natural synthetics called lichens

BY
AMY SCHOEMAN

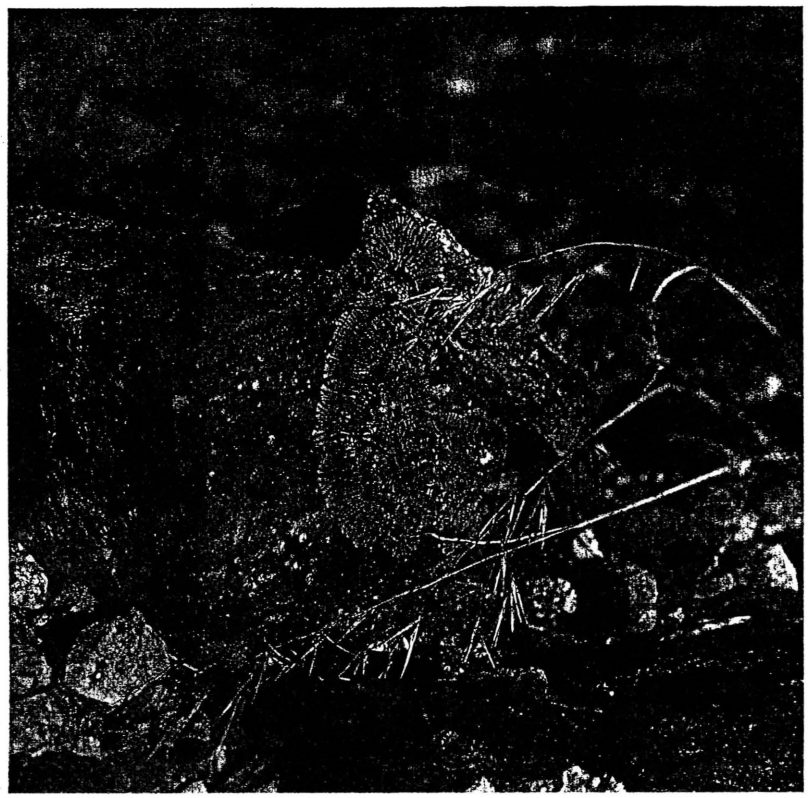
229855

1. Reception, Information desk
2. Lounge

Toilets
Dining tent
Videos

Staff Housing
Villa 1
Villa 2
Villa 3
Old House
Helipad
Water Tower
Station Buildings
Guest Bungalows
Tennis Court
Guest Bungalows
5 - 8
9 - 12
Resource Centre
Amabilis Hall
Kuiseb camp
Kuiseb River

GOBABEB Training and Research Centre



The attractive and brightly coloured** Caloplaca elegantissima **is a saxicolous lichen, that is a species which grows on rocks.

An absorbing and intriguing feature of the Namib Desert is its lichens, unobtrusive organisms that tend to be seen but not noticed. At first glance they appear rather nondescript, but when sprinkled with water they 'bloom' or come to life dramatically, the colours brightening and the 'leaves' moving visibly. Seen through a strong magnifying glass or lens, an untidy-looking rock thus 'revitalised' turns into a shimmering display of multi-coloured coral, while an early morning fog can transform a 'barren' stretch of desert into a lush green meadow.

***Title page:** **A vast plain is coloured orange by a combination of feldspar gravels and small quartz pebbles encrusted with the lichen** Caloplaca elegantissima. **Insert:** Caloplaca elegantissima.*

The abundant occurrence and diversity of the Namib's lichens have generated much interest abroad. Early in 1986 an international team of lichenologists hosted by the University of the North and the Directorate of Nature Conservation visited Namibia and spent several days inspecting the different lichen communities in the central Namib Desert. They collected more than a hundred species for identification and classification, a large number of which are considered to be endemic and therefore unique to the Namib.

