



Kapisen

Plant Conservation Action group **Newsletter**

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Issue 10

The unnoticed plant diversity of Seychelles

The unnoticed plant diversity of Seychelles

Dear readers,

One of the most rewarding experiences for a field biologist is a moment when one discovers a new and previously hidden world, when suddenly everything that seemed familiar reveals new secrets. This may happen after the hard work of learning alone, or when an experienced biologist guides us through an area. Plants that may have looked similar before are revealed as amazingly different in type and form. Animals such as stick insects that were previously seen only by chance, with a newly trained eye can be found regularly.

In this issue of Kapisen we therefore introduce some of the overlooked plant diversity of the Seychelles islands. It is an invitation to discover, observe and be surprised by these lesser known forms of plant life. Two articles introduce the special groups of plants known as lichens (p. 13) and ferns (p. 10). They are not flowering plants like trees and palms, but they are related to “normal” plants. Figure 1 on page 10 and the textbox on page 14 explain what they are. Lichens and ferns are not yet very well known in Seychelles and the authors of the articles give an overview of the state of knowledge about them and explain some of their surprising features. An article by Kevin Jolliffe introduces orchids (p. 6) and also provides an update of our knowledge of these exquisite plants. Orchids are flowering plants, some of them very conspicuous, like the Seychelles national plant, Orkid Payanke. But many epiphytic orchids (those orchids growing on other plants) are difficult to spot and have small delicate flowers.

Even the largest flowering plants begin their lives as small inconspicuous seedlings (p. 20). Their forms and adaptations are fascinating, as is their struggle to survive the various hazards of life in the forest. Christoph Kueffer notes that what happens among seedlings shapes the future composition of our forests. Amongst the smallest of plants are the mosses and liverworts. Those who take the time to observe this tiny hidden flora of the Seychelles find that their life is not less dramatic than that of the big plants. Katy Beaver has for several years observed the epiphytes on a dying Sandragon tree at Morne Blanc (p. 3). She has found that these patches of epiphytic plants may change only slowly in normal times but can change spectacularly when a crisis occurs.

One of the aims of PCA is to help Seychellois from all walks of life to discover the many facets of plant life in the wild. It is only through exploration and observation that one can train the eye to see the surprises, and that is what PCA members regularly do. Two of the youngest PCA members tell of their experiences on Morne Seychellois (p. 5). Also, as usual we have compiled notes from the field from all our members (p. 19).

Other recurrent articles found in this tenth regular issue of Kapisen are: PCA News (p. 16), cartoons by Peter Lalande (p. 12 & 15), a plant puzzle (p. 9), and a list of recently published literature relevant to Seychelles' plant life and conservation (p. 22).

We hope that this issue of Kapisen will encourage our readers to explore new features of the Seychelles outdoors. If you prefer to do that in a group, please contact PCA and join us on our next field trip.

Katy Beaver, Eva Schumacher & Christoph Kueffer,
Editors

The electronic pdf version of Kapisen can be ordered from boga@seychelles.net or downloaded from <http://seychelles-conservation.org/kapisen.aspx> or www.plantecology.ethz.ch/publications/books/kapisen



Photo front cover

Droplets of water hang from the delicate structure of a forest moss (K. Beaver).

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The Sandragon epiphyte story unfolds further

By Katy BEAVER

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The story began in 2002 when a fungal disease of Sandragon (*Pterocarpus indicus*) started to take hold of this species in Seychelles, and many large and beautiful trees were threatened. There was a particularly large and strange tree growing near the top of Morne Blanc, its several trunks and many branches covered with a plethora of epiphytes of all kinds - ferns, mosses, liverworts, orchids and lichens - together forming a mini-habitat for many small native animal species. What would happen to this amazingly rich epiphyte biodiversity and its wildlife when the tree died?

This was the start of a long-term study to observe the changes that would surely come about on the giant Sandragon tree. Previous issues of Kapisen have told part of the story (see Kapisen 1, 3, 5 and the special edition for schools). This article brings the story up to date.

In October 2003, 21 monitoring quadrats (10 cm x 10 cm) were marked around the tree: on its main trunks, horizontal branches and along superficial roots. Other quadrats were set up on nearby trees of various species, on a large epiphyte-covered rock (these acting as 'controls'), and also on an adjacent Sandragon tree. The majority of these are still being

monitored on a regular basis. But after the slow death of the main tree between 2006 and 2007, large branches began to fall, sometimes destroying the area of a quadrat, so that only 14 of the original 21 Sandragon quadrats can continue to be monitored.

Monitoring of each quadrat is normally by means of close-up photography once every two months, which gives a picture of the normally slow changes that occur in that quadrat over time. But once every six months, a more quantitative method is used, providing a measure of the approximate cover of the total 100cm² quadrat by each species of epiphyte. By plotting the changes in species cover over time, the changes are easier to follow. So far, few of the epiphyte species have been fully identified, and over the period of study, it was realised that some of the small species may actually require separation into more than one. It will require several taxonomists to determine the various groups. Currently, drawings and numbers are used to identify species.

As was expected, the death of the tree brought about the death of many epiphytes and a flourishing fungus 'flora'. What was unexpected was the recovery of an array of epiphyte species, including the influx of several more! Also, on the ground beneath the Sandragon tree, there has been a profusion of large ferns, Begonias and other herbaceous species, presumably resulting from increased light levels after the disappearance of the canopy and smaller branches.

Two examples are used here to show the nature of changes between October 2003 and September 2009 (the most recent 6-monthly quantitative monitoring).

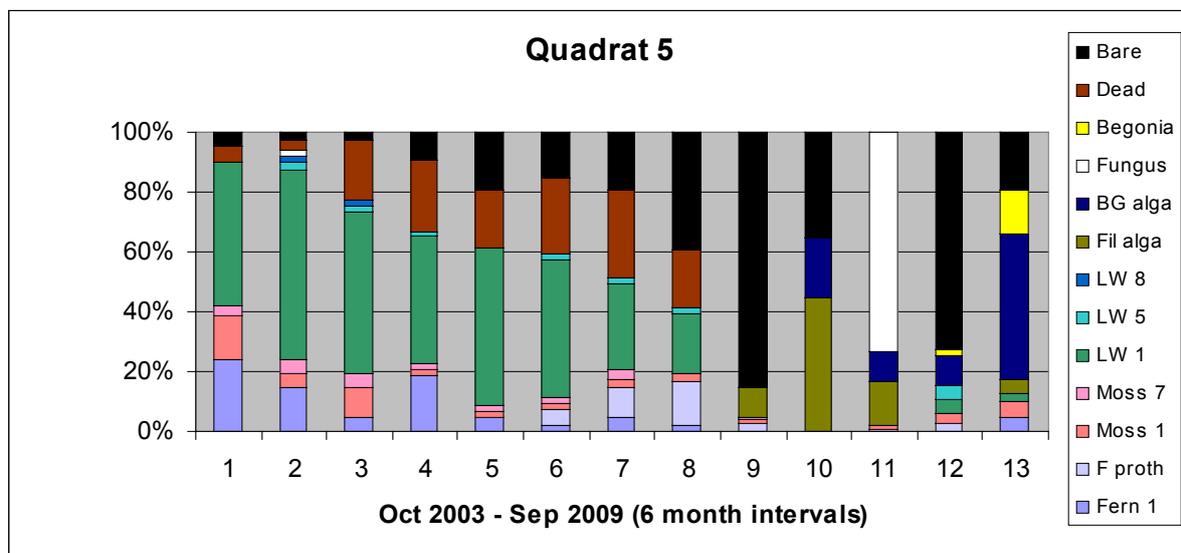


Figure 1. Changes in the cover of epiphytes in quadrat 5, situated on the main Sandragon trunk. (Bare = barren bark; Dead = dead epiphytes, BG alga = blue-green alga/Cyanobacteria; Fil alga = filamentous alga; LW = Liverwort; F proth = Fern prothalli)

Sandragon

Quadrat 5 is on the main Sandragon trunk, where the bark has been friable since early in the study. In 2003/4 there was a mixture of fern, moss and liverwort species, which slowly decreased over time, leaving bare patches of bark. Then in the latter half of 2007 the whole area became bare, with only tiny fragments of epiphyte growth, later to be replaced by algae and fungus. But by 2009 there was new growth of several of the epiphyte species, albeit very limited, and also sprouting Begonia plants.



