeneration

Lucia Atehortua, Victor Maza & Aura I. Urrea, *Department of Biology, Universidad de Antioquia, Medellin, Colombia*

Colombia's economy, the fifth largest in South America, has relied traditionally on rather few commodities, including coffee, bananas, petroleum and coal. However, in the last two decades and due to the unpredictable market demands for the above commodities, the economy has diversified and the country's exports now include, cut flowers, tropical fruits and manufactured products such as leather goods and handicrafts.

In spite of Colombia's great Biodiversity (relative to its area, the largest of the world), it has had little affect on its economy and relatively few species contribute to the national export market.

On the other hand, introduced and domesticated plant species, especially ornamentals (roses, chrysanthemums, carnations, lilies, among others), are now responsible for nearly US $800 million per year in revenues, placing Colombia as the

second largest exporter of cut flowers in the world after Holland.

The aim of this project is to provide solid scientific and technical data on native ornamental species of the genus *Heliconia* (*Heliconia marginata* and *H. platystachys*), both under *in situ* as well as *ex situ* conditions, for potential growers, in the form of a technological packet of information containing data that will allow them to control and manipulate their biology and production.

Reviewing the literature on the introduction of species into cultivation, there is not a simple work that deals with technical and scientific methodology that can be used as a model for this purpose, therefore we designed one to initiate this research project.

Choosing *Heliconia* species as the subject of the research was not accidental. This genus has nearly 40 species in Colombia, widely distributed along attitudinal as well as latitudinal gradients. Furthermore, it is becoming the center of attention of local growers and more important yet is starting to have a relatively important place in the local market as a cut flower.

Methodology

This is a multidisciplinary research project, involving biologists, entomologists, chemists, and biotechnologists.

The methodology developed in this project can best be described through the following activities:

1. Botanical expeditions; These expeditions have been made to determine the geographical distribution of the two wild species under this study, to collect germplasm and to correlate habit and habitat.

2. Selection of the area of study based on the size of the populations, transportation and security facilities.

3. *In situ* studies, based on monthly monitoring of the ecology and phenology of the populations of each species;

-Abiotic environmental conditions; Soil structure and analysis, pH, humidity, temperature, luminosity.

-Biotic environmental conditions; Symbiotic relationships with other microorganisms (mycorrhiza), insect relationships and frequency (beneficial vs. predatory), other plant species associated.

-Monthly growth and development rate (Phenology).

-Germplasm collection; Here we use the IBPGR guide lines and database for our collections.

In situ studies - Abiotic environmental conditions:

Analysis	*H. Marginata*	*H. platystachys*
Soil Structure and Analysis		
Texture	F	Ar-F Ar.
pH	5.2	4.8
O.M.(%)	3.5	2.0
P (ppm)	9	3
Effective C.E.C.		
(Meg/100 gr. of soil)	14.8	6.7
Al (meq/100 gr. of soil)	1.9	4.5
Ca	8.2	1.5
Mg	4.6	0.6
K	0.11	0.11
Microelements		
Fe (ppm)	590	228
Mn	188	8
Cu	13	3
Zn	4	3
B	0.2	0.1
NH4	19	8
Saturation Extract Analysis		
Electric conductivity		
(mn hos/cm)	0.14	0.057
Cations (meg/lt)		
Calcium	0.31	0.20
Magnesium	0.12	0.03
Sodium	0.31	0.53
Potassium	0.06	0.04
Anions (meg/lt)		
Carbonates	0	0
Bicarbonates	0.18	0.14
Chlorites	0.66	0.06

Biotic environmental conditions: Symbiotic relationships with other organisms

Mycorrhiza studies: M.V.A.

The Heliconia literature do not report any research work done in relation to mycorrhizal association. Under tropical conditions, mycorrhiza play an important role in the nutrients and hydraulic balance specifically with phosphorus which is one the limiting elements in tropical soils (Jaizme, V. et al, 1991; Lin and Fox, 1987; Iyer et al., 1988; Rizzard, 1990; Lin and Fox, 1992).

We are trying to approach its study, but we are only at the beginning.

So far we have applied the stain technique to determine the presence of mycorrhiza in the host plant. In the laboratory, soil samples are sieved to count spores from each species following the methods described by Sieverding, 1983. In *H. marginata* 26.1 spores were found per gr. of soil. In *H.* platystachys, 19.7 spores were found per gr. of soil. To multiply the fungi and to inoculate samples of plants we are carrying out an experiment to observe the efficiency of mycorrhiza using a grass, *Brachiaria decumbens* as a control plant. The experiment is still in progress.

Entomological studies

There are several reports dealing with Heliconia/insect relationships (McCoy, 1984; Seifert, 1979; Seifert & Seifert, 1979; Strong, 1977).

In our research work we found numerous species of insects that have been identified by national and international specialists.

At the foliage level, are found several species of Chrysomelidae that perforate the young leaves. There are also Homoptera associated with ants. However, the attack in *H. platystachys* is not as severe as in *H. marginata*, on which there are bigger populations of Homoptera.

Inflorescences are surrounded by large numbers of ants and some Homoptera associated with them. Lepidoptera from the family Pyralidae and roaches (Blatidae), Diptera, Hymenoptera, Coleoptera (Curculionidae), Thysanoptera and Scolytidae, all are found inside the bracts and flowers.