A lichen (pronounced 'like/in' or 'litch/in') is a composite organism which consists of two completely divergent components, the one an alga, a kind of duckweed that manufactures its own food by photosynthesis and the other a fungus, a mushroom or mildew, which lives off other organisms. Together they form a third entity, the lichen, which is quite different in appearance from either of the components and is adapted to environments in which neither could survive on its own. The alga furnishes sugar and other foodstuffs to the fungus, while the fungus supplies a protective covering, anchorage and moisture to the alga. The fungus is generally the larger component, and also determines the form which the lichen takes. This process of living together is known as symbiosis, an association which takes both members into an entirely new range of situations and possibilities for survival and growth.

Botanists have succeeded in separating these two components in a laboratory and keeping them alive by culturing them independently. Thus far, however, there has been little success in putting them back together again, or in creating a lichen artificially. Lichens propagate in a unique fashion, either simply by the distribution of small pieces of the thallus (the main body of the lichen; there is no differentiation between stem and leaf and true roots are absent) or by germination of spores of the fungal component, which must, however, first find its proper algal associate in order to survive.

There are more than 18 000 known species of lichen, ranging from cosmopolitan to endemic species, each with its own characteristic shape, size and colour. They are found from the tropics to the poles, amongst permanent snow on the highest mountain tops, in water and on sunbaked desert floors, growing on trees, rocks, leaves, grass, soil, moss and gravestones. Technically they are fungi, although they are sometimes erroneously considered to be mosses.

Lichens have a wide variety of growth forms, each with its own characteristic internal and external structure. For practical purposes they are divided into crustose, foliose and fruticose

SAVE WATER

The Gobabeb Centre obtains its water from the underground alluvial aquifer of the Kuiseb River. Its recharge depends on infrequent, large flood events that reach this part of the lower Kuiseb, often at intervals of decades. Under current usage, the water table drops by at least one metre per year.

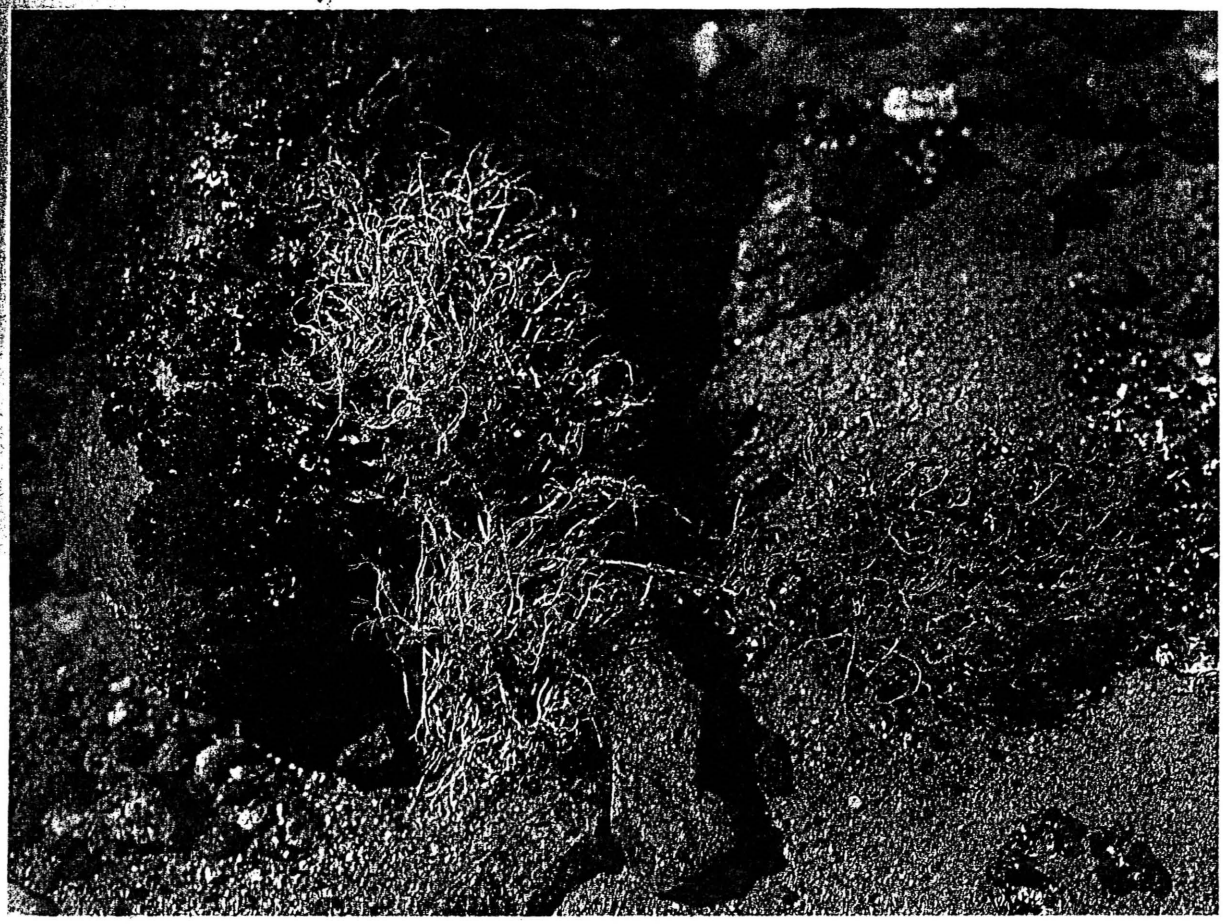
The residents of the Gobabeb Centre were able to reduce their water usage by two-thirds in 1994 when SDP 2 brought to their attention the large amount of water they were using per capita. Part of the reduction in water use was achieved by no longer watering trees previously used for landscaping. An appropriate arid landscape for the Gobabeb Centre is one of the proposed developments scheduled to occur after current building is completed. Another step recently taken was the replacement of old, voluminous toilet cisterns with smaller cisterns that have a controlled flush mechanism. In the Clay Houses, water from the hand-wash basins goes directly into the toilet cistern to further reduce water use. Short showers, timely repair of leaky taps, planned replacement of faulty water reticulation pipelines and installation of meters all contribute to reduction of water wastage.