Quadrat 5: Oct 2003 (no.1 in Fig.1)



Nov 2007 (no.9 in Fig.1)



Sept 2009 (no.13 in Fig.1)

Quadrat 22 is on the top of one of the large horizontal trunks, which must have formed early in the life of the Sandragon tree when it had some sort of accident, as this sort of tree does not normally produce branches so close to the ground. The changes in this quadrat have been quite different to those in Quadrat 5, with the fungal disease apparently having a relatively minor effect on the bark. However, certain species disappeared as the tree died, and the relative cover of others changed.

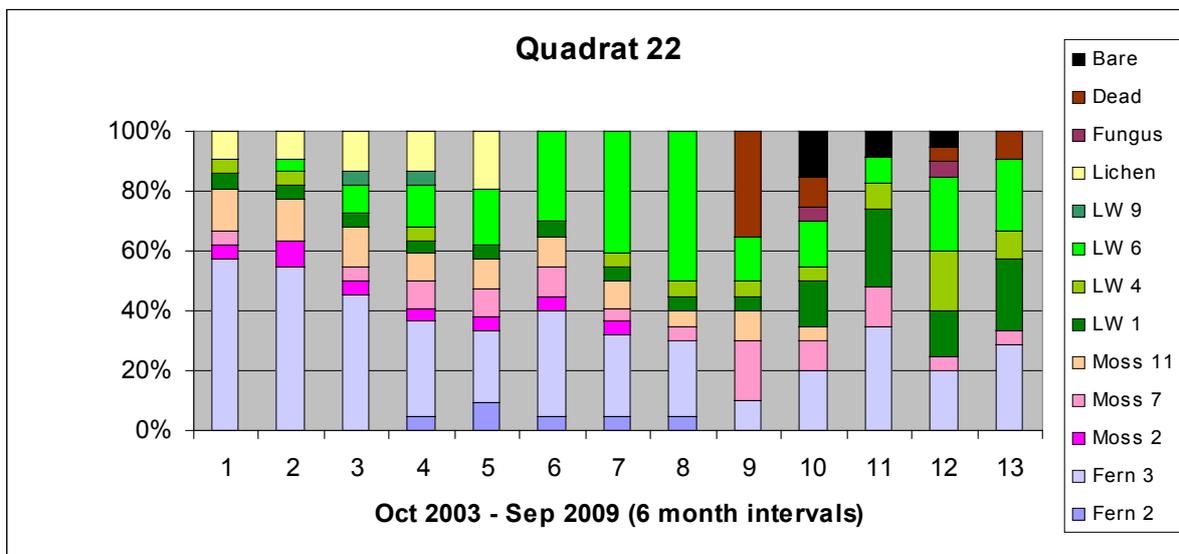


Figure 1. Changes in the cover of epiphytes in quadrat 22, situated on one of the large horizontal trunks. (See Fig. 1 for abbreviations)



Quadrat 22: Nov 2003 (no.1 in Fig.2)



Sept 2007 (no.9 in Fig.2)



Sept 2009 (no.13 in Fig.2)

Up into the cloud forest of Morne Seychellois

By Nathachia PIERRE and Mariette DINE

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We are Seychellois students studying at the School of A-Level Studies at Anse Royale, and both of us were excited by the idea of joining the PCA group, once we heard about it. Our aim in joining this group is to learn as much as possible from the specialists, to know their work and how it is done, so that we can get to do a job that we really love, for example become a botanist.

PCA organises occasional excursions for its members in order to learn more about plants, for monitoring purposes, for fitness and for the love of making new discoveries in our natural surroundings. We had already been on several of these field trips, but Morne Seychellois, the highest of our granitic peaks, we knew would be quite a challenge.

On this occasion there were just four of us, led by Bruno Senterre. We met at Sans Souci where the trail starts. We knew it is important to be fully "geared" when mountain climbing: small back pack, water, snack, tissue, extra clothes and most importantly good trainers for hiking. So forgetting ones proper shoes is a terrible mistake, as one of us learned the hard way, finding after a short time that it was easier to go barefoot than to walk in 'slippers', especially on slippery slopes over a leafy humus layer made wet from rain!

After a few hours of climbing and side-stepping the occasional harmless wolf snake, we finally came to the 'sommet' of Morne Seychellois, where there was an amazing view overlooking both sides of Mahé.

Morne Seychellois is unlike any of the mountains we have been to, with a huge variety of plants, both native and introduced, growing away from the ravages of human activities. The mountain seemed to us to represent life, with all its ups and downs, and with steep and gentle slopes. There were places and times of danger but mostly experiences and places that were wonderful and beautiful, with the glory of fresh air.

For example, the most exotic find for us was a large area dominated by 'Vakwa maron' which has a short stem but grows enormously long roots, with the whole plant covered with thick masses of moss. Bruno explained to us that in one small patch of moss the size of our hand there may be several different species. Few people study mosses and most of them are in their later years, often having lost their usual fitness to go mountain climbing. So there may be many as yet undiscovered. We were also surprised to discover that mosses contribute enormously to medicine.

Coming down the mountain was more of a challenge for one had to be more cautious about where to place one's feet. By the time we arrived back at our starting point it was already four o'clock. We were relieved because at some points it had been scary and easy to feel discouraged, but with perseverance, courage and determination, together with support and encouragement from the other two, we had managed, and by the time we reached the bottom we were already laughing and happy at what we had achieved.

We learned a lot from Bruno and we were very amazed by the vastly different types of plant and the uniqueness of the mountain top. It was incredibly beautiful and exotic. And, after having done this excursion, we seriously feel more prepared to deal with life itself!



Moss-covered roots of Vakwa maron.



Nathachia getting a closer look at epiphytes.



A bizarre network of roots and branches in the cloud forest. Photos by M Dine

Epiphytic Orchids of the Seychelles

By Kevin JOLLIFFE
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The Orchid family is the largest plant family in the world and contains over 30 000 species dispersed throughout the world except Antarctica. Many orchids have elaborate and beautiful flowers and are cherished the world over. Many exotic orchids are grown in gardens throughout the Seychelles, most of them coming from Asia, such as the Spider orchid *Arachnis flos-aeris*, *Vanda Papilionanthe teres*, ground orchid *Spathoglottis plicata* and the red *Renanthera* orchids, all of which grow well in a tropical garden.

The Seychelles archipelago is not blessed with as diverse an orchid flora as the larger islands of the Comoros, Mascarenes and Madagascar, but Seychelles does have a number of unique and interesting species, some of which are endemic. Many species are widespread throughout the Islands of the Western Indian Ocean, Africa and even Asia.

The total list of Seychelles orchids stands at a possible 30 native species and 6 of them are possibly considered to be endemic to the Seychelles islands (Govaerts, Kew World Checklist of Monocotyledons Database), but a number of these have not been confirmed as yet. Some old accounts of the flora, dating back to the 1800s, list species which could easily have been misidentified or confused with other related species. As a consequence more work



The small delicate flowers of the epiphytic orchid *Angraecum zeylanicum* are about 8mm wide (F Dogley).



Oeoniella polystachys is an epiphytic orchid found on Mahe, Silhouette and Praslin (F Dogley).

is needed to fully explore the orchid riches of the Seychelles.

Of the 30 possible native species 19 are epiphytic (growing on trees), climbers or lithophytic (growing on rocks) (Govaerts, Kew World Checklist of Monocotyledons Database). Many go unnoticed as they are small inconspicuous plants with tiny flowers, growing high up in the mountains, shrouded in mist and surrounded by mosses. It is likely that many people will recognize only two species: the national flower of the Seychelles *Angraecum eburneum* (Tropicbird orchid / Orkid payanke) and the leafless *Vanilla phalaenopsis* (Leafless vanilla / Lavannir sovaz) which is often seen with its green stems snaking over rocks and up trees. Both these plants produce the largest flowers of all the native orchids, which has undoubtedly led to the low numbers of Tropicbird orchids one now sees in more accessible areas.

