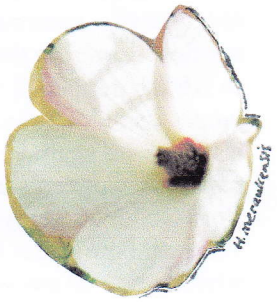
ASSOCIATION OF SOCIETIES FOR GROWING AUSTRALIAN PLANTS

HIBISCUS AND RELATED GENERA STUDY GROUP

OCT/NOVEM. 2008 NEWSLETTER NO. 16 : ISSN 1448-1448

A meeting of our Study Group at Buderim
Left, Colleen Keena, centre Geoff Harvey
right Peter Bevan



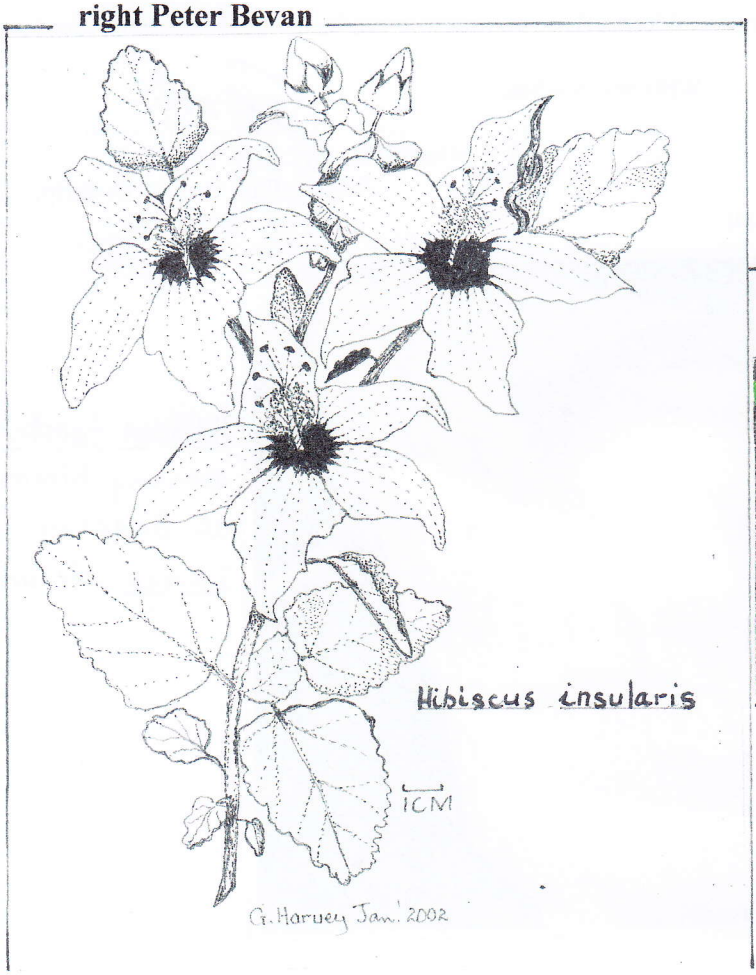
INSIDE ;

ARTICLE ON
Hibiscus insularis.

PLUS :

The Hibiscus Furcaria Section in Australia


H. divaricatus



NEWSLETTER NO. 17

After 16 issues of the Newsletter commencing June 2003, I hope that we are compiling meaningful information on Australian Hibiscus and the Related Genera. This type of information wasn't available at all or very briefly covered in any books that I could find on Australian Plants. Also many species in the Malvaceae family are most palatable to our introduced livestock and it is difficult to judge to what extent decline has taken place. Other factors such as fires may have an adverse bearing on plant populations. We should look at these questions if and when data becomes available.

Colleen Keena with her comprehensive web site http://www.hibiscus.org/index.php is by far the best, authoritative reference with some great sections and links.

When we first started I was concerned we would be scratching to continually put articles together. It is now obvious, the opposite is true with more and more subjects needing to be covered. We are making use of colour images to enhance articles on this very neglected Plant Family.

Thanks to Colleen Keena, Dr. Stephen Johnson and Dr. Dion Harrison in particular, the quality of our articles is improving with each issue. I am indebted to Colleen and Dion for their many suggestions in correcting and improving my article on "Understanding the Hibiscus Furcaria section in Australia". It took several attempts and much electronic mailing to arrive at the final version.

We still need to locate people around the country with a passion for Hibiscus to continually put together vital communication of knowledge. Every little bit of news such as occurrence of species, flowering times, what we grow in our garden etc, etc could one day be very important.

In Newsletter No 11 we wrote about the Genus ***Lagunaria*** with a good coverage of ***Lagunaria patersonia*** (Andrews) G. Don ***subsp. patersonia,*** the so called 'Norfolk Island Hibiscus'. In this issue we are again visiting Norfolk Island to look at the rare 'Phillip Island Hibiscus' – ***Hibiscus insularis.*** Colleen's article is accompanied by an impressive painting by Halina Steele.

Both Colleen and myself are donating some better quality paper to show off the various images.

The next Newsletter no 17 will appear some time after Christmas 2008, so Merry Christmas wishes go to all readers.

Please let me know of any proposed items that you may want to be covered in future Newsletters.

With best wishes,

Geoff

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Hibiscus forsteri opening bloom at Buderim. Image – G. Harvey

Painting of *Hibiscus insularis* – by Halina Steele

ARTIST'S BIOGRAPHICAL PROFILE
HALINA STEELE

Born in Queanbeyan, NSW in 1954, Halina has resided in Canberra for most of her life. She commenced painting with watercolours in 2000 and has exhibited with Canberra Botanical 2003-2006; Wildlife and Botanical Artists (ACT) 2003-2008; Botanica 2004, 2005, 2007 and 2008; and the 10th Annual Botanical Art Exhibition at the Filoli Center, California, USA in July 2008. In November 2004, Halina was awarded a Silver Medal by the Royal Horticultural Society in Westminster, London for a series of 8 paintings depicting Australian Native Hibiscus. She has also received awards for her botanical works from the Wildlife and Botanical Artists (ACT). Halina's paintings were accepted for the 12th International Exhibition of Botanical Art and Illustration held in September 2007 at the Hunt Institute for Botanical Documentation in Pittsburgh, Pennsylvania, USA. In July of the same year, she was invited to become a member of the Florilegium Society at the Royal Botanic Gardens Sydney Inc. Her paintings are held in the permanent collections of the Hunt Institute and the Botanic Gardens Trust, Sydney, New South Wales, Australia.