At the end of the research work we expect to have a broad view of the insect relationships with these species and to correlate their frequency with environmental conditions. For

Chemical composition of the plant parts

H. marginata	N	P	Ca	Mg	K	Fe	Mn	Cu	Zn	B
Pst + Leaf	1.1	.17	.62	.65	3.61	204	1070	155	16	13
Rhizome	.9	.10	.47	.45	1.35	10050	795	61	76	31
Root	1.2	.19	.455	.31	4.34	94	321	18	32	12
Inflorescence	1.5	.26	1.04	.83	4.97	191	1600	13	30	19
H.platystachys										
Pst	.6	.13	.29	.25	2.39	44	332	7	29	9
Leaf	2.1	.14	.29	.30	1.76	103	394	18	14	7
Rhizome	.9	.008	.65	.559	1.71	2245	575	16	97	16
Root	1.2	.30	.41	.60	4.15	3045	895	22	27	23
Inflorescence	2.0	.24	1.08	.58	9.67	103	696	23	70	14

this type of work we considered that the knowledge of the beneficial as well as the predatory insects will allow us to apply biological control in the near future, instead of agrochemical control, which will help save the tropical environment.

Other plant associations

The tropical Biodiversity exhibits extensive relationships among several groups of plants and other organisms. In our research we are taking samples of the plant species associated with the two species of *Heliconia* and so far we have found the following plants growing with them and sharing the same habitat.

With *H. marginata*:

Because the habitat of *H. marginata* is in swampy areas, that condition limits the possibility for other species. However we found that *Stromanthe jacquinii* shares the habitat during some part of the year (June and July).

With *H. platystachys* :

This species shares its habitat with several species of *Heliconia* and other Zingiberales. Among those species are: *H. spathocircinata, H. latispatha, Costus friedrichsenii, Dimerocostus strobilaceus, Calathea lutea, Calathea* sp., and *Renealmia* sp..

Monthly growth and development rate

For this study, plant observations have been divided into three stages:

1. Seedling state,
2. Juvenile clone,
3. Adult clone: Reproductive and sterile.

The monitoring parameters of vegetative growth are: Length of pseudostem, Number of leaves of the seedling, Number of leaves of the clone, Number of seedlings per clone, Distance among clones, Inflorescence length, Number of bracts of each inflorescence, Number of bracts open, Number of bracts with fertile flowers, Number of bracts with immature fruit, Number of bracts with mature fruit.

Beside those parameters, for each species we are taking the following data: Slope of the area where each clone is growing, Distance of the clones from flowing water, Location of the clones in relation to the forest gaps, forest edge and pasture land, Total area of each population.

All the information gathered, is organized in a data base and we ultimately expect to have a clear idea of the behavior and preferences of each species.

Standardization of tissue culture media

The culture medium is basically Murasshige & Skoog with the following modifications:

For initiation of flower meristems and embryos; Liquid media plus BAP 7 ppm.

For grow and development; Solid media plus BAP 7 ppm, AIB 1 ppm and AG3 1 ppm.

For rooting; BAP 1 ppm, AIB 1 ppm.

Germplasm collection

Based on IBPGR guide lines for a germplasm collection, we designed a system for *Heliconia* species and we are taking the information needed for a gene bank. Currently, we are writing a grant proposal dealing with the establishment of a germplasm bank for cryogenic conservation for this genus, starting with these two wild species.

At the *ex situ* germplasm bank we already have about 30 species of Heliconias from Antioquia and we are collecting other species from different geographical areas in Colombia.

That germplasm has been used to select diverse explants for use with tissue culture techniques.

In addition to their importance as cut flowers, we are planning to explore in the near future, other ethnobotanical uses such as a natural preservative (antioxidant) reported by Prance & Kallunki (1984), medicinal reported by Altschul (1973), and edible properties reported by La Rotta (1989).

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THE ROLE OF THE HSI *BULLETIN*

After ten years of existence, it is time to remind our members of the role of our publication, the *Bulletin* of the Heliconia Society International (HSI).

Usually, the *Bulletin* will be published quarterly. It is planned that HSI members receive four issues per annum. This task can only be guaranteed with the valuable input of all HSI members and Heliconia enthusiasts. The Bulletin is your bulletin - your newsletter!

The present editorial team of Rudolf M. Sterkel and Dr. Gilbert S. Daniels combines the experience of a production oriented horticulture consultant, with that of a botanist and heliconia collector.

We, the editors, should be the collectors of information, but not the sole source of generating stories. Rudolf is responsible for collecting information. His main role is to communicate with prospective authors to compile information and obtain manuscripts. Gil edits your valuable input and produces the final copy that goes to the printer.

Mailing is done by Rudolf out of Sycamore, Illinois, except for Australia and South East Asia which is shipped in bulk to Australia and then mailed to individual members from there.

When submitting manuscripts, please include color slides with titles and appropriate notes to explain your photos. They will be returned as soon as possible. We are very eager to follow the recommendation of our Board of Directors to publish full color issues.

The *Bulletin* is the best communication link among HSI members. Only the *Bulletin* can inform all members about activities within the society. Reports about the biennial international conferences, decisions of the Board of Directors and important membership information can only be found here.