The other 16 species are all small flowered plants, two of which are possibly endemic. The unique *Hederorkis seychellensis* is a plant of mountain forests, growing amongst mosses on trees, and producing small sprays of bright pink to white flowers. It is related to the other possible endemic *Polystachya bicolor*, (awaiting confirmation after a full revision of the Genus) which is much more common and widespread, also found growing in the mountain forests but sometimes in full sun on exposed boulders. It produces erect clusters of bright pink waxy flowers.

The *Bulbophyllum* genus is an interesting and large group of orchids containing over 18 000 species, of which three widespread species occur in the Seychelles. They all produce small bulbs along a rhizome and have one or two leaves on top of each bulb. The flowers are small and often produce a foul

Orchids

Complete Native Orchid Species List For Seychelles

Genus	Species	Status	Global Distribution	Seychelles Distribution	Confirmation
<i>Acampe</i>	<i>pachyglossa</i>	Native	Africa, Madagascar, Comoros, Mascarenes	Mahe, Silhouette, Praslin?	Confirmed
<i>Agrostophyllum</i>	<i>occidentale</i>	Native	Madagascar	Mahe, Silhouette, Praslin?	Confirmed
	<i>seychellarum</i>	Endemic?	Madagascar	Mahe, Silhouette	Unconfirmed
<i>Angraecum</i>	<i>calceolus</i>	Native	Madagascar, Comoros, Mascarenes, Mozambique	No record	Unconfirmed
	<i>eburneum</i> ssp. <i>eburneum</i>	Native	Madagascar, Comoros, Mascarenes	Aldabra, Amarantes	Confirmed
	<i>eburneum</i> ssp. <i>superbum</i>	Native	Madagascar, Comoros, Mascarenes	Mahe, Silhouette, Praslin	Confirmed
	<i>multiflorum</i>	Native	Madagascar, Comoros, Mascarenes	No record	Unconfirmed
	<i>zeylanicum</i>	Native	Sri Lanka	Mahe, Silhouette	Confirmed
<i>Bulbophyllum</i>	<i>humblotii</i>	Native	Africa, Madagascar, Mascarenes	Mahe	Confirmed
	<i>intertextum</i>	Native	Africa, Madagascar	Mahe, Silhouette	Confirmed
	<i>longiflorum</i>	Native	Asia, Africa, Madagascar, Comoros, Mascarenes	Mahe	Confirmed
<i>Calanthe</i>	<i>triplicata</i>	Native	Pantropical (Africa, Asia, S. America)	Mahe, Silhouette	Confirmed
<i>Cynorkis</i>	<i>fastigiata</i>	Native	Madagascar, Comoros, Mascarenes	Mahe, Silhouette, Praslin	Confirmed
	<i>seychellensis</i>	Endemic?			Now considered <i>C. fastigiata</i>
<i>Disperis</i>	<i>tripetaloides</i>	Native	Madagascar, Comoros, Mascarenes	Mahe, Silhouette, Praslin	Confirmed
<i>Goodyera</i>	<i>seychellarum</i>	Endemic		Mahe, Silhouette	Confirmed
<i>Graphorkis</i>	<i>concolor</i> var. <i>alphabetica</i>	Native	Madagascar, Comoros, Mascarenes	Silhouette	Unconfirmed
<i>Hederorkis</i>	<i>seychellensis</i>	Endemic		Mahe, Silhouette	Confirmed
<i>Liparis</i>	<i>flavescens</i>	Native	Madagascar, Comoros, Mascarenes	No record	Unconfirmed
<i>Malaxis</i>	<i>seychellensis</i>	Endemic		Mahe, Silhouette	Confirmed
<i>Oeceoclades</i>	<i>seychellensis</i>	Endemic?		Mahe?	Unconfirmed
	<i>pulchra</i>	Native	Asia, Africa, Madagascar, Comoros, Mascarenes	Mahe, Silhouette, Praslin	Confirmed
<i>Oeoniella</i>	<i>aphrodite</i>	Native	Rodrigues	Praslin	Confirmed
	<i>polystachys</i>	Native	Madagascar, Comoros, Mascarenes	Mahe, Silhouette, Praslin?	Confirmed
<i>Phaius</i>	<i>tetragonus</i>	Native	Comoros, Mascarenes	Mahe, Silhouette	Confirmed
<i>Platylepis</i>	<i>occulta</i>	Native	Madagascar, Comoros, Mascarenes	Mahe, Silhouette	Confirmed
<i>Polystachya</i>	<i>bicolor</i>	New Endemic Species?		Mahe	Confirmed?
	<i>cultriformis</i>	Native	Africa, Madagascar, Comoros, Mascarenes	No record	Unconfirmed
	<i>fusiformis</i>	Native	Africa, Madagascar, Comoros, Mascarenes	No record	Unconfirmed
	<i>mauritiana/ concreta</i>	Native	Africa, Madagascar, Comoros, Mascarenes	Mahe, Silhouette	Confirmed
<i>Vanilla</i>	<i>phalaenopsis</i>	Endemic		Mahe, Silhouette, Praslin	Confirmed
<i>Dendrobium</i>	<i>crumenatum</i>	Exotic	Asia	Mahe	Confirmed
<i>Spathoglottis</i>	<i>plicata</i>	Exotic	Asia	Mahe	Confirmed
<i>Vanilla</i>	<i>planifolia</i>	Exotic	South America	Mahe, Silhouette, Praslin	Confirmed

Orchids



The hood-shaped flowers of *Poystachya bicolor* are only 5mm wide but very pretty (K Jolliffe).

smelling perfume to attract flies to pollinate them. By contrast, orchids of the *Angraecoid* group, which includes the Tropicbird orchid, produce a fragrant perfume in the evenings, to lure moths to sip their nectar and pollinate the flowers. The nectar is contained in a long spur on the often beautiful white or green star-shaped flowers.

Unfortunately, increasing numbers of exotic orchids are naturalized in the forests of the Seychelles. The most widespread of these is the Pigeon orchid *Dendrobium crumenatum* which produces clusters of white flowers that only last for one day. It is often self-pollinating, which greatly increases its spread through wind-dispersed seeds, so that it now occupies almost all parts of Mahé, from the coast right up to the very top of the mountains. Indeed many areas which should hold numbers of native species now contain rampant populations of Pigeon orchids. I have even noticed that the ground orchid *Spathoglottis plicata* is present in many forests on Mahé and the commercial Vanilla, *Vanilla planifolia*, has survived and spread in the surroundings of old plantations on Mahé and Praslin. Vanilla could be used to revive a small tourist market for the production of the popular vanilla pods so widely used for cooking. These exotic orchids may potentially pose a problem to native orchids because they occupy the same special microhabitats on trees, rocks or on the ground as the native species and may compete with them for these particular places.

Although epiphytic orchids are not easy to see, even when you get up into the mountain forests, with a little patience and keen eyes it should be possible to enjoy their intricate beauty.

On the previous page there is the complete list of

orchid species for the Seychelles, adapted from Kew's checklist for monocotyledons and including species listed in the references below. A number of species are as yet unconfirmed as there is a lack of evidence that they occurred in the Seychelles. Kevin is currently trying to revise all the native orchid species of the Seychelles in an attempt to help correctly identify what species actually occur here. Any information would be greatly appreciated.



Orkid payanke (*Angraecum eburneum*) is the national flower of the Seychelles (E Schumacher).

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Activity Corner

Activity Corner

By Katy BEAVER

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Solve the clues below and write your answers across the rows of the grid on the right.

When you have finished, transfer all the letters from this grid to the cross-referenced squares of the lower grid, and you will be able to read a quotation from the Seychelles National Strategy for Plant Conservation 2005-2010.

(Of course you may be able to use the lower grid to help solve some of the clues too!)