During your visit, please help the Gobabeb Centre use its scarce water resources on a sustainable basis.

PROTECT OUR LANDSCAPE

The Gobabeb Centre is currently in a state of change with building, renovation and other developments. In the past, travel within the boundaries of the Gobabeb Centre took place on designated roads and well-used paths. With expansion of the premises, new roads and pathways have yet to be established. Meanwhile, we ask all visitors to stick to constructed roads and established tracks to protect the substrate.

It is important to continue to accommodate the endemic wildlife living on the grounds of the Gobabeb Centre. These include small annual and perennial plants and a host of insect and vertebrate species including but not limited to three species of barking geckos, several other lizard species, nesting larks and chats and a wide array of tenebrionid beetle species. Keeping to areas already heavily used will reduce further destruction of their habitat.



Two examples of fruticose or shrub-like lichen, the orange *Telochistis capensis,* ***and the green*** *Ramalina* ***sp, growing on the same rock with other saxicolous species.***

types. The blue, white, black and orange crust-like patterns on the rocks at Henties Bay are crustose lichens; a rich and colourful variety of these occur throughout the Namib. These lichens are usually so closely attached to the substrate that they can scarcely be separated. An extreme example of this group is a *Lecidea* species which occurs inside cracks of small quartz pebbles. Its occurrence is only indicated by the presence of reproductive structures on the surfaces of these stones.

Foliose lichens are easily recognised, as the thallus resembles a leaf. These lichens occur in a large variety of external forms. They usually lie flat on the surface and are generally attached to the substrate by root- or cord-like structures. Some of the world's largest lichen thalli, up to 90 cm in di-

When lichens are watered they come to life dramatically, the colours brightening and the 'leaves' moving visibly, becoming soft and leathery to the touch.