Your editorial team is appealing to you to share your knowledge with fellow HSI members around the world. Please send us your information. We would like to receive:

1)Research reports about -

- Taxonomy.
- Production methods. Here we are looking for material to publish a series called Heliconia production worldwide. Please send in manuscripts about production of any Zingiberales in your respective home country. Please include statistics, production, marketing, varieties, problems, future thoughts, etc.
- Plant protection.
- Post harvest treatments.
- Environmental issues.
- Newer propagation methods, for example propagation by seed or tissue culture.

2) Travel reports -

HSI-members are frequent travelers:

- To collect plant material.
- Visit gardens and plant collections all over the world.
- Visit friends within HSI.
- Work with market places.
- On assignment as consultants to promote production of heliconia and relatives.

3) Marketing reports -

Accurate marketing information is desperately needed. The VIIIth International Heliconia Conference in Frankfurt, Germany focused on these aspects more than any other previous conference. Please send us information about:

- Markets for heliconias and relatives.
- How to prepare flowers for the market, particularly about shipping and handling, and post harvest methods.

4) Advertisements -

The last pages of each bulletin are usually reserved for Announcements and Advertisements.

- Announcements are free of charge for HSI-members, as long they are HSI-related and non-commercial.
- Advertisements cost $20 US per entry for up to 50 words or $40 US per entry for 51-100 words per volume (4 issues). Please send check or money order in **US Dollars** to Gil Daniels together with your ad.

We thank our predecessors for their great contributions: Dr. W. John Kress, Fred Berry, Bob Hirano and Ray Baker, and eagerly await your response.

Sincerely yours,

Your editorial team, **Rudolf and Gil.**

Important Notice

HSI Headquarters has moved

New Address:

Heliconia Society International

c/o Fairchild Tropical Gardens

10901 Old Cutler Road

Miami, FL 33156-4296 USA

Where to Find Literature About Heliconias?

In recent bulletins we published the bibliography *"Heliconia* (Heliconiaceae) A Bibliography" and an update. All of this information was compiled by our Board member Sandra Barnes, librarian at the Main library of the University of the West Indies in Trinidad & Tobago.

Sandras remarkable efforts trace almost all publications written about *Heliconia.*

However her task would be much easier with the support of all authors. Please send a reprint or photocopy of your article to Sandra as soon as available. May we appeal also to all HSI members to look out for publications. If you come across anything about the genus *Heliconia* or any other member of the Zingiberales in the literature, please send copies of those articles with name of author, source etc. to Sandra as well. This will help her to continue to compile a list of all literature in a timely manner.

Foreign language publications are of particular interest. Please send them as well, but write a short summary in English and include some key words. Let us show, that HSI is truly international.

All this work will benefit HSI members, researchers,

libraries and HSI enthusiasts all over the world.

As a further special service to HSI members, you actually can order photocopies of these publications mentioned in the bibliography directly from Sandra in Trinidad. Photocopies and postage cost money. Neither HSI nor the University of the West Indies have funds for this service, so please expect to pay for your order.

Costs for reprints will usually be $0.50 US per page plus postage. **Do not send money with your order.** You will be billed for actual costs before the copies are sent.

Please address your requests to:
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Trinidad & Tobago

Heliconia at Cisalada Permai

***Mrs. H.F. Abdulkadir**, Jl. Patimura 43, Kebayoran Baru, Jakarta 12110, Indonesia*

From the time of its founding, five years ago, Cisalada Permai Nursery in Indonesia has rapidly expanded its plantings of *Heliconia*. Originally there were only available a few species of *Heliconia* that have long been in cultivation in Indonesia, i.e. *Heliconia rostrata, H. collinsiana,* and a red form of *H. bihai*. Additional species were imported from Hawaii and Australia. Starting with such species as *H. caribaea* and *H. psittacorum*, the collection has now grown to include more than 68 different species.

Cisalada Permai Nursery is located on the slope of Mount Salak at an altitude of 500 meters (1640 feet) above sea level, with average daily temperatures of 25 to 30° C (77-86° F) and an annual rainfall of 2500 mm (100 inches) per year.

The ambient conditions of temperature and rainfall, together with ample sunlight are thus conducive to excellent growth in *Heliconia*. While most species respond well to a high incidence of sunlight, a proper balance of light intensity and fertilization is required for optimum bloom. As an example, *H. sharonii* requires shade for the development of good stem length. Plants will grow in full sun, but their growth is stunted under these conditions. *H. platystachys*, on the other hand grows well in the shade, but requires supplemental fertilizer provided in the form of cow or goat manure to bloom well.

In addition to *Heliconia* species, several species of *Musa*, as well as gingers and anthuriums are grown at Cisalada Permai.

Heliconias in Guayana

***Boyo Ramsaroop**, Double B Exotic Gardens, Georgetown, Guayana*

In 1985, there were only three types of *Heliconia psittacorum* known from Guyana. At that time, however, there were already eleven varieties grown on the late Adrian Thompsons' farm, which I subsequently acquired from him. Adrian Thompson was the pioneer of Heliconia cultivation in Guyana. As a result of finds that I later made in other parts of the country and subsequent hybridisation, my firm, Double B Exotic Gardens, now has over sixty colour forms of *H. psittacorum*. These colours range from a very dark red, almost black, to a very pale pink, almost white, through oranges, yellows and peach. I also have what may be the worlds only variegated *H. psittacorum*. This plant, which I call 'Peto', has a green and white variegated leaf and bears a pink inflorescence very similar to one I call 'Savitri'.