CLUES

1. The Kreol name for several endemic palms.
2. Bwa _____ : famous plant of Aride Island.
3. Many farmers now use _____ irrigation. / Empty space.
4. All green plants need this.
5. Contains plant seeds. / Kreol name of *Hibiscus tiliaceus*.
6. Peril, threat.
7. Important food plant. / Metric weight.
8. One of Seychelles' protected islands.

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									

8C	1E	3A	6E	7C	2A	1C	7H	2F	6A	2B	7D	4F		5G	1B	4D	5C	3C	6C	7F		1D	4C	3I
7A	2E	8F	4A	1H	7G	3F	4E	1I	6D		3G	4B	6F	5I	5D	8A	4G		5A	1A	7B	3B	6B	
3H	8D		8E	7I	3D	8B	5B	2C	5H	1F	4H													

When you have finished filling in the lower grid, there will be 3 letters from the upper grid which you have not used. Use these 3 letters to make a word that fits in this sentence:

I will ___ my best to complete this puzzle!

Good luck ☺



See page 25 for the solution.

Ferns and filmy ferns of the Seychelles - still species to discover or rediscover

By Bruno SENTERRE

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Ferns are a very old group of plants and belong to the phylum of Pteridophyta (Fig. 1). They appeared ca. 400 Ma (million years ago), and dominated the surface of Earth, with the gymnosperms, until the appearance of the first flowering plants (ca. 130 Ma). Ferns are characterized by their reproduction by spores rather than seeds (in contrast to the flowering plants and gymnosperms, i.e. the spermatophytes) and by the presence of a vascular system (in contrast to mosses and liverworts). The Pteridophyta are subdivided into two main groups, i.e. the ferns *sensu stricto* (Class of the Polypodiopsida) and the fern allies (Class of the Lycopodiopsida).

The fern flora is still a very poorly explored group in the Seychelles. It was first treated by Baker (1877) and has since then been partly reviewed by Christensen (1912) and Tardieu-Blot (1960). Other authors have worked on checklists (Awmack 1997; Bailey 1971; Gerlach 2003; Gerlach et al. 1996) or generic revisions (Janssen & Rakotondrainibe

2006; Lorence & Rouhan 2004, etc.), but a detailed revision of the whole flora is still lacking and many areas of Seychelles have never been explored by fern botanists. About 90 species are listed, most of them native (90-95 %), but the exotic fern flora has hardly been considered. Several native species have not been seen for a very long time, or were collected only once.

In a previous volume of Kapsen, some characteristics of ferns were already introduced (Rouhan 2004). Ferns are a relatively small group of vascular plants: only ca. 12,000 species worldwide, as opposed to e.g. 30,000 orchid species (see page 6). Nevertheless, some genera are huge, as for example in the Lapat lezar genus (*Selaginella*, a fern relative) or Lang-d-bef genus (*Asplenium*), which may both have up to 700 species! Seychelles fern endemism (ca. 9 %) is generally much lower than for other vascular plants (ca. 40 %), but is similar to Bryophytes (although the later are even more under prospected). On the other hand, the “ecological endemism” in ferns, i.e. their specificity or fidelity to a given habitat, is often pronounced. This is one of the most striking characteristics of ferns. For this reason, ferns, but also the other small plants of the forest understorey, are extremely useful as indicators of habitat types within rain forests, for conservation purposes (Senterre et al. 2009).

The tallest ferns can exceed 10 m high in the Seychelles, and look like trees, such as the beautiful and threatened Fanzan (*Cyathea sechellarum*). Other species have their stem creeping on the

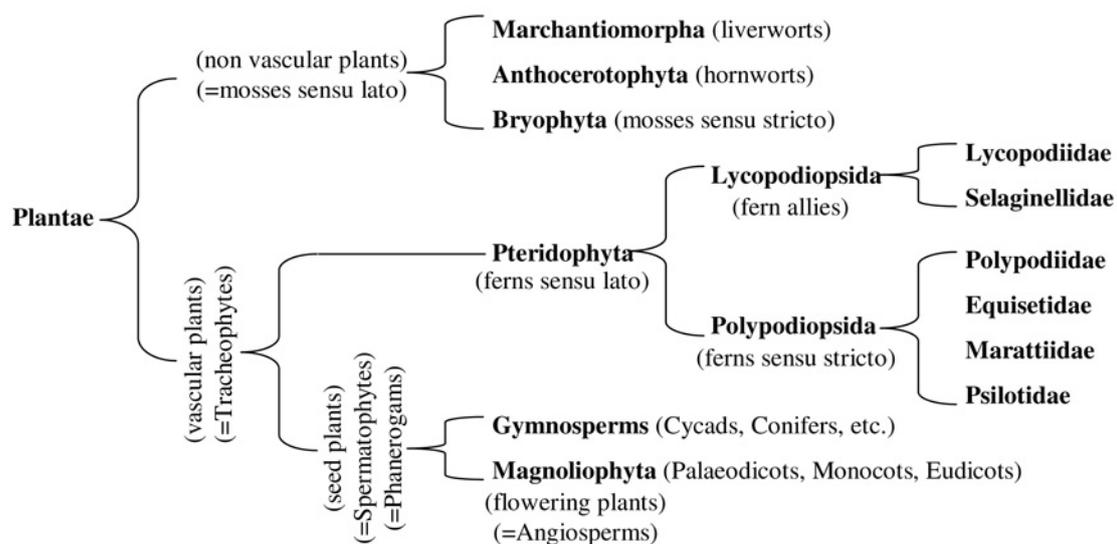


Figure 1. Systematic of the plant kingdom with a special focus on ferns. The main taxonomic groups are emphasized in bold, and their systematic position corresponds to their lateral position, i.e. kingdom, phylum, class, sub-class, respectively from left to right.



Figure 2a. Baton monsennyer (*Angiopteris evecta*) in a ravine submontane forest of Mahé (B Senterre).

ground and bear up to 3 m long leaves, as big as those of Fanzan. Another of the most amazing giants is Baton monsennyer (*Angiopteris evecta*), which characterizes the montane ravines. By contrast, the epiphytic flora contains some of the smallest ferns. While climbing in the mountains of the Morne Seychellois National park, the dark forest understory becomes suddenly totally “green” when reaching ca. 550 m altitude: this is the moss forest. The tree trunks, branches and even the floor are covered by many species of mosses, liverworts, ferns, orchids and also lichens (see also page 6 and 13). This is something you will see on all mountains throughout the humid tropics. In Seychelles as elsewhere, the cloud forest is always characterized by the diversity of a very special group of ferns: the filmy ferns (Hymenophyllaceae, Polypodiidae). The filmy ferns include about 600 species, most of them within two very large genera. We generally recognize them by their small (often less than 15 cm) filmy leaves. These leaves are usually only one cell thick, without stomata, and some filmy ferns have a regressed root system, or even are rootless. Such bryophyte-like adaptations to hygrophilous habitats are unique amongst vascular plants! About 8 filmy fern species have been listed for the Seychelles, but some names and synonyms are doubtful. Some species have been listed without citing specimens and have never been seen again, and some species found in the field do not match any of those previously listed. Among my recent filmy fern discoveries, one is the smallest fern of the Seychelles. It was collected on the top of Pérard (next to Morne Seychellois) and its largest mature leaves do not reach 1 cm long. Its flabellate shape looks like a miniature of the Kokodmer leaf, the tallest leaf of the archipelago. This species grows on tree trunks in association with moss carpets and is extremely difficult to see. It is related to a species



Figure 2b. *Angiopteris evecta* with its impressive trunk-like base (B Senterre).

found in Madagascar, the Mascarenes and Tanzania but differs in some characters and its identity is still doubtful. It seems restricted to the upper part of the montane forest, the most unexplored habitat of Seychelles.