Environmental Observatories Network in Namibia (Eonn)
SADC-DRFN Desertification Interact (SDDI)
Namibia's Programme to Combat Desertification (Napcod)
Appropriate Technology in Arid Lands (Atal)
Demonstration at Gobabeb of Renewable Energy and Energy Efficiency (Degree)
Rammed Earth Hall (New Community Resource Centre)
Recycled Water

Also: Swimming at the pool
Videos for Children at the main station
Station tours as requested

18h00 Volleyball **in the Kuiseb**

19h00 Sundowners **in the dunes**

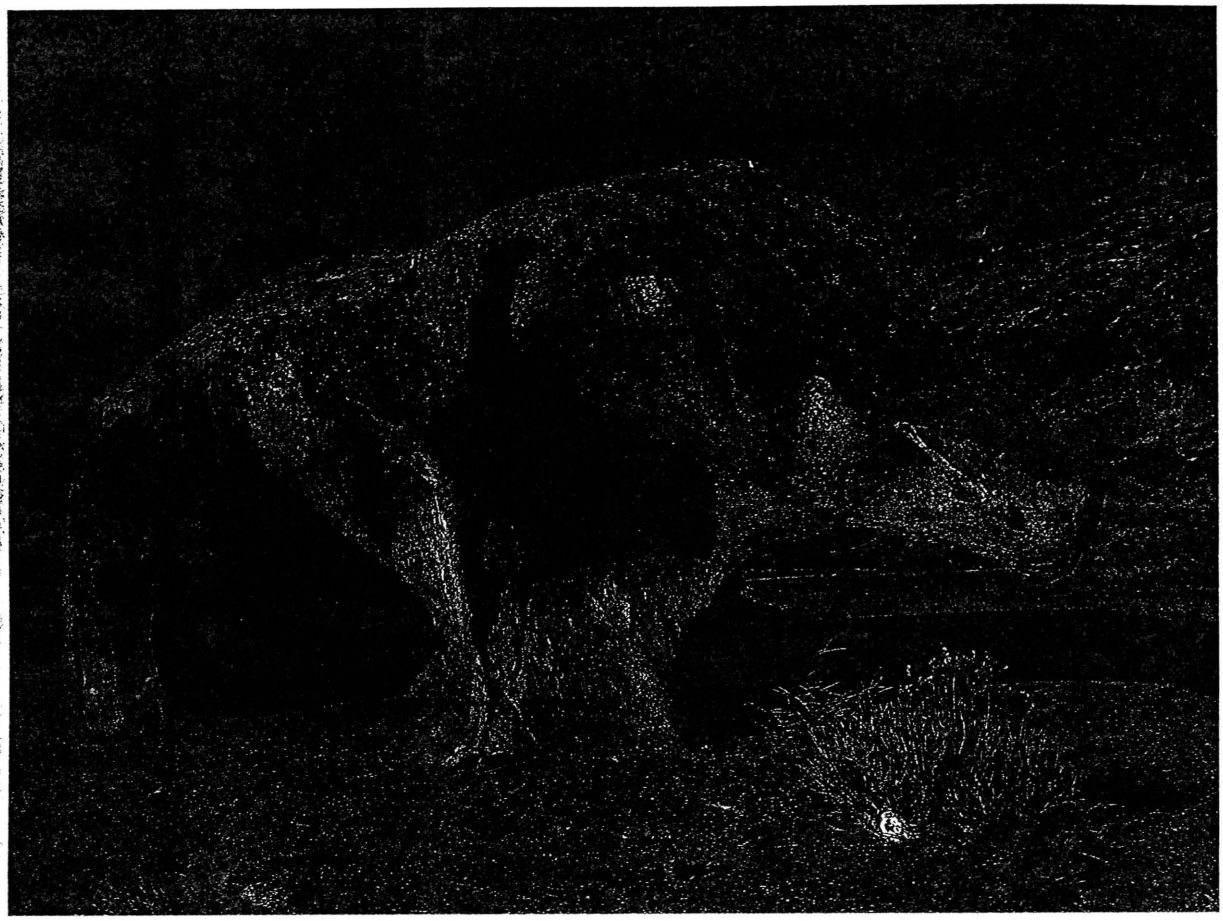
20h30 Evening Banquet **in dining tent**
Address by Dr Willie Jankowitz - on behalf of Dr Tjama Tjivikua - Rector of the Polytechnic of Namibia
Address by Chief Seth Kooitjie
Traditional Chief of the Topnaar Community
Later, for those who are interested:
Scorpion walks by Snake and Olavi
Star gazing by Paul

