

# Studying Biology in the Namib

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by Mary Seely

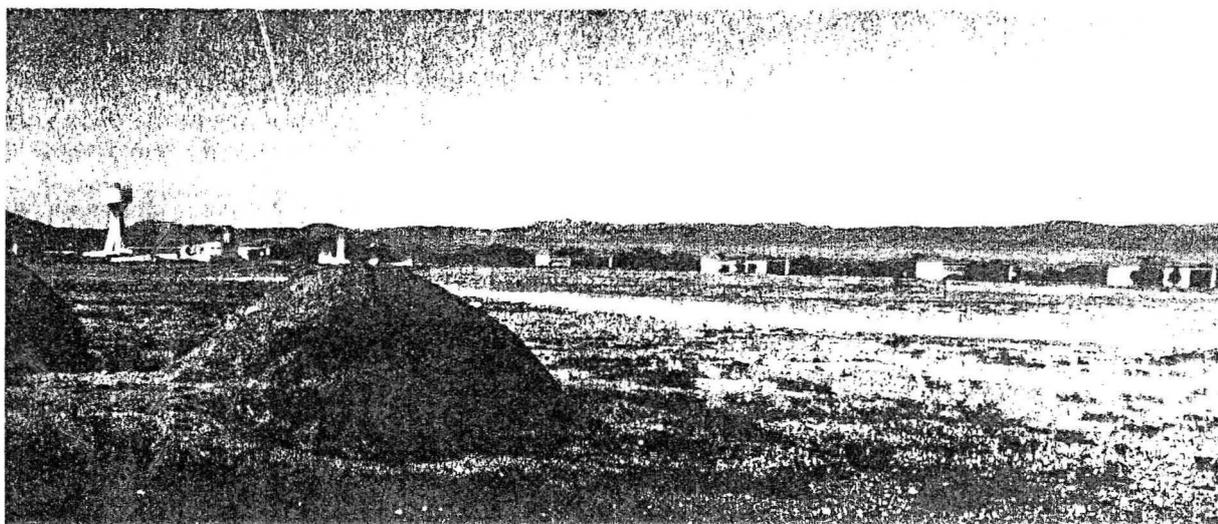
To the people of Windhoek, Swakopmund and Walvis Bay tourists from around the world are no novelty. But intermingled with the holiday makers, photographers and big-game hunters are a few more single minded souls. While ever observant of the passing scene around them, they are, nevertheless, quite intent on their ultimate destination, the Namib Desert. These people constitute the assortment of scientists — geomorphologists, archaeologists, botanists and zoologists — who come, often from great distances, to study some aspect of the desert's ecology, past or present. And as knowledge of the Namib increases in the scientific world, the number of scientists from all disciplines who come to observe and study this biological 'mecca' will also

increase, contributing to the amount of information available concerning Namibia's most intriguing desert.

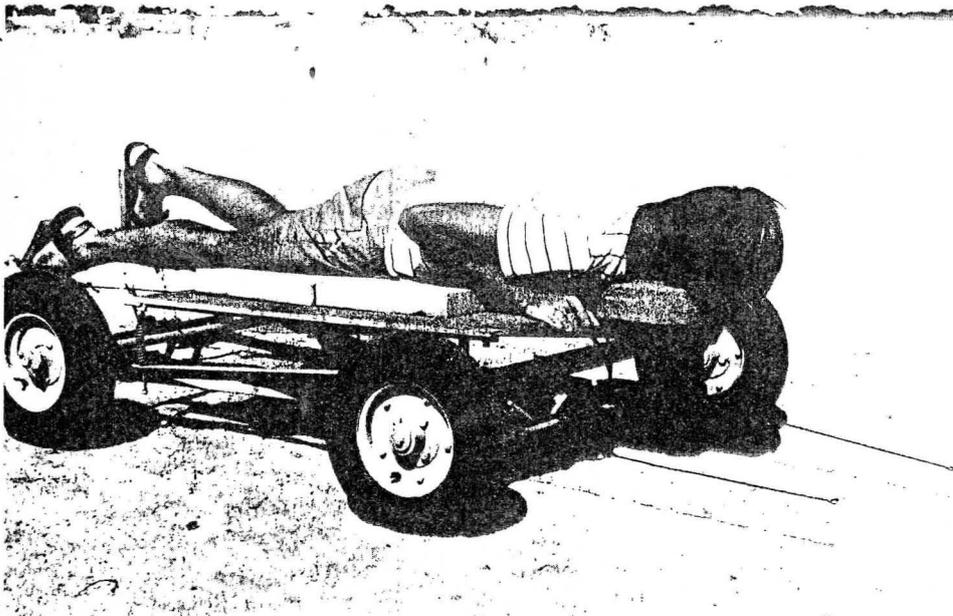
Many of these scientists, sooner or later, make their way to Gobabeb, for Gobabeb is the site of a small desert research station located in the heart of the Namib. The Namib Desert Research Station, as it was initially known, was founded in the early sixties by Dr Charles Koch, an entomologist from the Transvaal Museum. On his first visit to the Namib in 1949 Dr Koch was the invited guest of a broad-based, international scientific expedition. Dr Koch's role, as the acknowledged world authority on arid-zone tenebrionid beetles, was to study the, then little known, tenebrionid beetles of the Namib. This first hand view of