In conclusion, ferns are extremely interesting because they help in our understanding of different habitat types, and there are still species to be discovered or rediscovered. There is a need for more collections, and therefore more explorations by fern specialists. Such explorations are difficult since most of the interesting areas are on the summits, hill sides and ravines of the highest mountains of Mahé and Silhouette. We are far from having a comprehensive fern flora of the Seychelles. The revision of a general fern flora for the Western Indian Ocean



Figure 3. An unknown species of Hymenophyllaceae, with leaves less than 1 cm long (B Senterre).

will be extremely difficult, but will bring invaluable information on biodiversity patterns and evolution processes.



Figure 4. Lower montane forest with its typical cover of epiphytes, including many Hymenophyllaceae (dark green), mixed with mosses (yellow green), here on Silhouette (B Senterre).

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Peter's Plants



Bwa fourmi

The Lichens of Seychelles

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Lichens are unique organisms (see Box on p. 14) that play a major role in the physical and biological environment of our planet. They are important in the development of plant-animal communities and succession on rocks and soils. Having evolved diverse adaptations in response to widely differing environmental conditions throughout the world, they can occur from tide level up to the tops of high mountains, from cold Arctic regions to deserts, from bare rock surfaces to branches and leaf surfaces of tropical forest trees. Lichens can be found on a wide range of surfaces such as bark, leaves, soil, rock, construction materials, gravestones and iron rails.

Lichens are also important as natural sensors of our changing environment. The sensitivity of particular lichens to a very broad spectrum of environmental conditions, both natural and unnatural, is now widely known. They are therefore used in evaluating threatened habitats, and in monitoring environmental damage and the effects of a large number of chemical pollutants in nature. Thus, lichens can often be used as an early warning system in habitats which are affected by human activities.

The lichen floras of different habitats in Seychelles are distinct. Seychelles' shores are often poor in lichens. Rocky shores support thin, often continuous crusts or mats of algae and cyanobacteria, while maritime lichens, which produce distinctive colourful



Lichen mosaic generated on a granite rock surface (K Beaver).

zonations on rocky shores throughout much of the world, are less obvious in the Seychelles islands. Lichens are also absent from eroded corals, where their ecological role is again being taken over by cyanobacteria. In contrast, inland rock surfaces are often covered with lichens, but these can be difficult to collect because of their close attachment to the rock. Thin soils and mosses over rocks are more rewarding, in that they support taxa ranging from *Peltula* to *Cladonia*. Soil banks and fibrous plant material are generally unstable, but *Lepraria usnica* is occasionally to be found in such habitats. Lichens may colonize nearly all available tree bark surfaces, where their colourful mosaics are displayed at their best, each lichen generating a delicate and intimate geographic pattern with its neighbour. However, in upland wooded areas, a mixture of mosses, liverworts and lichens clothe the bark of living trees. The nature of this epiphytic flora changes with age, and as the trunks die, different mosses and liverworts support the decomposition process undertaken mainly by fungi (see p. 3, this issue). Lichens are also to be found on the living leaves of some tree, shrub and fern species; this is due to the long-lived evergreen nature of the leaves which allows the slow growing lichens to establish themselves.

Lichens can be very specific in their choice of growing stratum – for instance the bark of a particular tree. In a coastal area of Silhouette we compared the lichen species that grow on the bark of Coconut (*Cocos nucifera*) and Takamaka (*Calophyllum inophyllum*). 25 Coconut and 25 Takamaka trees were randomly selected from a large stand of widely-spaced trees, with more-or-less vertical trunks, of reasonably similar height and girth, and subjected to similar environmental conditions, particularly in respect of their proximity to the sea. In all, 34 lichen taxa were determined, of which 15 appeared to be specific to Coconut and 6 to Takamaka; the remaining 13 taxa were common to both. In temperate regions of the world it has been shown before that many lichens clearly favour specific hosts, but host specificity has been questioned for tropical lichens. Our rather basic study described above clearly shows that not only are more lichens restricted to Coconut, but overall a greater biodiversity (28 taxa) is associated with it compared to Takamaka (19 taxa).

Over the past few decades various lichen collections have been made in the Seychelles. But in many cases the material remained undetermined in herbaria. However, more recently, a list of lichens for the Seychelles Group, based on field, herbarium and literature studies, has been compiled (Seaward, M.R.D. & Aptroot, A. (2009) Checklist of lichens for

Lichens

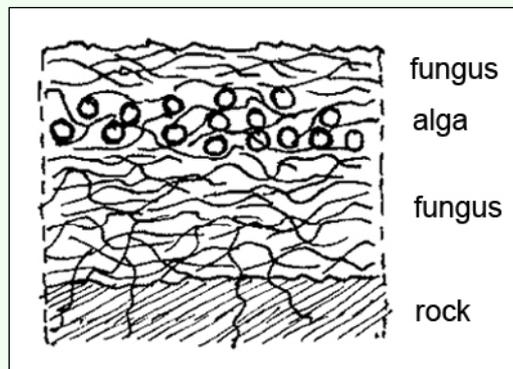
What is a lichen?

Although a lichen looks as if it is a simple organism, it is actually made up of two different organisms! One is a fungus and the other is either a green alga or a cyanobacteria (a bacteria-like organism that contains chlorophyll). The two organisms form a symbiotic (mutually beneficial) relationship in which the photosynthetic partner produces food and the fungal tissues help to protect the alga or cyanobacteria from intense light, drought and heat. Thus together they can colonise difficult habitats that many other plants cannot tolerate.

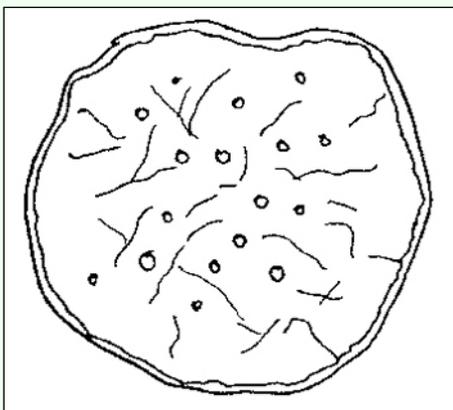
Usually the body (thallus) of the lichen has a thick layer of fungal hyphae on the outside and the algal cells lie inside. They often grow extremely slowly (a few millimetres per year). Reproduction can be through sexually produced spores, or more commonly by means of 'soredia' (powdery structures consisting of a few alga cells surrounded by fungal hyphae) or 'isidia' (tiny outgrowths from the lichen thallus, also consisting of a mixture of alga cells and fungal hyphae).

Different lichens often have a recognisable thallus structure, surface features and reproductive structures. However, determination of the different taxa requires not only observations on the visual appearance but also tests to identify chemicals which are produced by the lichen.

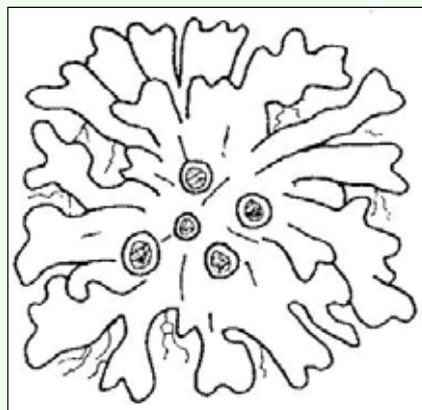
Lichens are often separated into groups according to their growth form - crustose, foliose and fruticose. Crustose lichens are fixed very tightly to their substrate and have irregular or circular shapes. Foliose lichens are more leaf-like and are attached to the substrate with tiny root-like hairs. Fruticose lichens, such as the Barb senozef (see photo on p. 15), hang downwards from a short stem-like structure, or stand upright like tiny leafless shrubs.