Sunday 2 February 2003

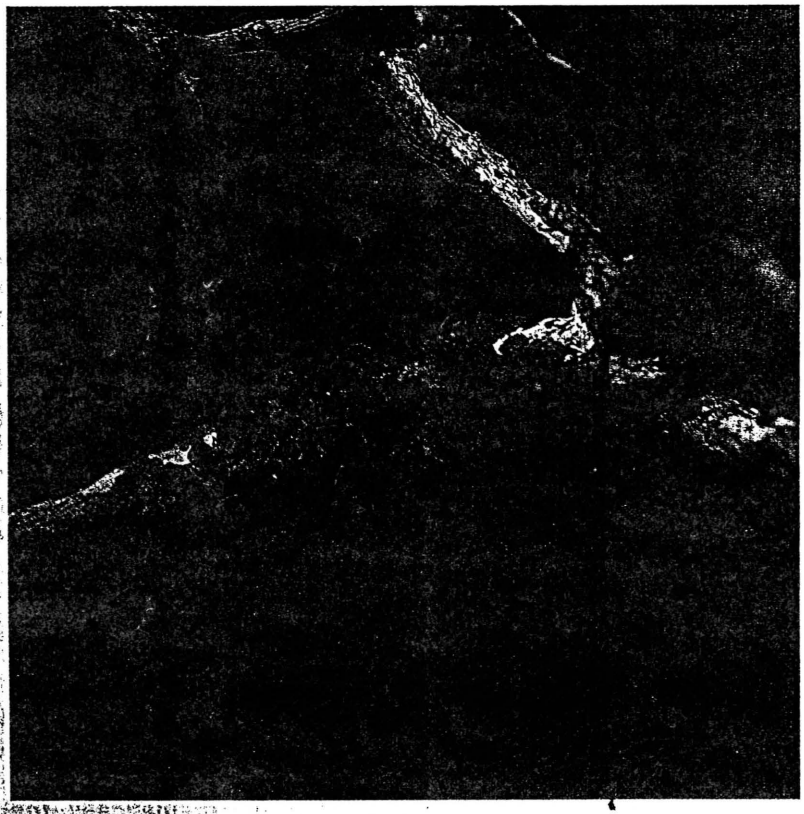
08h00 - 10h00 Breakfast **in dining tent**

Self guided nature walks at any time in the river and dunes (brochures available in the Community Resource Centre)

DRIVE CAREFULLY ON YOUR WAY HOME



A rock resembling a giant prehistoric polar bear, with lichen growing on its muzzle.



A species of** Xanthorea **growing on a dried out twig.

ameter, are found among this group.

Shrub-like lichens, which either hang or grow straight upwards and are attached to the substrate only at their bases, are referred to as fruticose lichens. These species are usually hairy, such as the commonly known old man's beard lichen of which some species grow as long as 5 m. Sometimes they are shaped like fingers or ribbons. There is an endemic species of wandering or windblown lichen, *Xanthomaculina convoluta,* which resembles small dried-up tubular leaves. Thalli of these species tend to collect in indentations, forming thick dark mats of what looks like dried seaweed.

The lichen communities which are found in the Namib are peculiar to deserts which have a regular supply of fog-moisture. Similar conditions occur in the southern desert of

Programme
Gobabeb Training and Research Centre
Information Weekend 31 January - 2 February 2003

Friday 31 January 2003

13h00	Lunch for early arrivals **in dining tent**
13h00 - 19h00	Registration Arrival of guests
17h00	Station Tour **(depart from dining tent)**
20h00	Meet and greet followed by evening meal in dining tent Welcoming remarks by Mr Tangeni Erkana Vice-Chairman, Board of Trustees of Gobabeb Centre