the great diversity of species and of the marvelous ways that they were adapted to the harsh desert habitats changed the course of Dr Koch's life. He gave up his position in Europe and joined the Transvaal Museum where for several years he was not even paid for what was a 'labour of love' to this captivated entomologist. Although Dr Koch had spent all his life naming and describing beetles and attempting to understand how they were related to one another, he was very quick to grasp the basic ecological principles pertaining to the Namib environment. It was to further the study of biological interrelationships in the Namib that Dr Koch established the research centre at Gobabeb.

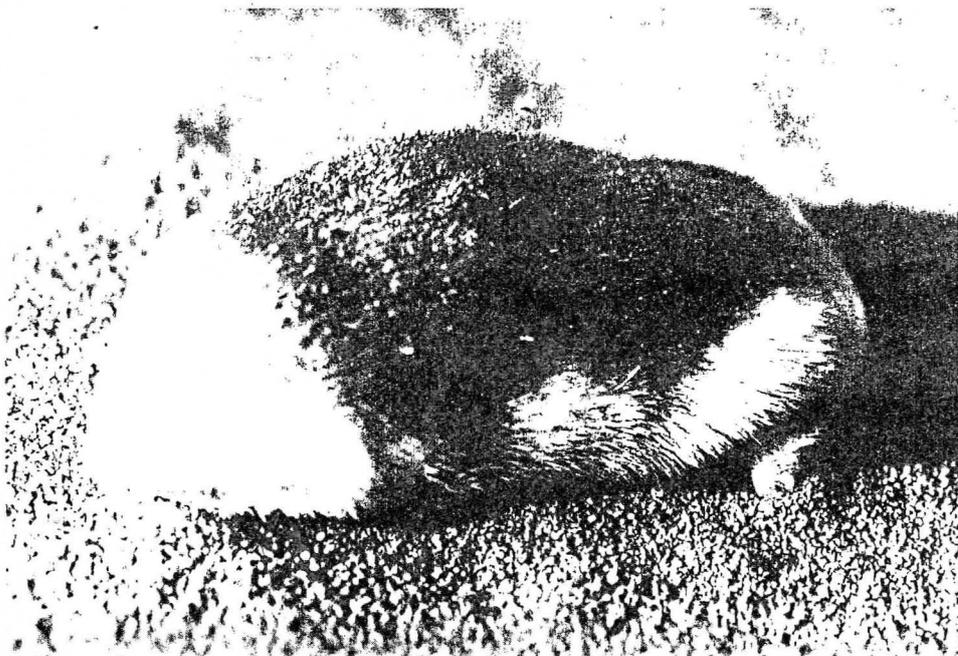
Having himself become so interested in the Namib, Dr



The Namib Research Institute at Gobabeb, home of the Desert Ecological Research Unit, is situated on the bank of the usually dry Kuiseb River bed. The dunes south of the Kuiseb and the plains to the north are easily accessible on foot for regular study.