Among the more outstanding cultivars are 'Petra' which has orange-red bracts usually eight inches long, 'Brigitte' which is peach, 'Nadja' which is florescent pink and 'Double B Pink' which is the largest of my collection, with bracts typically ten inches long.

New hybrids include 'Queen Elizabeth' which has off-white bracts with pink tips and cream fruit and was first noticed during the visit of the Queen to Guyana last February (1994), 'Kamaria' which has peach bracts and greyish cream fruit and 'Babe' which has dark brown bracts with brown fruit. New hybrids that are continuously evolving are mainly a result of open pollination through the activities of hummingbirds.

Most of the Psittacorums that I have found in Guyana, are from the Laluni area which is eight miles north-east of Soesdyke on the eastern bank of the Demerara. Double B Exotic Gardens is, in fact, reputed to have one of the widest selections of the *Heliconia psittacorum* in the world and this has been substantiated by renowned botanists such as Dr. Paul Maas from the University of Utrecht in Holland and our own HSI president, Dr. John Kress from the Smithsonian Institution in Washington D.C., U.S.A..

In addition to the Psittacorums, I have also collected previously unknown varieties of the larger heliconias. In the Nappi area in the Kanuku Mountains in south-western Guyana, three types of *Heliconia Bihai* possessing various combinations of yellow and red were found and named after that area. In the Suma Kuma area on the same mountain range, the 'Kuma' and the 'Kuma Negro' were found. A *Heliconia chartacea* cultivar which has been renamed Sexy Scarlet, much to my dismay, was also found in these mountains.

In the Hubu area, near Parika on the eastern bank of the Essequibo, I first found a yellow *H. spathocircinata* and then, a bit later, a cross between the yellow and common red forms. I have also found another *H. nickeriensis* in the Canje to Nickerie area. This variety is red as opposed to the previously known orange one found by Dr. Paul Maas.

Incidentally, in remote areas of Thompson's one hundred and seventy acre farm, which he named Arawak Farm, I found a new *H. bihai* which I named 'Adrian' in his honour and a new *H. stricta* which I named 'Iris' in honour of the late Iris Bannochie, who is often thought of as the mother of HSI. On another of my farms, near the Madewini creek, a new *H. bihai* was found which I named 'Timehri' which is sometimes referred to as Purple Throat.

One of my key policies in collecting heliconias, is that only a few from the newly found varieties are removed. This is carefully done so that the natural habitat is disturbed as little as possible. The new heliconias are then cultivated on our farms and, should these plants perish in the wild, for reasons such as disease or deforestation, they will still be preserved as part of

the worlds floral heritage.

I am very happy to say that Double B Exotic Gardens has in its own small way contributed to the popularity of heliconias today, and we have exported thousands of rhizomes to most of the major heliconia growing countries of the world.

Rhizomes, however, have the disadvantage of tending to be sensitive and, as such, their survivability is very hard to guarantee. We have, therefore, experimented with a new system of propagation using sawdust and coconut fibre, with the intention of exporting plantlets rather thae rhizomes. We have found the survival rates of these plantlets to be in the 90% range. This new method, though a bit more expensive than rhizomes, saves three weeks planting time in the tropics and six weeks in temperate conditions, and, has a higher success rate. The purchasing of these plantlets would be cost effective for those persons operating out of greenhouses. In addition, the media of sawdust and coconut fibre to which the roots cling , is treated against nematodes and other pests and diseases and is permissible into most countries.

As a result of our exports, the heliconias of Guyana are to be seen on almost every continent of the world.

Will The Real *Calathea ornata* Stand Up?

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Introduction

The Marantaceae (Prayer Plant Family) is a pantropical family of some 525 species in 31 genera with 80% of the species in tropical America. They occur as understory herbs in lowland rainforest to cloud forest and semi-deciduous forest habitats. They are of considerable interest to horticulturists because of their beautifully patterned foliage. Ninety-five percent of the patterned-leaved species are from tropical America, and 80% (86 species) are in *Calathea*, the largest genus in the family. Next in order are *Ctenanthe* with 9 and *Maranta* with 5 species.

The "Ornata" group of *Calathea* (Kennedy, 1986) is grown for the juvenile foliage which is dark green with pink or white lines. The taxonomy and nomenclature of the horticultural members of this group is inordinately confused. There are three main reasons for this: many species were described from juvenile plants, patterns change or disappear as the plant matures, and some species are polymorphic for patterns. Many species of the "Ornata" group were described from juvenile, vegetative individuals in catalogues such as Linden's or Sander's, or in botanical/horticultural publications such as *Belgique Horticole*, *Flore des Serres*, etc. Often the description was just a few lines or an illustration of the leaf, but these species are validly published. However, there are a number of species which have similar juvenile patterns, so most subsequent taxonomic treatments have lumped them together as varieties of one species or considered them "merely forms" (Bailey and Raffill, 1914). In fact, growing them in botanical gardens where they can flower has shown them to be distinct species. Some illustrations in original publications are actually accurate enough to distinguish which one of several similarly patterned species was being described and named. The original description of *C. majestica*, as a *Maranta*, is vague, but the plate is accurate enough to identify the species. In the absence of a type specimen, I have designated this plate as the type.