HIBISCUS INSULARIS

Colleen and Geoff Keena, Glamorgan Vale, Queensland

Hibiscus insularis (Family *Malvaceae*), *Phillip Island Hibiscus*

Hibiscus insularis is endemic to Phillip Island in the Norfolk Island Group. Phillip Island is a small island approximately 6 km south of Norfolk Island, over 1,000 km to the east of Australia. *Hibiscus insularis* is commonly known as Phillip Island Hibiscus. This distribution of this species can be considered highly fragmented as it occurs only as small isolated subpopulations (W1).

This hibiscus is in Section Bombicella which has a pan-tropical distribution. Hibiscus in this section are generally found in dryer regions but *Hibiscus insularis* is found in a wetter region (W2).

The International Plant Name Index indicates that *Hibiscus insularis* was recorded as long ago as 1833 (W3). This long recognition has been no guarantee of protection. While most references (e.g. W 1) note the struggle against feral animals such as grazing pigs, goats and rabbits, these have not been the only threats. Discussing *Hibiscus insularis* in 1914, one visitor wrote that "a few plants still remain on the island, but those I saw were in a most unhealthy condition, being covered with coccids, aphides, smuts, and other blights and pests. They were obviously maintaining an unequal struggle with an unfavourable environment" (W4).

The threats to the continuing survival of this species continue (W1). The feral animals have been removed and no longer pose a threat to the native vegetation. Currently, the greatest threat to Phillip Island Hibiscus is the invasion of Phillip Island by African Olive (*Olea europaea* subsp. *africana*) which competes with Phillip Island Hibiscus for water and nutrients, and can grow as dense thickets which block the expansion of Hibiscus populations. As well, moth caterpillars (of the species *Pectinophora scutigera* and *Asinoplaca cosmia*) have been found to inhabit the seed capsules of Phillip island Hibiscus and consume the seed. While this does not threaten current individuals of Phillip Island Hibiscus, it reduces the ability of the species to produce viable seed to enable the recovery and growth of the population. Soil erosion is yet another threat on Phillip Island as it reduces the ability of native vegetation to recolonise areas of the Island. Further risk factors include the cyclones that can sometimes be experienced in the early months of the year and the lack of vegetation which makes the island more vulnerable to erosion during periods of heavy run-off. Finally, a study of the biology of Phillip Island Hibiscus found that there was no evidence that the adult population consisted of more than one genetic individual. If this is the case then the species is also at risk from extremely low levels of genetic diversity (See W1 for references to current threats).

Hibiscus insularis is now protected by Australian Government legislation. As the number of mature individuals is extremely low, with the total population recorded during recent surveys numbering less than 50, this species is eligible for listing as critically endangered. The current conservation status of Phillip Island Hibiscus, *Hibiscus insularis*, is Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999.* (W 5)

With all of the introduced animals now removed from Phillip Island, seedlings are now growing near the original bushes (W 1).

Recommendations are given for threat abatement and recovery in W 1. Control and eradication of weeds (including African Olive) is being undertaken on Phillip Island and the Park management will undertake aerial layering of Phillip Island Hibiscus to induce vegetative reproduction and promote the recovery of the species. It has been suggested that several of the priority actions listed in Mosley (2001) for the conservation of Norfolk Island would also be of benefit to Phillip Island Hibiscus. A study of current land use patterns and rehabilitation needs on the islands, and development of a plan for soil rehabilitation, is recommended. The restoration of native vegetation and the eradication of weeds are also listed as priority activities. Information now available on the biology of Phillip Island Hibiscus can be used to develop more targeted conservation practices.

INFORMATION ON HIBISCUS INSULARIS

The following information is taken from the Department of the Environment, Water, Heritage and the Arts (2008) website (W1). This site provides detailed information, including references for the following.

Description

Phillip Island Hibiscus is a large shrub or small tree to 2.5 m high. Flowers are solitary and cream to light green coloured when they first open, with a dark magenta center, but turn reddish or purple as they age. The lobed leaves have a shiny upper surface, and are 3–5 cm long and 2–4 cm wide. See FIGURES 1,2,7.

Population Information

Propagated populations of the species are located at the Botanic Gardens on Norfolk Island and in Booderee Botanic Gardens in Booderee National Park (formerly the Jervis Bay annexe of the Australian National Botanic Gardens).

In 2003, there were fewer than 50 mature plants of Phillip Island Hibiscus growing on Phillip Island. In 1988, Phillip Island Hibiscus occurred as two small patches with respective diameters of 10 and 50 metres. By 2001 a third patch (10 by 50 m) had become established. The natural population has increased from previously recorded population levels (13 plants in 1939, and only eight plants in 1963).

Habitat

The preferred habitat of Phillip Island Hibiscus is difficult to determine given the impact of feral browsing animals on the Island. The Norfolk Island group has a subtropical climate and the volcanic soils are nutrient rich, friable and porous. They do not hold moisture well.

Life Cycle

Phillip Island Hibiscus seedlings have very small leaves, which develop into a deeply lobed juvenile form. This stage may persist for up to 20 years before the adult leaf form is produced. Since flowers are only seen once the adult foliage is present, Phillip Island Hibiscus has a long generation time.

This change in leaves has been noted elsewhere.