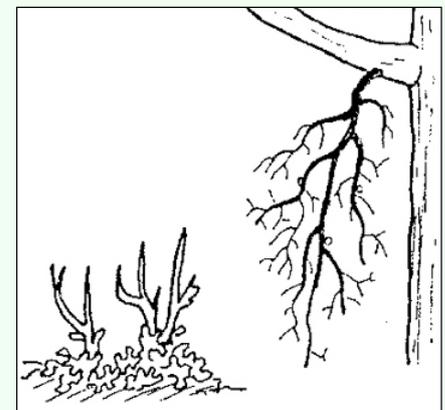
section of a lichen



crustose lichen



foliose lichen



fruticose lichens

Lichens



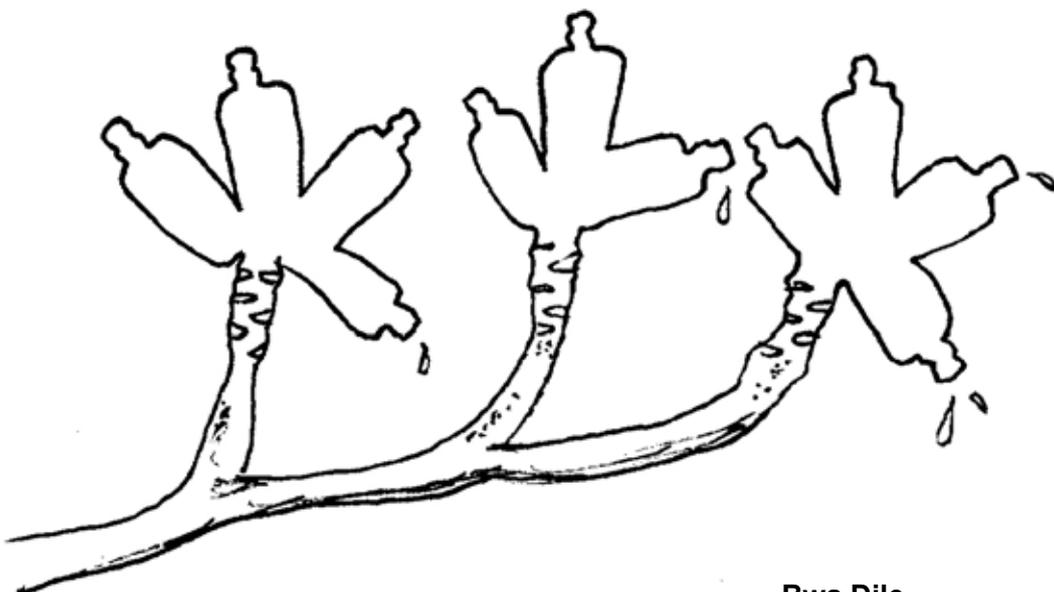
Bark epiphytes, including a spectacular beard lichen (*Usnea* sp.) (K Beaver).

the Seychelles group. *Bibliotheca Lichenologica* 99: 335-366). This preliminary list is valuable in providing an overview of lichen biodiversity in Seychelles. In all, 396 lichen taxa have been recorded from 26 islands (mainly Silhouette, Mahé and Aldabra). However, overall recording is very patchy and indeed highly deficient for many islands.

The current lichen checklist is by no means exhaustive, and is currently being updated. Nevertheless, it provides some measure of the lichen biodiversity of the Seychelles granitic and coralline islands, which hitherto were underworked or indeed overlooked by lichenologists. Moreover, the initial list has established an essential baseline for future studies, for example aimed at monitoring the biodiversity and stability of lichens, which are highly sensitive not only to local disturbance but also to far-ranging impacts, such as global warming and pollutant dispersal. It will also allow comparisons with the lichen floras of other Indian Ocean islands, as well as neighbouring continents.

Certain habitats in particular need further study, such as habitats at higher altitudes. Preliminary work on Silhouette, for example, testifies to their lichenological importance: species of *Leptogium*, *Pseudocyphellaria*, *Sticta* and *Usnea* were restricted to such areas, and there appears to be an increase in the biodiversity of foliicolous species (i.e. lichens that inhabit the surface of leaves) with altitude. Naturally, much fieldwork remains to be done. Hopefully the existence of the initial list of lichen taxa may encourage others to improve the level of recording for the less well collected of the Seychelles islands.

Peter's Plants



Bwa Dile

PCA News for the year 2009

There is quite a lot of PCA News as we are covering a whole year in this edition! This is because the last 'Kapisen' was a special issue for schools, so did not include any group news. Much of PCA's efforts in 2009 went into a large GEF-funded project on Invasive Alien Species, but there have been plenty of other activities and projects as well.

Membership

PCA has gained several younger members, including two student members doing A-levels, Nathachia Pierre and Mariette Dine, and one recent graduate, Barry Nourice, who received a 1st class degree from Tamil Nadu Agriculture University in India. We are also losing one valuable member, Mike Clemitson, who has been especially supportive in the setting up of our website. Although our website (<http://seychelles-conservation.org>) still requires considerable effort to update and upgrade the information, it was Mike who was instrumental in getting it up and running. As he is leaving Seychelles, we wish him well and assure him that improving the website is one of our important tasks for 2010.

Major project activities

Research and report writing has been a focus for some PCA members. A small team took on a large GOS-UNDP-GEF project about Invasive Alien Species (IAS). They carried out a review of all past IAS management efforts in Seychelles and a report filled with valuable information has just been finalised. A questionnaire sent to stakeholders revealed that the top six problem species for managers are Black rat, *Clidemia* (Fo watouk), Indian myna, Cinnamon, "Philodendron" and Spiralling whitefly.

One of our members, Dr Bruno Senterre, worked on another GOS-UNDP-GEF project relating to post-fire rehabilitation, especially for badly eroded land on Praslin. Other PCA members have provided advice and input to this project, which included a 3-day training workshop. The next step will be to trial various rehabilitation methodologies.



Part of the Curieuse mangrove that was damaged by the tsunami but is regenerating naturally (K Beaver).

Through another member, Sylvanna Antha, PCA now has a link with a project on Curieuse Island where there is a richly diverse mangrove that was damaged during the 2004 tsunami. A small part of the project involves an attempt to rehabilitate the area, although it is now realised that the mangrove may to some extent be a semi-artificial habitat resulting from the closure of a marine area by a seawall in the early 20th century. This was part of a rather disastrous attempt to raise sea turtles in the enclosed shallow water.

PCA members also helped a number of research scientists with collection of specimens for plant taxonomy research, e.g. at the Paris Museum of Natural History and Stockholm University, both of which may lead to further opportunities for cooperation.

Our continuing link with North Island

Between 2005 and 2009, vegetation rehabilitation on North Island was included in the ICS-FFEM "Rehabilitation of island ecosystems" project (see "Kapisen" 4, 6 and 9), with PCA providing advice and monitoring services (partly through our link with ETH, Zurich). Although this project came to an end during the year, the rehabilitation

programme will continue on North Island, and it is pleasing that an independent assessor for the project was greatly impressed by the progress achieved. A new agreement between North Island and PCA will mean continued monitoring of vegetation and follow up on experimental rehabilitation methodologies; and we will continue to provide advice and assistance when required.

Several PCA members also took part in and made presentations (wearing their various 'hats') at the ICS-FFEM 4-day workshop on island restoration held in Victoria in June. Hearing about all the restoration efforts taking place in Seychelles and also in Reunion and Mauritius was inspiring.

Plant habitats of Aldabra and Aride

PCA Chairperson Lindsay Chong-Seng spent 3 weeks on Aldabra Atoll early in the year, carrying out vegetation research for Seychelles Islands Foundation with a small team of people. They were checking the plant species found in various habitat types (known as 'ground-truthing') so that vegetation types can be shown on a digital map of Aldabra. This process will help future researchers to know what species are likely to be in an area of study, allowing for example matching of insects or birds to particular plant species groupings. The plant information on the digital map can also be linked with other data, such as rainfall around the atoll, or the positions of freshwater pools, as well as providing a new baseline for future studies of the effects of climate change.



Ground-truthing requires lots of walking, measuring, plant identification, taking GPS coordinates, and recording - in amongst the giant tortoises and often in the very hot sun! (L Chong-Seng)

Katy Beaver spent a few days on Aride Island in February, sloshing around in the small wetland while updating the vegetation map of the marsh prior to the proposed introduction of threatened freshwater terrapins. The previous study was done in 1997 and the most noticeable difference was the amount of open water. In 1997 aquatic plants covered almost the whole wetland and there was very little open water. By 2009, there were extensive open water patches where no plants were growing due to intense shade created by native trees (mainly *Bodanmyen*), planted as part of the rehabilitation of the coastal plateau on this protected seabird island.