Species of the "Ornata" group usually lose their juvenile pattern as they mature, often being plain green as adults. Some even change to a different pattern as subadults! Horticultural introductions were named and described from live, juvenile plants. Botanical collections, *i.e.* herbarium specimens of flowering individuals, were also named and described, so not surprisingly some species were described two or more times.

Some species are polymorphic, with different pattern forms in different parts of the range, or even with different genetically controlled pattern forms in the same natural population. *Calathea majestica* usually has lined juvenile leaves, but one form has a distinct "brush" pattern of 2 broad, longitudinal, yellowish green bands. This was described as a different species, *C. princeps*, but it is merely a form of *C. majestica*, which I have treated horticulturally as *C. majestica* cv. Princeps. (Since a Latin name can be used as a cultivar name if the cultivar had been published under that name as a species).

The species of the "Ornata" group have consistently been misnamed in the horticultural industry. What is sold as *C. ornata is* actually *C. majestica*, and the so-called varieties of *C. ornata* are actually distinct species in their own right.

Historical Perspective of the "Ornata" Group - 1847-1914.

Calathea ornata was introduced into horticulture from seeds collected in Colombia by J. J. Linden (Lemaire, 1848). Linden first advertised it for sale in his catalogue of 1847 as *"Maranta sp. nova* (Très-belle à feuilles discolores, rayées de blanc rosé)". It was published under the name *Maranta? ornata* by Lemaire (1848) in *Flore des Serres*, where he distinguished two varieties (actually just forms) based on the color of the leaf markings, "foliis *albo-lineata*" and "foliis *roseo-lineatis*". The species, *Maranta ornata* is validly published, but not the proposed varietal names. In his 1849 catalogue, Linden lists the two color forms as two species: *Maranta roseo-lineata* and *Maranta albo-lineata*, but based on the same illustrations as *C. ornata*.

Calathea regalis (Rollison ex Lemaire) Kennedy, ined., was first illustrated and published by Van Houtte (1854-1855) in *Flore des Serres* as *"Maranta?*sp. var. *regalis*". The publication is invalid as no specific epithet was given for the variety. It was introduced from Lima, Peru, according to Van Houtte (1854-1855) by M. M. Rollison & Sons of Tooting and the name was validly published by Lemaire (1855) using the same illustration as in *Flore des Serres* but reversed left to right. Lemaire (1855), in comparing *C. ornata* and *C. regalis* noted neither had flowered but it is probable that the distinction between the two species would be confirmed by more complete characters, which indeed it was. Koernicke (1858, 1862), however, treated *M. regalis* as a variety of *C. ornata*

Calathea vittata Koernicke apparently wasn't validly published until 1860 although it was clearly introduced earlier, probably before *C. regalis*, as it [as *Maranta vittata*] was advertised in Van Houtte's 1853-1854 Catalogue. Koernicke (1860, 1862) points out that *C. vittata* differs from (*C. ornata*) "Varietät *albo-lineata*" by the wider, more constantly paired, white lines on the upper leaf surface which nearly touch the midrib, and the pale green, rather than red-brown lower leaf surface. He notes also (1860) that it was distributed under the

Figure 1. *Calathea majestica* published as *Maranta majestica.*

Figure 2. Inflorescence *of Calathea ornata*.

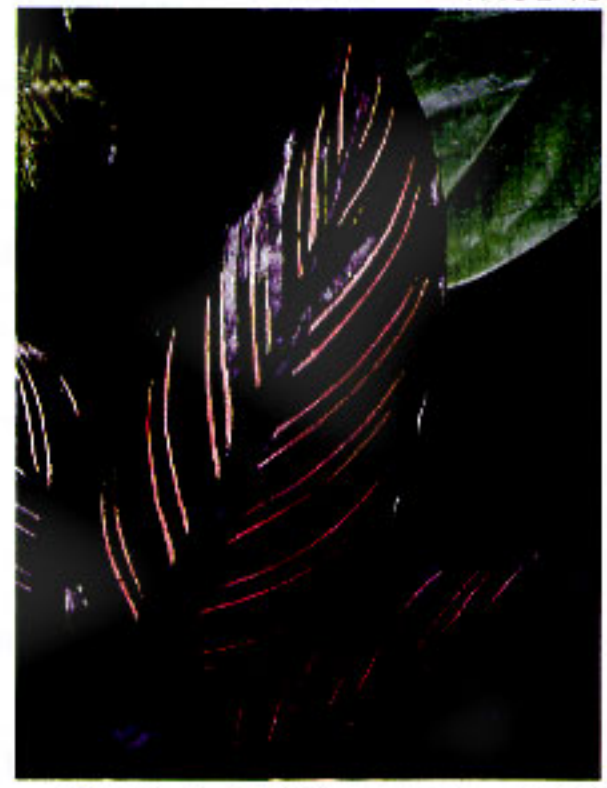

Figure 3. *Calathea ornata* - initial juvenille pattern.

Figure 4. *Calathea ornata* - later juvenille pattern.

Figure 5. *Calathea elliptica* 'Vittata'.