"There is a marked difference between the juvenile and adult foliage shapes, with tiny round leaves gradually changing over ten years or more to the large leaf commonly recognised as a hibiscus" (W6).

The flowers of Phillip Island Hibiscus grow in an upwards fashion at the ends of branches, with rarely more than one flower at the same stage on the same branch (See Figure 3). Large amounts of nectar are produced. The flowers are female when they first open (See Figures 4, 5), and one day later they enter the male phase (at which point they are capable of self-pollination). Over the next few days the flowers turn pink and close up, then wither. Separation of the male and female stages by one day increases the opportunity for outcrossing.

This species is believed to be bird-pollinated, but it is possible that the original pollinating species has become extinct. Phillip Island Hibiscus is capable of producing seeds by self-pollination, and is also capable of vegetative reproduction through stem-layering.

PROPAGATION

Some references indicate that propagation can be from seed (P1, p. 375; P2, p. 76), see Figure 6, however given the time taken for the life cycle, cuttings seem to be preferable. These can be firm wood cuttings taken in late spring (W7).

CULTIVATION

While *Hibiscus insularis* has not fared well in its original habitat, cultivation has ensured its place in horticulture, see Figure 7.

I suspect that there may be a difference between the water requirement of seedlings and cutting-grown plants. I wonder whether the root system of a seedling compared to the root system of a cutting-grown plant may mean different water requirements. I have grown seedlings, (judging by the number of years they have taken to flower) and have found that these perform quite well with no supplementary watering other than in extreme conditions. Our plants were watered only once even at the height of the drought last year yet the flowering was stunning this year.

Extreme Conditions

It has been noted that plants are damaged by frost (W13). We have found they can survive light frosts but at around -5C, the buds on exposed parts of the bushes are damaged and fall off although buds protected by overhanging foliage can reach maturity.

As the plants can take both full sun and partial shade, providing protection from summer heat and the cold of winter may mean the plant will be less affected by hot, dry conditions or by frost.

Fertilising

Our plants our grown as part of an informal garden, with paths meandering among the plants. The plants are such a feature when in flower, that one path leads straight to one of the bushes. The plants are mulched with sugar-cane mulch but don't receive any fertiliser. However, if the plants were to be grown in a more formal manner, the fertilising regime documented by Jeremy Coleby-Williams should be noted. He feeds his plants once a year with a pelletised, blended, organic fertiliser in autumn and once every month the plants get a foliar feed with liquid seaweed (W13).

Differences in cultivation and in the wild

As with other Australian hibiscus, cultivation means that the plant may perform quite differently from plants grown in the natural environment. In the wild this plants makes a largish, spreading shrub with beautifully layered branches and neatly serried rows of tooth-edged, little leaves. Pruned as a shrub they reach 3 or so metres high and 4-5 metres wide. Allowed to grow as a tree they're often multi-trunked, see Figure 8, with a broad arching canopy, reaching to 4 or so metres high and 4-5 metres wide. Storms can break tree branches when in flower (W13).

NEW USES

i. *Hibiscus insularis* is listed by Ergon Energy as a 'Plant Smart' tree suitable for Mareeba Shire (W14).

ii. Les Beers and Jim Howie (W7) have noted that the plant is ideal for growing in coastal areas as it is reasonably salt resistant.

They also note that it makes a fine hedge plant and windbreak.

Its use as a hedge plant to create a semi-formal, flowering hedge has been explored by Jerry Coleby-Williams. He has planted a hedge of *Hibiscus insularis* for some shade and shelter at the front of his garden and says that when the hedge is in full flower it stops traffic (W15, W16).

Jerry Coleby-Williams writes that there are many more side branches on this than on most other hibiscus species and that this is important when selecting a plant to create a hedge. He continues that that is why other hibiscus hedges are unworthy of the title 'hedge'. 'They just don't sprout enough to be clipped and look well-clothed in foliage and often quickly become leggy and sad-looking' *. His hedge has one annual cut after flowering that allows it to be shaped semi-formally. Cutting back after flowering means flower buds are initiated for the next season (W13). The tips of the bushes need to be pinched out to encourage bushiness (W12).

ILLUSTRATIONS AND ART

A specimen of *hibiscus insularis* was sent from Norfolk Island to be identified at the Commonwealth Forestry Bureau in 1933. An image of this specimen can be seen online (W17).

It is included in the temperate house at Kew Gardens: '*Hibiscus insularis*, with its many little gentle flowers, appearing somehow generous in an 'arms outstretched' sort of way'. (W8) It is also described on a French site (W9) and a Canadian site provides a photo, a description and information for cultivation (W10).

There are a number of features that make this plant desirable in horticulture.

i. the dense bushy form (W7, W11) See Figure 7.
ii. the tiny, neat leaves
iii. evergreen
iv. disease-free
v. tolerant of wind
vi. tolerant of full sunshine or partial shade (W11)
vii. blooms are produced freely See Figure 7.
viii. changing colour of the blooms, with both coloured blooms at the one time (W7, P1) Figures 1,2.
ix. bright crimson stigma pads are very pronounced for a small flower (W7). See Figure 5.
x. light pruning only is required to keep the plant in a nicely rounded shape (W7)
xi. suitable for hedges (W7, W12, W13)
xii. bird attracting because of the amount of nectar the flowers produce (W13)
xiii. easily grown (W13)
xiv. lack of prickles

VARIATIONS IN FLOWERING & WATER REQUIREMENTS ACCORDING TO LOCATION

Jerry Coleby-Williams notes Sydney's warm-temperate, sub-coastal humid climate is ideal for Hibiscus insularis because the climate is very similar to that of Phillip Island. He writes that the Royal Botanic Gardens, Sydney sent seed and cuttings from about nine adult plants growing in their collections to Phillip Island (W13).

In Sydney, *Hibiscus insularis* plants at the Royal Botanical Gardens were grown from 15cm cuttings taken in late summer. Eighteen months later, after the plants had been in the ground for a year, they were 1.2m high (W12).