**Alan Marsh, Research Associate of DERU, studies ants of the Namib plains using the 'ant mobile' which he designed especially for this purpose. The vehicle is slowly propelled across the gravel surface by pedalling so that the ants can be observed at close range.**



**The golden mole is a small, elusive insectivore of the dune habitat which has only been known to science for twenty years. Its ecology is currently being studied at Gobabeb.**

Koch realized that other scientists — once they became aware of the unique aspects of the desert — would also wish to study it first hand. Thus he did not merely establish a site where he could pursue his own interests but also encouraged 'visiting scientists' to work at the research station. In this way the contributions of scientists from throughout the world could be integrated into the body of knowledge concerning the Namib Desert.

Today Gobabeb is the location of a flourishing research centre where resident and visiting scientists pursue a variety of research topics. During the last twenty years the framework of Dr Koch's original concept has been expanded. Since 1970 the Department of Agriculture and Nature Conservation has maintained two or three resident staff members at Gobabeb and in 1973 they expanded the facilities and renamed them the Namib Research Institute. More recently, in addition to maintaining the facilities, several of the Nature Conservators have initiated research projects. These have resulted in contributions to our knowledge of mammals in the desert and also allowed the conservators to earn higher academic qualifications. Throughout the years various members of the State Museum have also contributed to research concerning the Namib Desert.

The direct descendent of Dr Koch's research programme is the Desert Ecological Research Unit, funded by the Council for Scientific and Industrial Research (C.S.I.R.) and the Transvaal Museum. Dr Koch organized this direct support to the research effort and the DERU was established under his guidance in 1965. Today the DERU consists of a number of resident scientists and assistants, varying from six to ten or more at any one time, and a continual flow of visiting scientists. A number of longer term

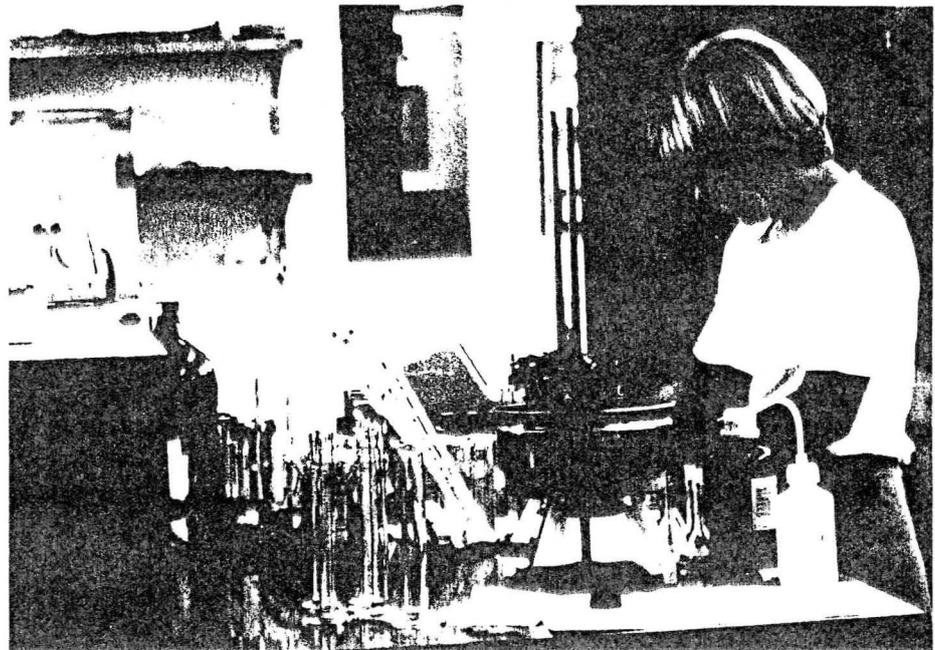
residents are students from South African universities who are working towards MSc or PhD degrees while investigating some aspect of desert ecology. Residents and visiting scientists study a wide variety of subjects ranging from characteristics of the soil and the climate to the plants and smaller animals of the desert environment in addition to further study on Dr Koch's tenebrionid beetles.

How does a research centre composed of such seemingly diverse elements actually function successfully? This is a question asked by participants and outsiders alike. Although 110 km from the nearest town, Walvis Bay, the facilities provided at Gobabeb are excellent. With electricity, running water and laboratories, it is possible for scientists to concentrate on research, rather than day to day living. Ordinarily when a scientist is budgeting for field research in undeveloped areas the formula of one day of support and organization for every two days of research in the field is applied. At Gobabeb the ratio of days spent on productive research can be greatly increased as the basic facilities are provided.