Figure 6. *Calathea majestica* 'Albolineata'.

Figure 7. Inflorescence of *Calathea sanderiana.*

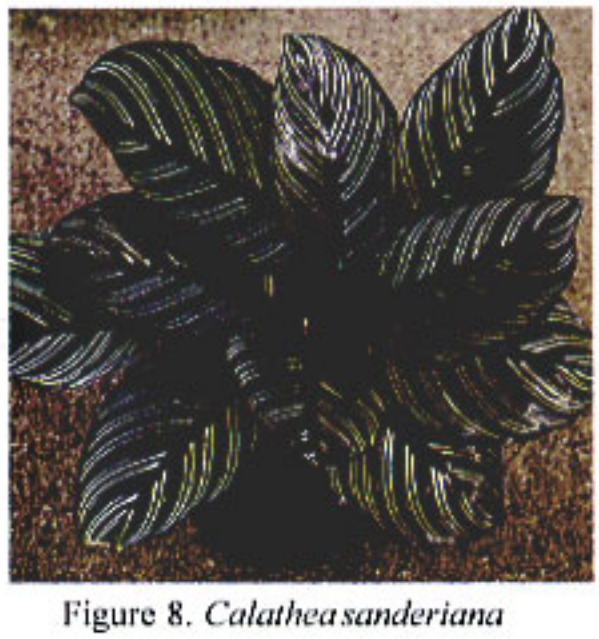

Figure 8. *Calathea sanderiana*

Figure 9. *Calathea sanderiana* - juvenille pattern.

name *"Phrynium pumilum* in den Garten". In Lowe's (1861) book, *Beautiful Leaved Plants*, both *Maranta vittata* (pl. 38) and *Maranta alba-lineata* (pl. 55) are illustrated and he credits Linden for the introduction of *M. vittata*. The illustrations of the two are very much alike, possibly the same species. The plant listed as *M. alba-lineata* is quite unlike the original illustration of the white-lined variety (form) of *C. ornata*, and is virtually identical with the cultivar 'Vittata' currently sold commercially. Koernicke (1858), referring to the two varieties of *C. ornata*, states "Beide Varietäten aus Cayenne und Columbien, von Linden eingefuhrt". *Calathea vittata* (the white-lined cultivar of *C. elliptica*) occurs from Colombia to the Guianas; however, *C. ornata* is known only from eastern Venezuela and adjacent Colombia, which suggests that some of Linden's later collected material, perhaps of the white lined form of *C. elliptica*, probably was erroneously distributed in gardens under the name *Maranta albo-lineata*. Koch's (1864) excellent publication gives the first detailed description of mature, flowering individuals of both *C. ornata* and *C. vittata* (both as *Phrynium)*. Koch (1864, p.48) described the inflorescence of *P. ornatum* as 11.5 X 5 cm with bracts more or less membranaceous, oblong and ochre-colored. This inflorescence description clearly fits the patterned *Calathea* from the area of Maracay, Venezuela *(Kennedy 3848*, MY) an area Linden visited on his collecting trip in 1842. The description of the inflorescence of *P. vittatum* leaves no doubt that it is merely a patterned form of *Calathea elliptica* (Roscoe) Schumann.

Calathea majestica (Linden) Kennedy, introduced in 1864 from Peru, was first published as *"Maranta (Phrynium) majestica* Linden", in Linden's 1865 Catalogue. It was discovered by Linden's collector Wallis in the forests of the Rio Purus and from there has become one of the most widely cultivated of the ornamental Calatheas, rivaled only by *Calathea zebrina* (Sims) Lindley. Shortly after, Linden (1869) introduced another of Wallis's discoveries, published as *Maranta (Phrynium) princeps* Linden. Morren (1870) and Regel (1879) both treated the species *M. majestica* and *M. regalis* as varieties of *C. ornata*. Regel (1879) however, treated *Maranta princeps* as a distinct species in *Calathea*, *C. princeps* (Linden) Regel, because of its distinctive pattern of two broad yellow-green bands along the leaf. Flowering material of *C. princeps* later showed it to be merely a different pattern form of *C. majestica* (Kennedy, 1986). Nicolson & Mottet (1884, p. 455) listed *roseo-lineata, albo-lineata, regalis,* and *majestica* as four varieties under *C. ornata,* and then described the leaf of *C. ornata* as "...yellowish-green, relieved by broad transverse bands of dark olive-green...", clearly at odds with the original description and plates, and actually a description of either *C. princeps* or a form of *C. regalis*.

The second most commonly grown species of the "Ornata" group, *Calathea sanderiana (Sander)* Gentil was published as *Maranta sanderiana* in Sander's (1894) Catalogue, the year following its introduction at the Great Quinquennial International Exhibition in Ghent. The same year an excellent illustration of *M. majestica* was published in an article by L. Linden (1894) J. Linden's son, in which he protests that the plant recently exhibited in Ghent as a new introduction under the name *Maranta sanderiana is* the same as his *M. majestica!* Alas, even he confused these two species when juvenile, apparently not quite the botanist his father was. Later, in 1901, Bergerstein and Abel essentially redescribe *C. majestica* under the name *Maranta imperialis,* using as an illustration (fig. 18) the identical plate L. Linden (1894) previously published of *Calathea majestica!* (Figure 1).