Aride Island wetland: an open area (left) - beneath the vegetation is 30-40cm deep water! A shaded area with open water visible (right) (K Beaver).

Outreach

Occasionally 'Kapsen' gets feedback from readers, and we are always very pleased to receive it. The recent schools issue of 'Kapsen' even managed to reach Eritrea, where the readers were inspired to send some comments to the Editors. They emphasized the importance of awareness building and education for environmental conservation, and noted that unfortunately still not everyone knows about the importance of plants and the vital links between man and plants.

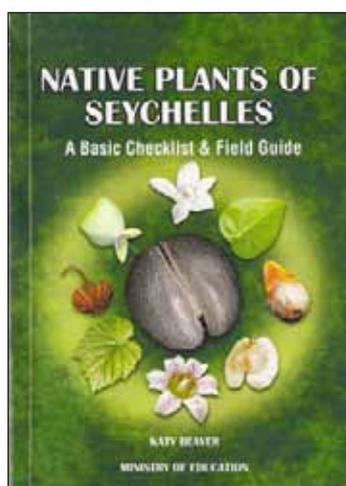
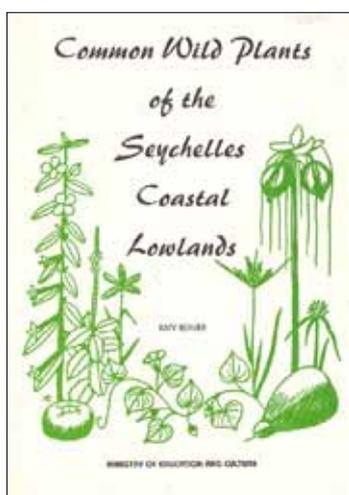
We were very pleased to produce a special edition of 'Kapsen' for Seychelles' schools half way through this year. And PCA is particularly grateful to the Ministry of Education for contributing half the printing costs, thus enabling copies to be sent to each primary and secondary school and to relevant post-secondary institutions. Hopefully this will generate more interest in the plants of Seychelles and in plant conservation amongst teachers and students. You can download the schools edition of 'Kapsen' from our website if you haven't seen it:

<http://seychelles-conservation.org/kapsen.aspx> or
www.plantecology.ethz.ch/publications/books/kapsen



Also relating to education, during the Wildlife Clubs Festival in November, held at La Promenade in Victoria, two PCA members ran an activity about plants called "Lots of Lovely Leaves". This provided an opportunity for children to learn about plants growing in the surroundings. At the same time, it presented one of our younger members, Nathachia Pierre, a chance to play an active role as a facilitator for the activity.

Earlier in the year, a quite different audience was targeted - people interested in alternative healthcare. A local NGO known as APOCHIS held a mini-fair in April, so that its members could demonstrate various alternative therapies to the public. PCA is keen to promote the cultivation of native medicinal plants, particularly by local herbalists, rather than the collection of wild plants, especially rare endemics. We linked up with the Biodiversity Centre, which provided several species of endemic medicinal plants for sale so that people could grow their own. Our displays also advocated the sustainable harvesting and use of medicinal plants.



Two books on plants of Seychelles have been reprinted this year - "Native Plants of Seychelles - a basic checklist and field guide" and "Common Wild Plants of the Seychelles Coastal Lowlands", both by Katy Beaver. Originally produced by the Ministry of Education for use in schools, they are now made fully available to the general public. Both books are on sale at various local outlets and also available through the Natural History Book Service (www.nhbs.com). These are not-for-profit reprints, with proceeds going towards the work of PCA.

Another plant book, originally produced by PCA in 2005, "Guide to Endemic Palms and Screw-pines of the Seychelles Granitic Islands" by Denis Matatiken and Didier Dogley, is to be reprinted by Seychelles Islands Foundation in 2010.

NOTES FROM THE FIELD

Rat damage to *Roscheria* and other endemic plants growing in Seychelles forests has been previously reported in Kapisen 6. It seems to occur mainly in the dry season when water is scarce. PCA members found damage to quite a number of small *Roscheria* palms on Mt Jasmin, Mahé. Rats had chewed through the growing tips, thereby destroying the palms. Interestingly, a few weeks later, the nearby peak of Glacis D'Antin was found to be free of such damage; which leads one to wonder why rats, that must be present in high numbers at both places, attack small palms in one place but not in the other.

Three more positive and interesting finds on the trip to Mt Jasmin were: a) an immature plant of the rare *Canthium sechellense*, b) the small but probably quite old tree of *Brexia madagascariensis*, which continues to survive, and c) one of the rarer small orchids.

Another observation on the trip to Glacis D'Antin was a plant of *Seychellaria*, that miniscule saprophytic plant that is hard to see on the high mountain forest floor. After hearing this report of a probable new site record for this species, Christoph Kueffer noted that "Besides the Seychelles *Seychellaria*, at least two other species are recognized in the genus: *Seychellaria madagascariensis* (Madagascar) and *S. africana* (Tanzania); and there is some new evidence that the family of *Seychellaria*, Triuridaceae, may be a sister family to the Pandanaceae (Rudall, Int. J. Plant Sci. 2003), which is quite funny: the smallest and some of the largest endemic flowering plants in Seychelles may be closely related."

Talking of plants which are hard to see, it was noted in one PCA meeting that seed pods of *Curculigo sechellensis* (Koko maron) and *Hypoxidia rhizophylla* (Pti koko maron) are rarely noticed (they are often covered with dead plant material, which makes them difficult to spot). But, more importantly, no one seems to have recently found seedpods with viable seeds inside. *Hypoxidia* frequently reproduces asexually by budding of small plants from the tips of mature leaves but it can produce seeds as well. If anyone DOES find any seed pods containing viable seeds, please report the location to PCA. If something is affecting the sexual reproduction of these plants, it is important to find out what it is.



Flowers of Koko maron - but do they produce viable seeds? (K Beaver)



Kokodmer male catkin; the pollination process remains enigmatic (C Kaiser-Bunbury).

Christopher Kaiser-Bunbury reports news of a new field study on the Coco de mer palm:

Seychelles Islands Foundation in collaboration with local partners (Seychelles National Parks Authority, Praslin Development Fund, and Ministry of Environment) and an international partner (ETH Zurich), has launched a project to study the demographic structure, reproduction and genetic diversity of Coco de mer *Lodoicea maldivica*. Despite some substantial work on the Coco de mer, there are still gaps in the basic biology of this iconic species of the Seychelles. Christopher explains: "Using field studies, we would like to find out simple facts about palm growth, population structure, flowering phenology, and pollination mechanisms. This and other information will then help us to assess, amongst other things, the health of the population, whether the current harvesting scheme could lead to the extinction of Coco de mer in the long term, and whether animals or wind is responsible for the pollination of the palm. Taken together, we will learn about how best to manage and conserve this magnificent natural heritage for the future."

Seedlings – The Tiny Trees that Represent the Future of Seychelles Forests

Christoph KUEFFER, ETH Zurich

kueffer@env.ethz.ch

Forest floors are carpeted with a transient form of tiny plant life – tree seedlings. We often tramp on these tiny young trees when on our hikes but we rarely pay much attention to them, which is a shame because the fate of seedlings determines the future of the forests. In fact, seedlings tell a dramatic story. Consider this: In a mid-elevation forest such as Mare aux Cochons there are an average of c.100 seedlings per square meter and they may remain as seedlings for some 5 to 10 years before they either die or become adults. An adult tree may occupy an average area of c. 5 square meters and may reach an age of 50-100 years. During the lifetime of an adult tree, up to 10'000 individual seedlings grow under its canopy and in the end only a single one may eventually become the new adult tree, while all the others die. To conserve and restore forests thus requires an understanding of the struggle of seedlings for survival amidst numerous hazards such as competition from other plants, herbivores, diseases or tree fall.