We have seen Hibiscus insularis thriving and blooming freely in Port Macquarie, N.S.W. It performs well still further north in sub-tropical locations such as Brisbane and the Brisbane Valley. As well, it is recommended for planting in Mareeba in North Queensland (W14).

While *Hibiscus insularis* performs well across a range of locations, the actual location where plants are grown seems to mean differences in flowering and in water requirements.

Flowering

One reference indicates that in a frost-free garden, *Hibiscus insularis* will bloom for about 10 months of the year (W11). In an article entitled 'The ultimate Hibiscus ?', Jerry Coleby-Williams notes that in Sydney this species flowers for up to nine months of the year and that while it flowers for an extended period, it doesn't flower in one huge burst of blooms. However, in his garden in Brisbane, he notes that the plants set loads of flower buds in readiness for show time in late winter to early spring (W13).

This is the same in the gardens where we have grown it, both in the western suburbs of Brisbane and in the Brisbane Valley. When plants start flowering, and this has been at least ten years in both gardens, then there is a stunning display at the end of winter and in early spring. No flowers are seen at other times.

Water requirements

It has been noted that it is happy in all but poorly drained soils (W7) and that it needs to be regularly watered (W13).

The beauty of *Hibiscus insularis* has been depicted on stamps such as a 1d stamp in 1960, a 1c stamp in 1966 (W18), a 35 c stamp in 1984 (W19) and a 45 c stamp in 2002 (W20).

Artists such as Ida McComish (1885-1978) have painted *Hibiscus insularis*. Her 1937 painting is held in the National Library (W21). *Hibiscus insularis* is also depicted on a poster. This illustration of *Hibiscus insularis* shows a frog and gecko doing a highland fling (W22). Botanical artists such as Halina Steele have also painted *Hibiscus insularis* (W23). One of the paintings done by Halina is included in this Newsletter.

SUMMARY

Hibiscus insularis is not just a beautiful plant for those of us who like to grow or illustrate native hibiscus. Its continued existence is due to 'cultivation, conservation and education', all of which are valued by members of native plant societies and study groups such as this one.

REFERENCES:

WEB

W1 Department of the Environment, Water, Heritage and the Arts (2008) http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=30614
W2 Sections and Segregates of Hibiscus http://www.malvaceae.info/Genera/Hibiscus/sections.php
W3 Prodromus Florae Norfolkicae 1833. http://www.ipni.org/
W4 Transactions and Proceedings of the Royal Society of New Zealand 1868-1961. Volume 47, 1914 http://rsnz.natlib.govt.nz/volume/rsnz_47/rsnz_47_00_000660.html
W5 Critically Endangered Norfolk Island Flora Species http://www.environment.gov.au/biodiversity/threatened/species/norfolk-island-flora-critically.html
W6 http://www.environment.gov.au/parks/norfolk/nature-science/plants-of-interest.html
W7 http://www.hibiscusworld.com/BeersBook/13-OtherSpecies.htm
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W9 http://www.cbnbrest.fr/site/html/visite/serres/oceanique.htm
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W22 http://www.fbga.asn.au/HelenLeitchPrints.htm
W23 http://www.bellis.info/Bellis/Blog/Entries/2008/6/28_Entry_1.html

PRINT

P1 Wrigley, J. W. & Fagg, M. Australian Native Plants, 4th Edition. Reed Books, China, 1996.
P2 Beers, L. & Howie, J. Growing Hibiscus. Kangaroo Press, N.S.W., 1985.

* NOTE:

Other species of Hibiscus, particularly Hibiscus rosa-sinensis, are used to form screens and hedges in countries such as Papua New Guinea and in sub-tropical and tropical Australia. Another member of section Bombicella, Hibiscus pedunculatus, has also been used as a low hedge in south-east Queensland.

However, Jerry Coleby-Williams has shown that it is certainly worthwhile considering Hibiscus insularis as a plant for hedging, especially as it does not have the rampant growth of Hibiscus rosa-sinensis or the restricted height of Hibiscus pedunculatus.

FIGURE 3 : Buds, Day 1 & Day 2 blooms, pods

FIGURE 4 : Buds about to open

FIGURE 5 : Day 1 bloom

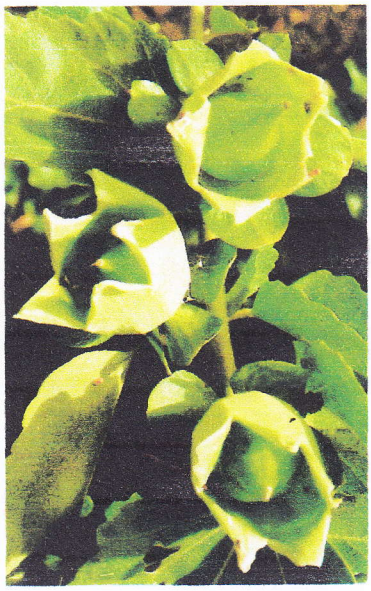

FIGURE 6 : Seed pods forming

FIGURE 7 : Hibiscus insularis in a garden

FIGURE 8 : Trunks of plant above

FIIGURE 1 :Hibiscus insularis Day 1 blooms

FIGURE 2 : Hibiscus insularis Day 2 blooms

UNDERSTANDING THE HIBISCUS FURCARIA SECTION IN AUSTRALIA

Geoff Harvey
Study Group Leader for Hibiscus and Related Genera

This brief write-up is to help new members of our Study Group, who may wish to grow and perhaps hybridize the different species and forms of *Hibiscus* L.. section *Furcaria* D.C, This interesting group differs from other *Hibiscus in that each calyx lobe* has a prominent thickened midrib and two thickened marginal ribs (Hochreutiner 1900).
In Australia there are 28 known indigenous species of *Furcaria* section *Hibiscus*, whilst there are more than 100 distributed around the world in mainly tropical and subtropical localities. The Furcaria Hibiscus growing on the Australian east coast exhibit all the desirable characteristics, which if combined through extensive breeding could result in spectacular small plants for modern gardens.
Please note that the chromosome numbers of all endemic Australian species that have been studied are n = 54 (allohexaploid), including *H. meraukensis* Hochr. (indigenous).