Saturday 1 February 2003

07h00 - 09h00	Breakfast **in dining tent**
09h00	Summer Desertification Programme #11 Presentation by participants - **in Amabilis Hall** Award Ceremony, Dr Göran Hedebro
10h30	Tea **in dining tent** Chat with SDP participants and view computer models - **in Amabilis Hall**
12h00	Overview of Renewable Energy and Energy Efficiency Projects and Initiatives in Namibia Launch of Renewable Energy and Energy Efficiency Bureau - **in Amabilis Hall** Remarks by Mr Gottlieb Amanyanga, Director of Energy
13h00	Lunch **in dining tent**
14h30 - late	Information Market **in Community Resource Centre and Amabilis Hall** Projects of Gobabeb Centre and its partners: *Overview of Renewable Energy and Energy Efficiency Projects and Initiatives in Namibia (R3E) - Presentation by Robert Schulz (R3E) at the following times 14h30, 15h30 and 16h30 - **in Amabilis*** Summer Desertification Project (SDP) Environmental Learning and Action in the Kuiseb (Elak) Supporting Environmental Education in Namibia (Seen)

Peru, the adjacent north Chilean desert, the north-western Baja California and the north-western coast of Australia. This distribution is directly correlated with the fog conditions caused by cold currents, such as the Benguela, which flows northwards along Namibia's coast.

Lichens fulfil an important function in whichever habitat they occur. In dry areas they are ecologically important as they colonise habitats by influencing ground stability, hydrology, fertility of the soil and the microclimate. Lichens which grow on rocks are slow but efficient soil formers, disintegrating the rock gradually and adding yearly to the increment of new soil. They are also an important link in the food chain. The role of the lichens on a Namib Desert plain can for instance be compared to that of grass on a plain in the Orange Free State. They provide food and shelter to a variety of insects and micro-organisms and in dry years are also a food source for the springbok of the desert. In addition, from a purely visual point of view, their subtle colours bring an aesthetic quality to an otherwise colourless landscape.

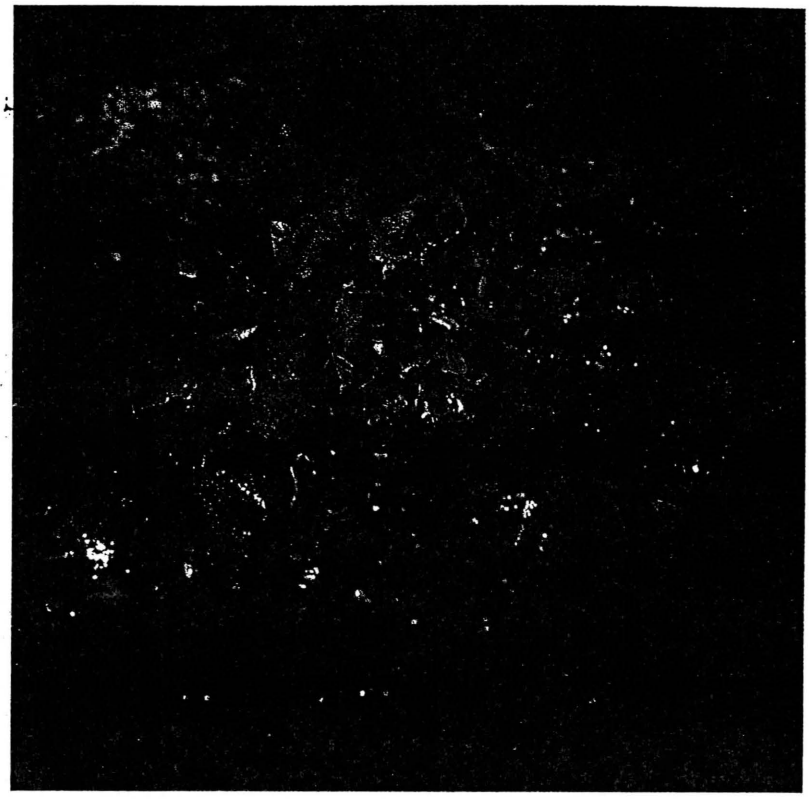
In sub-arctic regions lichens are often the sole winter food of reindeer and caribou. This 'reindeer moss' contains a large percentage of lichenin, a nutritive starch which powdered and mixed with flour is eaten by humans in times of scarcity. In North Africa and Asia lichens are used by nomads as emergency grazing for their stock. Lichens have also been used as an emergency ration by explorers on long expeditions. As recently as 1972 the survivors of an aeroplane crash in the Arctic regions of Canada used lichens to supplement their food rations.