Once you start to pay attention to seedlings you will realize how much the life of a seedling differs between different forests in Seychelles. In Cinnamon forests the forest floor is covered with a particularly dense seedling carpet (Figure 1). This is because adult Cinnamon trees compete with seedlings through a very dense root mat and almost completely stop their growth (Kueffer et al. 2007). A seedling may remain at the same small size of some 10 to 30 centimetres for many years without any growth. In an experiment



Figure 1. A thick carpet of Cinnamon seedlings (E Schumacher).



Figure 2. Cutting a trench around quadrats of seedlings removed root competition from adults. The seedlings in the quadrats grew much faster and stood out visibly within months (E Schumacher).

we cut trenches in the ground around small patches of seedlings to remove root competition from adult trees. Within months the seedling patches that were released from the interference of adult roots stood visibly out from the surrounding seedlings (Figure 2).

In montane cloud forests a main challenge for a seedling seems to be to establish at all. The forest floor is composed of a deep organic layer that is often water-logged, and very poor in plant-available nutrients, which makes a difficult growing medium. Also few seeds fall to the ground in this habitat. Consequently, very few seedlings are found in a cloud forest such as Congo Rouge, typically less than 10 per square meter – 10-times less than in mid-altitude Cinnamon forests! In this habitat seedlings are often found growing only in special places such as on decaying wood. The most common regenerating species in this habitat is the invasive Gouyavdsin (*Psidium cattleianum*), which produces sprouts that spread across the forest floor and occasionally root. Through such vegetative reproduction they can spread without needing to establish from germinating seeds and thus avoid the problem to establish on the forest ground. Next time you visit a montane forest try this: Tear a Gouyavdsin plant from the ground and follow its sprouts. You'll have difficulty to find the end of the plant! Often all Gouyavdsin plants as far as your eye reaches are from the same individual!

In palm forests such as La Réserve on Mahé (see Kapisen 4, p. 5 & Kapisen 8, p. 10), the forest floor is covered with large palm leaves, which poses still another difficulty for seedlings to establish: there is hardly any soil exposed. Seedlings therefore often grow in small pockets of organic matter that have accumulated on the leaves, or they have to pierce through small spaces between leaves. Species with

large seeds, such as Kapisen, may be able to grow to considerable size thanks to the food reserve in the seed before their roots may penetrate to the ground. Similarly on Glacis most ground area is solid rock, and seedlings can only establish in accumulations of organic matter in crevices. In fact, a special obstacle to regrowth in Seychelles is the many granite boulders, and some species have adapted to establish on rock. For instance orchids (see p. 6), the endemic herbs Zakobe (*Gynura sechellensis*) and Nean (*Procris insularis*), or some of the palms and pandans.

To deal with these different obstacles in early life, plants have developed a wide range of adaptations. Two striking ones in Seychelles are those of the Cocco-de-Mer palm and Fig trees (Lafous). The Cocco-de-Mer produces the largest seed in the plant kingdom and the first true leaf of the seedling can reach up to several meters high, and it takes a seedling some 20 years to become an adult (Edwards et al. 2003). Many fig trees start their life as epiphytes, i.e. on another tree. They germinate and establish on a branch and only later their roots grow to the forest floor. Next time you visit Mare aux Cochons have a look at the canopy of the two nutmeg trees that grow next to the path near the old Cinnamon distillery. You may do so from the small woody shelter above the path, and you'll see a Lafous gran fey growing in the canopy of the nutmeg trees.

The fate of seedlings is particularly important for the conservation of the rare endemic plants of Seychelles. In an assessment of the threat status of the endemic woody species performed by PCA in partnership with ETH Zurich (Huber and Ismail 2006), it was estimated that for 6 out of 10 species (57% to be precise) regeneration in the field was either zero or poor, i.e. no or almost no seedlings ever found. A team from ETH Zurich together with James Mougall and Terence Valentin identified and counted over 60'000 seedlings in Mare aux Cochons (Kronauer 2005; Kueffer 2006). The good news is that they still found seedlings of 25 endemic tree species, including rare ones such as Bwadmontanny (*Camposperma sechellarum*), Bwa dir (*Canthium sechellense*), Bilenbi maron (*Colea sechellarum*), Bwa dou (*Craterispermum microdon*), and Bwa gro lapo (*Grisollea thomassetii*). The worrying news, however, was that out of the some 60'000 seedlings only some 900 were from native species; and about half of them were from the common palm Latannien fey (*Phoenicophorium borsigianum*). While for most of the other species only one to a few seedlings were found.

To conserve the native flora of the Seychelles we urgently need to better understand why seedlings are so rare. Even if adult trees are still found in the wild, their juveniles may not do well, and without action these species will thus not survive for very long. One reason is that adult trees are rare and only few seeds are produced and reach the ground. Replanting adult trees may enhance seed production and alleviate the problem. However, at least for some species the seedlings themselves are faced with problems. For instance, 58 Bwa dou seedlings were found, but they were all smaller than 50 cm. It seems that seeds reach the ground and germinate, but the seedlings soon die. Rats, tenrecs or snails probably predate seeds and seedlings, and this probably leads to the mortality of many species. Diseases and insect herbivores may also be a problem. For instance, juveniles of Kapisen (*Northea hornei*) are often found dying at the tips of the plant – similar to what is called 'damping off'. *Phytophthora cinnamomi* is a disease that affects native plants worldwide in such a way, and Cinnamon is one of the hosts. It may for instance be that this disease affects seedlings in Seychelles forests, and it would be worth checking. Bwa dir (*Canthium bibracteatum*) saplings (juveniles > 50 cm tall) are regularly found completely defoliated by some herbivore, but it is not known which one.

Seedlings are the future of the Seychelles native flora and forests. The scattered remaining old trees of rare native species will not live forever. Only if we can assure the safe establishment and growth of the native trees when they are still tiny can we conserve the diversity of Seychelles forests!

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Answers to clues

1. LATANNYEN
2. SITRON
3. DRIP / VOID
4. SUNLIGHT
5. FRUIT / VAR
6. DANGER
7. CORN / GRAM
8. COUSIN

Quotation

Understanding, valuing and conserving our rich flora is important.

3-letter word

TRY



Seychelles Plant Conservation Research Agenda

The Seychelles Plant Conservation Research Agenda is a response to the National Strategy for Plant Conservation.

Edited by PCA members, it is the outcome of an international workshop held in Victoria in 2007.

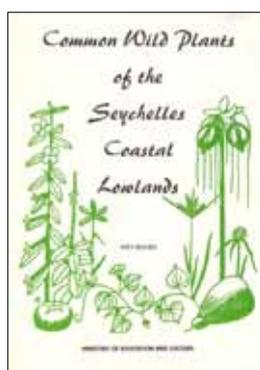
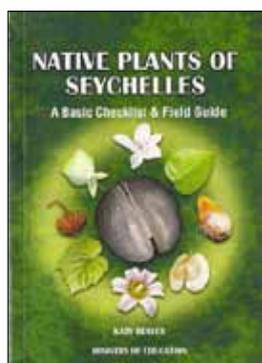
An electronic version of the Seychelles Plant Conservation Research Agenda can be downloaded here:

<http://seychelles-conservation.org/kapisen.aspx>

www.plantecology.ethz.ch/publications/books/kapisen

Local and international experts are most welcome to consider how they can contribute to the achievement of the targets!

Reprints of plant identification guides



Reprints of two plant identification guides are available now. Originally published by the Ministry of Education, their distribution has until now been very limited. The reprinted books are available from local book sellers and other outlets at a reasonable price. Profits from sales will go to PCA, so by buying copies of these books you will be supporting plant conservation!

The books are also available from the website of the Natural History Book Service <http://www.nhbs.com>.

PCA field trips



Sunday 11 April
Sunday 20 June
Sunday 15 August

Sunday 10 OR 24 October
Sunday 19 December

Before the date, please contact Katy Beaver to find out details and arrangements
(email kbeaver@seychelles.net or telephone 241 104)

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For joining PCA, contact Lindsay Chong-Seng (Chairperson) or Katy Beaver (Secretary) at

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