(1) Endemic *Hibiscus* section *Furcaria* species that occur in the states of Queensland and N.S.W.
H. heterophyllus Vent. Chromosome number n = 54 (hexaploid)
H. splendens Fras. Ex Grah. Chromosome number n = 54 (hexaploid)
H. divaricatus R. Grah.
H. saponarius craven
H. forsterii F. D. Wilson
***H.* species ('Barambah Creek'** P. Grimshaw + 2484)
***H.* species** (Emerald S.L. Everist 2124) Confirmation needed that this sp. belongs to *Furcaria*.

(2) *Hibiscus Furcaria* species that occur in Queensland as well as other Australian States and/or Countries.
H. meraukensis Hochr. (Indigenous) Chrosome count n = 54 (hexaploid). Occurs in tropical Qld., W.A., N.T.., Torres Strait Is. Including Thursday Island, the south coast of P.N.G. and Irian Jaya as well as the Malesia Floristic Region. Merauke, the place that this species is named after, is located on the south coast of Irian Jaya about 70 km west of the border with P.N.G.
H. zonatus F. Muell. Occurs mainly in the N.T. and rarely in W.A. and Queensland's western gulf region..
H. diversifolius Jacq. (Indigenous) Chromosome number n= 72 (octaploid). A pantropical species that grows along the east coast of Australia. It differs genetically from our endemic species and is of extra-African distribution.
H. radiatus Cav. Chromosome number n = 36 (tetraploid) Also n = 72 (ref. http://www.malvaceae.info/Biology/Chromosomes.html Occasionally seen in Qld. Gardens and disturbed land where it grows as an annual or bi-annual. It is apparently of Indian origin occurring in Burma, Vietnam, Malaya and Indonesia.
H. acetosella Welw. Chromosome number n = 36 (tetraploid) Probably of African origin, it is widely distributed in tropical and sub-tropical climates of the world.
H. sabdariffa L.Typical chromosome number n = 36 (tetraploid) with forms having n = 18 (diploid) and n = 72 (octaploid) also reported - (ref. Dr. Dion Harrison, Univ. Qld. Pers. Comm.) Often grown in gardens for 'rosella' jam making and may emerge on disturbed land. Grown commercially during times of early settlement.

(3) Endemic *Hibiscus* section *Furcaria* species that occur in W.A. and N.T.
H. stewartii
H. reflexus
H. squarrulosus
H. minutibracteolus
***H. fryxellii* var fryxellii**
H. fryxellii* var. *mollis
H. superbus
H. aphelus
H. zonatus
H. kenneallyi
H. brynessii
H. marenitensis
H. inimicus.
H. aneuthe
H. symonii
H. riceae
H. petherickii
H. fallax
H. bacalusius
H. arnhemensis

Hibiscus meraukensis
South of Cape Crawford
Northern Territory
Image May 2002
G. Harvey

H. thegaleus
H. menzeliae
Please note that ***H. mustiae*** is a form of ***H.zonatus. H. australensis*** is not an Australian species.

(4) *Hibiscus* section *Fucaria* species that occur in Western Australia and/or N.T. as well as other Australian States and/or Countries.
H. meraukensis Hochr. Chromosome number N = 54 (hexaploid) (indigenous)
***H. zonatus* F. Muell.** Recorded also in the western part of Burk Pastoral District of Queensland.
H. sabdariffa L.(naturalized). Typical chromosome number n = 36 (tetraploid)
H. cannabinus L. (Kenaf) Experimental crop. Chromosome number n = 18 (diploid)

(5) *Hibiscus* section *Furcaria* species from Tropical North Queensland.