Two more species in the "Ornata" group were described in the early 1900's but this time from mature, flowering individuals. *C. gigas* Gagnepain was described from a plant in the Paris Conservatory; and *C. contamanensis* Huber was described from a plants collected in Peru by Huber which flowered in the botanical garden of the Museo Goeldi. After growing a number of these patterned juveniles to maturity in botanical gardens, their identity and relationships could be better determined: *C. gigas* and *C. majestica* are the same species botanically as are *C. contamanensis* and *C. sanderiana.*

Bailey & Raffill (1914) confused the issue even more, remarking that "The forms this plant (*C. ornata*) assumes during the different stages of its development have been distinguished by some nurserymen who have distributed them under separate names, *C. regalis, C. majestica,* and *C. rosenstriata.... Maranta albo-lineata* has been referred by some authors to this species but it has no near affinity and is a different plant from *C. ornata, C. imperialis* or *C. sanderiana".* And later, he mentions the previous three taxa "...are probably all forms of one very variable species". It is hard to know just what was being sold under these names at that time.

Species with the "Ornata" (lined)Pattern

Calathea ornata (Lemaire) Koernicke, *Gartenflora* 17: 87. 1858. (Figures 2, 3, 4)

Occurrence: It is found in NE Colombia and adjacent Venezuela, and is locally abundant in Parque Henri Pittier, in the State of Maracay, Venezuela. It is very rare in cultivation. *Calathea ornata* is, unfortunately, much more difficult to grow than is *C. majestica.*

Pattern: The juvenile foliage is initially purple below with pink lines above which, in later produced leaves are white, then fewer and less pronounced and finally disappear altogether. The underside of the leaf goes from purple to green or remains purple in the adult foliage. The size or age at which the leaves change from pink to white lines varies among individuals and may have a genetic basis, though it could possibly be influenced by culture. Some small plants observed in the wild had white lines whereas some clearly older and larger plants in cultivation had retained pink lines.

Fortunately, there is a specimen of one small patterned leaf in the St. Petersburg herbarium which, because of its characteristic hairs on the upper side of the leaf, was sufficient for certain identification.

Calathea regalis (Rollison ex Lemaire) Kennedy, unpublished.

Occurrence: It is known only from the Departments of Huanuco and Loreto in Peru. *Calathea regalis* is uncommon in cultivation, primarily grown in botanic gardens, but certainly more frequently cultivated than *C. ornata*

Pattern: The juvenile foliage is purple below with pink lines above. Later leaves begin to lose the lined pattern, the lines narrowing and changing color as a lighter yellowish green area develops on either side of the lines. The lined pattern is replaced by a "brush" pattern with two broad areas of yellow-green on either side of the midrib and underside as the leaf looses the purple. This transitional pattern is lost and

the leaves are plain green or with a faint hint of the yellow-green when the plant is in flower. The coloring of the plate with lighter green areas along the pinkish lines, I feel is not merely shading but what the artist actually saw. The manner of the transition in patterning is unique for *C. regalis*.

Calathea elliptica (Roscoe) Schumann, *Pflanzenreich* IV. 48: 75. 1902. (Figure 5)

Occurrence: It is fairly wide-spread in northern South America, found in Colombia, Venezuela, the Guianas and northern Brazil. It is wide-spread in cultivation as well, by the cultivars 'Vittata' and 'Wilson's Princeps'. Both are in tissue culture and 'Vittata' is by far the more commonly cultivated of the two.

Pattern: The leaf pattern is polymorphic within the species, the leaves unpatterned, patterned with white lines or patterned with a "brush pattern" above and green below. At least in some places different forms occur within the same population. The lower leaf surface is purple or tinged purple initially but the color is quickly lost in the early stages of growth. In this species the pattern persists in the mature foliage, though somewhat diminished in intensity. The lined form is referred to as *C. elliptica* 'Vittata'. The "brush" patterned form is found mainly in French Guiana and is sold as 'Wilson's Princeps'.

Calathea majestica (Linden) Kennedy, *Canadian J. Bot.* 64: 1325. 1986. (Figure 6)

Occurrence: This species is found in Amazonian Colombia, Ecuador, Peru and Brazil. It is one of the most common species of Marantaceae in cultivation and is very widespread in tropical gardens as a landscaping plant especially in the Americas, but also in Asia and Africa. It has even reached Tahiti, Samoa and Rarotonga.

Pattern: The pattern is polymorphic within the species, but quite constant within a geographic region. There is more variation in patterning within C. *majestica* than in any other species of the group. Four color forms are presently in cultivation (Figure 10). Three of these cultivars are quite common: 'Princeps', 'Roseo-lineata' and 'Albo-lineata'. The fourth is less commonly cultivated. Only in 'Albo-lineata' does the leaf loose the purple color with maturity. While cultivars 'Princeps' and 'Roseo-lineata' loose their pattern as mature plants, the other two retain it. Selfing of cultivar 'Albo-lineata' showed it to be heterozygous both for pattern and for the loss of pattern. The segregate plant pattern obviously exists in the wild but not in cultivation. The cultivar 'Roseo-lineata' is found in Colombia, Ecuador and Peru and is the most common form. Dr. Jesus Idrobo (pers. com.), at Universidad Nacional in Colombia, reports finding 'Albo-lineata' near Villavicencio in Colombia, and Dr. Ratter (pers. com.) of Edinburgh Botanical Garden, reports collecting 'Princeps' in Amazonian Brazil.