A very important facility at Gobabeb is the library which contains about 500 books, 20 major international journals, 25 local journals and over 6000 reprints. This is one of the most complete collections of material on desert biology to be found in southern Africa. The library provides a focal point where a search of the scientific literature can begin. For scientific research must be built upon what others have already discovered in similar fields and an extensive knowledge of the available literature precedes actual research activity. The accumulation of desert literature in the library at Gobabeb is the result of contributions from desert scientists, of purchases funded by the CSIR and Trans-



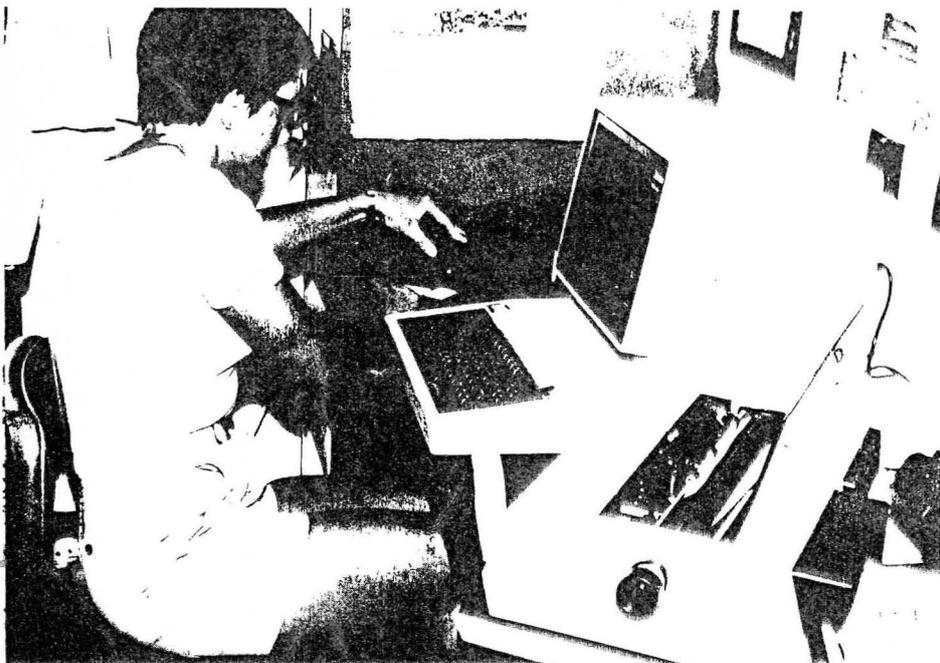
**The small plant reference collection maintained by the DERU allows ecologists working in the Namib to tentatively identify unfamiliar species. Dr. Jenny Day from the University of Cape Town is searching through the collection.**



**Excellent basic laboratory facilities are available for resident and visiting scientists at Gobabeb. Ellsabeth Schober is carrying out a project to determine which chemicals deter herbivorous insects from eating the leaves of Namib dwarf shrubs.**



*Onymacris bicolor* is one of the very diverse tenebrionid beetle species which first interested scientists in the Namib Desert. This species, and many others, successfully occupy the harsh dune environment by imbibing fog water and consuming wind-blown plant detritus.



Publication of results is the most important step in scientific research. Linda Malan types all of the manuscripts written by DERU staff on a word processor, an extremely valuable aid to desert research.

vaal Museum and also from exchange of publications by DERU scientists with those from other institutions and other deserts. The cataloging, indexing and purchasing of this scientific literature constitutes a major task for the staff of the DERU.

But of course good facilities do not ensure good research. A second factor involved may be called the 'synergistic' effect. This means that scientists working in isolation are often not as productive as those working in a mutually interactive milieu. As more and more research is carried out in an area and as more and more becomes known, more and more thoughtful questions arise. Thus each scientist does not need to start from scratch to accumulate the necessary background information for much is already known and gaps in our knowledge are highlighted. By reading about work carried out in the Namib someone from — let us say — Zurich can see a possibility to further pursue a line of research he has been carrying out, for example, in Israel. When he arrives, the 'groundwork' has already been completed and his time and efforts can be focused on gathering knowledge and expanding concepts. The day-to-day exchange between all levels of scientists working in very diverse fields — but in a similar area — fostered by an active research community such as that located at Gobabeb, is beneficial to all concerned.