(a) Both ***H. heterophyllus*** and ***H. splendens*** extend into the tropics as far as the Lockhart River about 13 degrees south of the equator.
(b) The most northerly ***H. heterophyllus*** that I have grown came from Rocky River near Coen about 14 degrees south of the equator where it was collected by Peter Radke. It was a very prickly specimen acquired by Colleen Keena during a trip to Cairns .
(c) The most northerly ***H. splendens*** that I have growing came from near Glen Geddes about 22.5 degrees south of the equator. It was collected by D. Hockings and myself during April 2008. It has many epicalyx segments in a double row and a red peduncle.
(d) From Euri Creek at **Bowen**, I have growing a prickle free form that resembles ***H. heterophyllus*** in most morphological respects. Herbarium material will be collected and sent to Lyn Craven when I next visit Bowen. It has grown and seeded quite well at Buderim on the Sunshine Coast.
(e) ***H. divaricatus*** is reported to grow on Magnetic Island off the coast from Townsville and if this is correct it would be an extension to its normal range.
(f) ***H. meraukensis*** is common in the tropics and has evolved into several distinct ecotypes. I have observed it on the south coast of P.N.G. near Daru, some Torres Strait Islands close to the P.N.G. coastline, Thursday Island, W.A., the N.T. and much of northern Queensland. My most southerly observation was just south of the Capricorn Highway at Westwood on the road to Biloela.
(g) ***H. saponarius***. Plants were obtained from David Hockings who collected it on a trip to Cape York in 2003. They grew and bloomed quite well at Buderim. No seed was obtained and sadly the plants succumbed to winter conditions. This species is known from only two populations along the road from Musgrave to Edward River on Cape York Peninsula. The Queensland Herbarium list a specimen from the Northern Territory. It is regarded as being most closely related to ***H. meraukensis*** Hochr.
(h) ***H. forsteri*** Plants were obtained from David Hockings who collected it on his trip to Cape York Peninsula in 2003. One plant continues to grow very well at Buderim in a container and is 1.6 m tall. It has produced plenty of seed , so far not grown out. The attractive white flowers (see image) have a pink flush on one margin of the petal and reach 12 cm or more in diameter.
The plant drops foliage in winter but by mid September 2008 is again growing strongly.
This species also grows near Townsville and is well represented in the Queensland Herbarium collection.
(i) ***Hibiscus* zonatus** F. Muell The Queensland Herbarium hold 5 specimens collected from the western part of the Burk Pastoral District. A good image of ***H. zonatus*** on the 'Australian Plant Name Index', Australian National Herbarium is the only image I can find. I would desperately want to grow this Queensland occurring ***Hibiscus*** section ***Furcaria*** species that I have not seen to date. I am aware that it is grown and sold by nurseries in Darwin and will follow up this lead to try and obtain seeds or plants.
(j) ***Hibiscus radiatus*** Cav. This species is probably of Indian origin and occurs in Burma, Vietnam, Malaya, and Indonesia. It was collected in Australia in the 1950's by Keith Williams and illustrated in his book 'Native Plants of Queensland Vol 1' page 155. He states that the seed parent was growing on the sides of rough rocky gullies between Mary Kathleen and Mount Isa in Queensland. Study Group member, Walter Willcox of Bowen (pers. comm.) thinks that it is naturalized in the Bowen area where it can appear in cultivated or disturbed land. It has appeared at Buderim Cricket Grounds in disturbed soil dumped from construction sites. Seed obtained from the SGAP Seed Bank and grown at Buderim closely resemble a variation in bloom colour and form from S/E Asia as found on the Internet. (The seed was distributed in error as Hibiscus zonatus)
(k) ***Hibiscus diversifolius*** Jacq. The purple form was recorded by Keith Williams and illustrated on page 155 of his book 'Native Plants Queensland Vol 1' under the name of 'Euramoo Mallow" Apart from the Atherton Tablelands Crater Lakes, other localities of this form are not known to the Study Group Another form of ***H. diversifolius*** originated from seed supplied by Doug Phillips, the former Study Group Leader. It has been grown by Colleen Keena since about 1980, who gave it the name 'Colour Magic as it is now known in the nursery trade.. This form appears to be virtually sterile, even when hand pollinated and may be a hybrid with ***H. radiatus***.In winter the bloom colour becomes pale yellow/off white whilst in spring it returns to pink and finally purple.
The common yellow form is recorded from tropical Queensland, but is much more common south of about Fraser Island.

(l) ***H. acetosella*** Welw. This species is commonly seen at plant sales and may be naturalized in coastal northern Queensland. It is considered to be of African origin and is widely distributed in tropical and sub-tropical regions of the world.

(6) *Hibiscus* section *Furcaria* species from sub-tropical and temperate climates of Queensland and N.S.W.

(a) ***Hibiscus heterophyllus*** Grows as far south as Kiama and is common east of the Great Divide. There are so many forms of this species that observing, collecting and breeding them could keep a Hibiscus enthusiast occupied indefinitely. Near the coast along tidal streams and in gullies etc., the typical form is a bushy wide leafed plant. In the hinterland foothills tall specimens with narrow leaves reach six to seven meters growing in competition with larger trees on the edge of rainforest and amongst dry eucalypt forest. It is often seen along tracks that have been opened up for logging.
On the road to Tin Can Bay (east of Gympie) near Kia Ora ***H. heterophyllus*** grows in the pine plantations as well as along the roadsides. Where vegetation has been slashed or mowed between the road and the pine trees ***H. heterophyllus*** has regrown from the 'crown' into low bushy plants. Some of these are prickle free and some have reddish/brown bark instead of the usual green.
The most commonly encountered bloom colour is white with a band of deep rose pink to crimson along one side of the petals. The eye-zone or petal spot can be rich red or purple and is never edged with the narrow red line as seen in ***H..splendens*** and ***H. divaricatus***. The flowers present in an upright position on the bush and fully open. Occasional populations of yellow bloomed specimens occur in Queensland and New South Wales .

Plants recently observed near Kenilworth in the Sunshine Coast Hinterland are lemon yellow with a maroon/red marginal band on the petals.

Populations of pink blooms occur sometimes with darker stripes of pink or red on the petals. One such plant known as 'Pink Haze' was sold by Hibiscus World of Caboolture, Queensland. This plant was collected by Colleen and Geoff Keena at Warrell, N.S.W. Unfortunately, the plant grown by the Keenas was one of the casualties of the recent drought. This form is similar to a plant found more recently by the Keenas at Mt. Crosby Cliffs near Brisbane. This hardy plant is illustrated in this Newsletter as well as on the cover of Newsletter No 15. Both of these forms were growing amongst plants with white blooms. Perhaps the most spectacular dark pink is called 'Rosie' and is often seen in plant nurseries such as Fairhill

On the northern end of the Sunshine Coast, natural hybrids between ***H.. heterophyllus*** and ***H. splendens*** are seen between Eumundi and Tewantin as well as near Cooroy.
(b) ***Hibiscus splendens***. Not nearly as common as ***H. heterophyllus***, it occurs in widely scattered populations, sometimes on alluvial terraces as well as rocky slopes and volcanic summits such as Mt. Tinbeerwah near Tewantin. It is distributed to as far south as Kiama and eastwards of the Great Divide. I have grown nice specimens ex Colleen Keena that came from Cooperabung about 64 km from Taree. Both Study Group members Colleen Keena and Meg Goulding of Nabiac report it as being spectacular, perhaps the best of the many forms of ***H. splendens***. The best fully opening bloom that I have seen from Queensland was collected by David Hockings at Esk. In forest situations the plant may reach 6 meters, but in more open areas it is usually a bushy shrub of about 2 m to 2.5 m.

The style projects about 60 mm past the end of the staminal column, the stylar branches lie close together and are capped with globose stigma pads.