The distinguishing character in this species is the row of hairs along the veins on the under side of the leaf.

Calathea grandis Petersen, *Mart. Fl. Bras.* 3(3): 124. 1890.

Occurrence: This species is found in Venezuela, Trinidad and the Guianas. It is uncommon in cultivation, currently known only at Selby Botanical Garden.

Pattern: The juvenile leaves have thin pink lines above, and are green or tinged purple below. The purple coloration is lost early and the mature foliage is plain green. Schumann's (1902, p. 100) citation of Jenmann 2110 (K) from Guiana as *C. ornata* is incorrect and is in fact, *C. grandis*.

Calathea sanderiana (Sander) Gentil, Liste Plantes Cultivees dan les Serres Chaudes et Coloniales, *J. Bot. de l'etat Bruxelles*. 1907, p. 117. P. Weissenbruch, Bruxelles. (Figures 7, 8, 9).

Occurrence: This species is found in the western portion of the Amazon basin, in the Departments of Loreto and Madre de Dios, Peru. It is common in the horticultural trade and in cultivation generally. It is currently in tissue culture.

Pattern: *Calathea sanderiana* has the typical pattern development of pink lines on the upper surface of the leaf changing to white and virtually disappearing in the mature plant. However, the underside of the leaf retains the purple coloration throughout and some leaves may still show some patterning when flowering. The characteristic features are the minute hairs throughout on the undersurface of the leaf, the very dark bluish green color above with some lines distinctly thickened near the midrib.

Huber collected flowering material from the Botanical Garden of the Museo Goeldi which, like the type, he annotated as "Calathea lineata Hub. n. sp." (MG) but later published as *C. contamanensis*.

Calathea gymnocarpa Kennedy, *Bot. Notiser* 130: 333, fig. 1, 2A-B. 1977.

Occurrence: This species is found in SE Nicaragua, the Osa Peninsula of Costa Rica, the Atlantic lowlands of Costa Rica and Panama as well as NW Colombia. It is uncommon in cultivation, but found in occasional Botanical Gardens or private specialist collections.

Pattern: Polymorphic within the species but local populations are quite uniform. The juvenile foliage has the typical pink lines above, and is purple below. As the plants mature the lines as well as the purple coloration are lost, and the mature leaves are plain green. However, plants from SE Costa Rica retain the purple coloration throughout and go through a secondary brush pattern as a sub-adult before losing the pattern altogether.

It is strange that this species was not published earlier, as an illustration was made of it from a plant cultivated at Kew from material of Forget and the specimen, Sander 485 (K) was annotated as *"Calathea forgetii"* clearly in anticipation of being published as a new taxon. It is easily distinguished by the hooked hairs on the underside of the leaf.

Calathea bantae Kennedy, *Canad. J. Bot.* 64:1321, fig 1. 1986.

Occurrence: This species is found in Colombia and Amazonian Ecuador. It is relatively uncommon in cultivation.

Pattern: It is polymorphic for pattern within populations in Ecuador, having patterned and unpatterned individuals which either retain or loose the purple coloration. The patterned individuals generally retain the patterning, even in the flowering stage.

Calathea multicincta Kennedy, *Canad. J. Bot.* 64: 1323, fig. 2. 1986.

Occurrence: This species is currently known only from W Ecuador. It is also uncommon in cultivation, found in only a few botanical gardens.

Pattern: It is polymorphic within populations for presence or absence of the lined pattern, and in some areas of its range has a "brush pattern". The leaves are green below even in seedlings.

Juveniles are distinguished by the wide white lines on dark

Figure 10. Cultivars of *Calathea majestica*: above, 'Princeps'; right, 'White Star'; bottom, 'Roseo-lineata'; left, 'Albo-lineata'.

green, and hairs on the upper surface along the midrib and base of leaf and the long acuminate-attenuate leaf tip.

Conclusions

As the juveniles are more similar to each other than mature plants and all exhibit the striking lined pattern, real differences are often overlooked, or attributed to stage of growth. This is especially true in comparing a single plant to an illustration or description. Once a misidentification occurs it is compounded as the plants are distributed among growers and between botanical gardens and thus the misidentification becomes the accepted name. In this case, the earliest named but most difficult to grow species, *C. ornata,* was replaced in the horticultural trade by *C. majestica,* an excellent grower with a similar patterned leaf. Within a few years, the name *C. majestica* had virtually disappeared, first viewed as a variety of *C. ornata* and later considered just a growth stage or form (Schumann, 1902; Bailey & Raffill, 1914) of *C. ornata* Today it is most often sold under the name *C. ornata* var. (or cultivar) roseo-lineata, a clearly misapplied name. The two invalidly described varieties of *C. ornata* are in fact more like color forms as judged by the original description and plates. This example illustrates the critical importance of vouchering both juvenile as well as mature plants of horticultural introductions.

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Correction !

In the last issue of the HSI *Bulletin* (Vol.7 No.1/2), Plate 2 in M. Elizabeth Rogers' article on "Gorillas and Gingers" was printed upside down.

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