It is thought that the manna used by the Israelites for emergency food supplies on their journey through the desert consisted of thalli of the lichen *Lecanora esculenta.* In Iran today a powder made from this particular species is added to flour and it is believed that bread baked from this flour improves lactation. In earlier times the Egyptians imported lichens to mix with the material used to fill the stomach cavities of their mummies. Lichen powder was added to the bread which was placed with the mummies. To the Eskimos of Northern Canada partially digested lichens found among the stomach contents of slain wild animals are considered to be a delicacy and are removed and eaten soon after the hunt.

In some countries lichens are processed commercially as an edible commodity. In Japan the lichen *Umbilicaria esculenta* is produced as 'iwatake' and sold as a delicacy. During the Second World War the Russians used lichen in the manufacturing of sugar. Lichens are also used to prolong the life of certain foodstuffs. In earlier times for instance lichen flour was added to bread flour to make it last longer on extended sea journeys.

Litmus, a special kind of violet-coloured paper which is used to test for the presence of acid or alkali, is produced from certain lichens. The French and Scandinavians use lichen extracts as a preservative in their perfumes, in order to limit evaporation and effect the gradual release of the fragance. These extracts have a moss-like scent of their own which in turn adds an interesting fragance to the perfumes. Examples of perfumes containing lichen extracts are Lavender Water, Fern, Broom, Russian Leather and Amber.

Lichens have long been valued for their medicinal properties. In the Middle Ages it was believed that God marked certain plants in a particular way to indicate which illnesses



This foliose species,** Xanthomaculina hottentotta, **is endemic to the Namib Desert and the Cape Province. It was described for the first time by Dr M.E. Hale of the Smithsonian Institute in 1985.

22nd May	
07h00-08h00	***Breakfast***
08h15	Leave Grootberg
10h00	Depart from Kamanjab to Eros
13h00-14h00	***Lunch break***
16h00-17h00	Review Planning
17h00-17h30	Evaluation of Workshop
18h00	Dinner (Braai) at DRFN
23rd May	
07h00- 09h00	**Departure** for all **Meeting** at DRFN: Nickey //Gaseb, Rhena Hoffmann, Mary Seely and Helmut Woehl.

List of Participants

SDDI EVALUATION-PARTICIPANTS LIST			
NAME	**COUNTRY**	**ORGANISATION**	**TELEPHONE**
de Klerk Cecilia	Namibia	DRFN	00264-61-229855
Gaseb Nickey	Namibia	SDDI	00264-61-229855
Hoffmann Rhena	Germany	GTZ	0049-228-983-7122
Kruger Bertus	Namibia	DRFN	00264-61-229855
Majara Nthabiseng	Lesotho	SADC ELMS	00-266-22312158
Masuku Bongani	Swaziland	CCD NFP	00-268-5184162/5186329
Nanthambwe Steven	Botswana	SADC FANR	00-267-7252-9264
Seely Mary	Namibia	DRFN	00264-61-229855
Shikongo Sem	Namibia	CCD NFP	00264-61-249015
Woehl Helmut	Namibia	GTZ	00264-811281812

-19th May 2003-

Introduction to Workshop by Dr. Mary Seely

A fruticose type of lichen, on a bed of fallen mopane leaves, attached to a dry twig.

they could cure: lichens that were shaped like lungs were suitable for treatment of lung and allied diseases, while lichens that were golden yellow were used to treat yellow jaundice. It was believed that rabies in humans could be cured by the lichen *Peltigera canina*. It has been proven that extracts of a number of lichen species are effective in the treatment of infections such as tuberculosis and ringworm. In Sweden pastilles containing lichen extracts are manufactured for the treatment of sore throats.