The flowers are various shades of pink and the plant is exceedingly prickly with stellate hairs..
(c) ***Hibiscus* species 'Barambah Creek'** This prickle free species has a bloom similar to ***H. splendens*** and because of the locality where it occurs is considered to be cold hardy to the extent that it will withstand quite heavy frosts. It is a very valuable plant for growing in cooler localities and for breeding purposes. All specimens I have seen are low growing, spreading bushes perhaps less than 1.5 meters in height
A great number of plants were seen for sale during winter 2008 in general nurseries and were handsome plants full of buds. Unfortunately it deteriorates in appearance after the first season and under some conditions may be short-lived. It is prone to damage from mealy bug and scale.
Though referred to as a species it is possibly a form of H. splendens awaiting formal botanical description. It is very fertile as a pollen and female parent when crossed with other east coast endemic Furcarias.
(d) ***Hibiscus divaricatus***. This yellow bloomed species occurs in the Capricornia region of Queensland and in the Burnett Pastoral District to as far south as Kragra National Park on the boundary with the Darling Downs. It obviously withstands heavy frosts that are experienced at Gayndah and Munduberra and extends into the Carnavon National Park between Injune and Springsure in the Leichardt Pastoral District.
As with ***H. splendens*** it has a thin red line surrounding the eye zone or petal spot.
I would regard ***H. divaricatus*** as the hardiest ***Furcaria*** species that I have grown at Buderim. It also has the longest flowering period and in fact in its natural habitat seems to bloom continually. In the garden situation it appears to suffer less from pests such as mealy bug and scale.
(e) ***Hibiscus* diversifolius**. This common (indigenous) species grows from Fraser Island to as far south as the N.S.W. south coast. The flowers are yellow with purplish/black basal spot. It grows at the edge of swamps, streams, irrigation ditches and storm water drains. I have seen it sold in nurseries as an aquatic plant completely submersed in water.

(f) ***Hibiscus acetosella*** is quite commonly seen in nurseries and at plant sales. It was found growing wild on the northern end of the Sunshine Coast ref. pers. comm.. R. Oyston . It seeds and germinates prolifically in my garden situation at Buderim.
(g)***Hibiscus radiatus***. Another introduced species that grows and seeds prolifically. Possibly naturalized as mentioned above, it is a potentially dangerous plant to grow as it may become 'feral' under some situations.

(7)The Genomes of *Hibiscus* section *Furcaria*.

Margaret Y. Menzel spent much of her scientific career researching the genome biogeography of ***Hibiscus*** L. ***Furcaria*** DC. Due to her untimely death it was left to F. Douglas Wilson, who had worked jointly on the project, to summarize this work.
The Australian ***Hibiscus*** section ***Furcaria*** that were sampled include **H. *arnhemensis*** F.D. Wilson, ***H. byrnesii*** F. D. Wilson, ***H. fryxellii*** Mabb., ***H. heterophyllus*** Vent., ***H. menzeliae*** F.D. Wilson,***H.. meraukensis*** Hochr., ***H. splendens*** Fras. Ex Grah., ***H. symonii*** F.D. Wilson.

The Summary below is extracted from the following reference :

Wilson F.D. (1994). The genome Biography of ***Hibiscus*** L. section ***Furcaria*** D. C., Genetic Resources and Crop Evolution, v. Pp. 13-25

Hibiscus L. section Furcaria D.C. (Malvaceae) is a natural group of more than 100 known species, many of which are handsome ornamentals with large, showy, delicate flowers. This group includes the fiber, food and medicinal plant Kenaf, H. cannabinus L., and roselle, H. sabdariffa L. The basic chromosome number is x = 18. In nature are found diploid, tetraploid, hexaploid, octoploid and decaploid taxa. This group displays a remarkable amount of genome diversity, as shown by cytological analysis of 140 hybrid combinations from over 60,000 crosses. At least 13 genomes are present : A, B, C, D, E, G, H, J, P, R, V, X and Y. Subsaharan Africa is the centre of genome diversity ; nine of the 13 genomes are represented in African taxa, and nine of the 10 confirmed diploid species occur in Africa. Five (possibly six) genomes reside in extant diploids. The G genomes (or modified G genome) is widely distributed. Found in only one diploid species in Africa, it is found also in African tetraploid and African and Indian octoploid species, in New World tetraploid and decaploid species,and in Australian hexaploid species. The G-genome was apparently widely dispersed and differentiated, followed by hybridization, subsequent chromosome doubling, and radiation. The A, B, X, and Y genomes, on the other hand, are confined mainly to Africa, with a few taxa in Asia, and apparently are the products of a later round of hybridization and allopolyploidy.

The **conclusions** of this paper read as follows :

1. The G genome is probably the 'primitive' genome of Hibiscus section Furcaria, in view of its present cosmopolitan distribution.
2. A likely scenario was a dispersal of G-genome diploids from the source of origin in what is now sub-Saharan Africa to Australia, followed by genome differentiation, subsequent hybridization and allopolyploidy, and radiation at the hexaploid level.
3. Subsequent dispersal took place from Australia to Hawaii and to the Tubuai Islands.
4. Similarly, G-genome diploids were dispersed from the African origin to the New World (possibly Brazil initially), followed by genome differentiation, hybridization and allopolyploidy, and radiation at the tetraploid level.
5. Evolution took place in Africa of the A, B, C, D, E, H, and Y-genomes, followed by the development of the African allotetraploid and octoploid species.
6. The B-genome diploid, H. surattensis was dispersed widely from Africa to Madagascar and across the Indian subcontinent and southeastern Asia, and probably participated in the development of the BG - - octoploid(s) in India.
7. The CDEG, octoploid H. diversifolius originated in Africa and spread subsequently to Madagascar and independently to the New World and to Oceana and Australia.
8. Susequent hybridization of the CDEG species with diploids gave rise to the allodecaploid H. maculates in the Caribbean and to H. fifiensis in Fiji.