The subtle orange, green, blue, grey, black, ochre and yellow lichen colours are the result of lichen acids, chemical compounds which are peculiar to lichens. These acids have potent antibiotic properties and in some countries are used as a substitute for penicillin. In earlier times lichen acids were widely used in dyes; today they are still used in Britain as a dye retainer in the manufacture of the exclusive hand-woven Harris tweed.

It has been established that the thalli of certain lichen species which occur in Arctic regions are at least 4 000 years old. The growth rate of lichens depends among other things on the locality and the growth form of the specific species. Generally speaking crustose lichens grow between 0,06 and 3,8 mm per year, foliose species between 0,06 and 26 mm per year and fruticose species between 0,8 and 36,5 mm per year.

Today lichens are commonly used to determine the age of substrates which cannot be dated by conventional methods. For instance, by employing lichenometry the age of the statues on Easter Island in the Pacific Ocean off Chile was calculated to be 430 years. This method is also used to determine the age of rock paintings, glacial walls and so on.

The lichen flora of the Namib is unique not only because of the large number of endemic species, of which some have only limited occurrences at a few isolated locations, but also because of the unusual variety and extent of the different communities. Many people, however, are oblivious to their interest value and intrinsic worth, while some are not even aware of their existence and inadvertently cause irreparable damage by driving through the communities.

The lichen fields of the gravel plains are especially vulnerable to damage by vehicles. People unthinkingly leave the road and drive heedlessly backwards and forwards over the desert surface, destroying not only the lichens but breaking the hard surface crust of the substrate. Not only do lichens have an extremely low reproductive cycle, but before they can recolonise the substrate has to recover sufficiently, which in the case of the gravel plains could take hundreds of years.

Other than the enclosure of a number of small lichen reserves by former Director of Nature Conservation Bernabé de la Bat in the vicinity of Cape Cross during the seventies, steps are yet to be taken to protect the Namib's lichen communities in such a way that their continued existence is ensured. One of the objectives of the recent visit by the international team of lichenologists was to submit a report to the SWA Directorate of Nature Conservation in which recommendations will be made for the future preservation of the Namib's unique lichen flora.

Acknowledgements:

I would like to thank Dirk Wessels, from the Department of Botany, University of the North, for supplying me with information and for identifying the lichen species in the photographs.

Bibliography:

HALE, M.E.: The Biology of lichens, 2nd ed. 1974, Edward Arnold.

WESSELS, D.C.J. & BUDEL, B.: Lichens and Bagworms, *African Wildlife*, Vol. 39, No. 3, The Wildlife Society of Southern Africa.

Tentative Programme

18th May 2003, Sunday
Arrival of participants
Distribution of relevant documents and Reading

Date & Time	Activity
19 May	
12h00-13h20	**Welcoming *Lunch (Light)***
13h30-13h35	Introduction to W/shop Dr. Mary Seely
13h35-14h15	Presentation- 'Regional CCD project Africa' Ms. Rhena Hoffmann (GTZ CCD Project)
14h20-15h15	SDDI Report Nickey L. //Gaseb (SDDI Project Manager)
15h15-15h30	Review continues
15h30 16h00	***Tea break***
16h00-17h30	Review continues
17h30-18h00	Synthesis framework, introduction Dr. Mary Seely
18h00-18h00	SADC-FANR informal briefing Mr. Steven Nanthambwe (SADC Environment Expert)
20th May	
08h00-08h30	Intro to Planning Planning commence
08h30-09h00	
09h00-10h00	Planning continue
10h00-10h30	Planning continue
10h30-11h00	***Tea break***
11h00-13h00	Planning
13h00-14h00	***Lunch break***
14h00-15h30	Planning
15h30-16h00	Tea Break
16h00-17h30	SADC partner country selection criteria
18h00	End of Day Two
21st May	
06h00	Depart from Eros to Kamanjab
09h30	Welcoming at Grootberg Helga /Howoses (Information Liaison officer)
	Programme outline (as by host)
13h00	***Lunch break***
14h15	Programme continues
18h00	End of Day Three (Evaluation of the day)