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Note : The genome of all the endemic Australian taxa sampled were G_aJV (hexaploid).
Hibiscus brackenridgei A. Gray, genome $G_bJ__$and ***Hibiscus australensis*** Fosberg, (not sampled) from the Tubuai Islands would be closely related to the Australian species from where dispersal is believed to have taken place.

Phylogenetics of diploid and Allopolyploid Hibiscus sect. Furcaria (Malvaceae)

Investigator : **Randall Small** - University of Tennessee

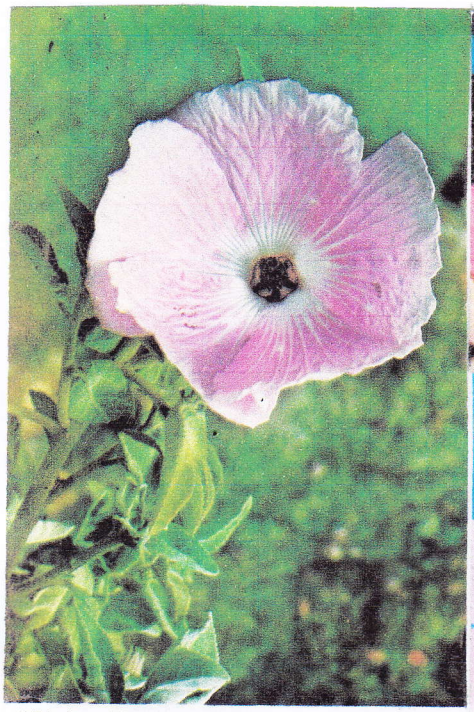
Start : 2003-08-31

Web ref. : http://www.sciencestorm.com/award/0108231.html

Abstract : 0108231 Small. One of the primary foci of the field of plant systematics is to understand the genealogical relationships among present day species, and to understand the processes that give rise to those species. This project is focused on a group of species in the genus Hibiscus in the plant family Malvaceae (the Mallow family). This group of Hibiscus, taxonomically classified as Hibiscus section Furcaria, includes over 100 species that are distributed worldwide. Ten of these species are known to be diploid (having the 'normal' two sets of chromosomes), while the remainder are polyploids having four, six, eight or ten sets of chromosomes. These polyploids are hypothesized to have originated through hybridization between two different species followed by chromosome doubling in the offspring. In this group the polyploidy species are more numerous than the diploid species , perhaps due to the diversity provided by the extra sets of chromosomes. The goal of this project is first to elucidate relationships among the diploid species in this group. Subsequently selected polyploidy species will also be analyzed- each polyploidy will contain genes from each of the parents, some of which are likely to be diagnostic, which will allow the identification of the hybridizing parents of each polyploidy species. Ultimately these data will be used to address the classification of the species into taxonomic groups, to study the geographic patterns inherent in those relationships, and the evolution of morphological characters. The data to be employed in these analyses include nuclear ribosomal genes and the chloroplast gene markers, as well as DNA sequences from nuclear-encoded genes of the alcohol dehydrogenase gene family. Molecular biology has provided researches access to a wealth of genetic data, in particular DNA sequences, for analyzing relationships among species. Plant systematics have relied primarily on sequences from two sources : chloroplast DNA and nuclear ribosomal DNA , both of which are genetically tractable and easy to isolate. There is a vast resource of DNA sequences that have remained relatively untapped, however, in the rest of the plant nuclear genome these types of sequences have been largely ignored by systematists primarily because they are more genetically complex and thus more difficult to isolate and characterize. This additional experimental effort, however, can be outweighed by the quantity and quality of data available from these sequences. Previous work by Dr. Randall Small on cotton and related species (genus Gosypium, also in the Mallow Family) has shown that these types of sequences can be readily isolated and can be exceptionally useful for systematic studies. These studies were expedited by the wealth of knowledge of cotton genetics because of its importance as a crop plant. To facilitate the transfer of such knowledge from well-known groups like Gossypium to less well characterized wild species groups (such as Hibiscus section Furcaria) the current project will use an understanding of the alcohol dehydrogenase gene family development in Gossypium to address species relationships in Hibiscus section Furcaria.. Thus, this project provides a direct test of the transferability of information gleaned from a genetically well characterized group (Gossypium) to a less understood group (Hibiscus section Furcaria).

Some Floral Forms of Hibiscus heterophyllus

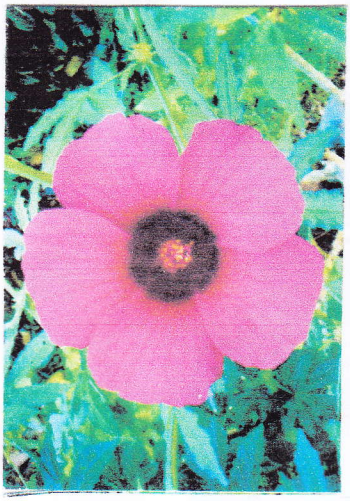
Some Floral Forms of Hibiscus splendens



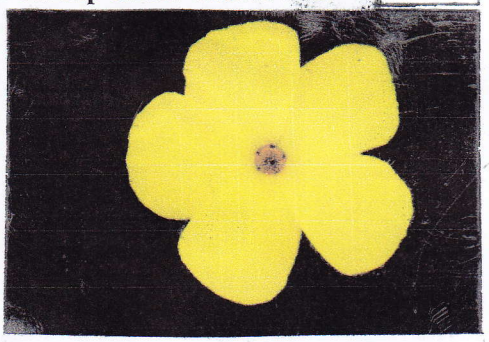
Hollyhock tree (*Hibiscus splendens*) (Picture, Mr. F. D. Hocking)

H splendens from top of Mt. Tinbeerwah

Hibiscus acetosella. Central East Africa
Flowering at Buderim October 2001
Images – Geoff Harvey



H. radiatus



H. divaricatus

H. meraukensis