Science and research in the Namib Desert may sound very interesting but it is all in vain unless the results of this work are made available to other scientists by means of publication. At Gobabeb, visiting scientists and staff alike work toward publishing their results in local and overseas journals so that it is readily available to all colleagues who might be interested. Publication of popular articles to make this scientific

information available to the public also takes a high priority. Since the inception of the Desert Ecological Research Unit under Dr Köch's guidance, several hundred publications on the Namib Desert have been written. Increasing this number through further research efforts is a major aim of all scientists working in the Namib.

Having briefly alluded to the biological wonders of the Namib Desert and described the Namib Research Institute at Gobabeb where much of the desert research takes place, the question arises as to what studies are currently being carried out in the Namib Desert.

*Welwitschia mirabilis* — Anyone who has heard of the Namib Desert, will have heard of the bizarre *Welwitschia* plant. The first specimen was discovered in southern Angola by Frederich Welwitsch in 1859 and a little book was written about it in 1978 by Prof. C.H. Bornman. During the more than a century that it has been known, the method by which the pollen from the male plants travels to the female plants, sometimes ten to fifty metres distant, has never been definitely established. Both the wind and the bugs which are commonly associated with these plants have been proposed as the major vector. Recently Beverley Marsh from the University of Cape Town has set about conducting a definitive experiment to establish what actually transports the pollen grains. Her results indicate that a number of species of insects, many of them wasps, are attracted to the nectar which is exuded by both male and female plants. While consuming the nectar, the wasps brush up against the pollen and then carry the grains to the next plant they visit. Some of the grains end up on female plants where fertilization takes place. As the *Welwitschia* remains a very interesting plant to botanists the

world over, because of its very ambiguous relationship to other plant species, determination of the mode of transport of the pollen grains constitutes an interesting contribution to Namib biology.

*The Golden Mole* — No one who knows the Namib, even only slightly, can fail to be fascinated by that elusive little insectivore, the golden mole. Although today its tracks are frequently observed by scientists working in the dunes, this small mammal was unknown until its skull was found in owl pellets at Sossus Vlei in 1959. In 1963 the very first living individual was captured making newspaper headlines that week. Now Laura Jane Fielden from the University of Natal, Pietermaritzburg, is busy carrying out a study of its biology in the central Namib near Gobabeb. She has found that this small mammal only seventy millimetres long can travel up to 600 metres in one night, on or just below the sand surface. It forages for beetle larvae and termites which live around the base of the grasses and succulents which grow in the dune field. In the eastern dunes where the vegetation is denser the moles are more common, although a few may also be found very close to the coast. One young mole was found in what appeared to be a nesting cavity in the sand, but this single, unusual find is not enough to establish its breeding season or habits. The biological adaptations of this unusual little insectivore to the desert dune environment are only beginning to be known.

*The Namib heat-runner* — Adaptations to high temperatures are often the subject of study by desert biologists. At Gobabeb Alan Marsh, a Research Associate of the Desert Ecological Research Unit, is carrying out a very interesting project to establish how the bearded ant *Ocymyrmex barbiger* manages to travel across

the desert surface when the temperature is over 66°C. Not only does this ant successfully tolerate such conditions, it actually appears to prefer them. This species forages for dead arthropods (insects and similar creatures) which are apparently stunned by the high temperatures. *Ocymyrmex* avoids succumbing to the high temperatures by periodically seeking a 'thermal respite', that is an escape to the lower temperatures provided by small twigs, dry grass tufts, etc. By climbing just a few centimetres above the very hot ground surface, cooler air is to be found. A brief period in these cooler conditions allows this ant to survive, meanwhile taking advantage of the less successful arthropods which provide it with a ready source of food and water.

*Vegetation circles in the Namib* — Travellers in the eastern part of the Namib where sandy substrates prevail, whether it be near the Orange River or the Kunene or anywhere in between, may have wondered why the very distinct circular vegetation patterns occur. Numerous explanations have been offered, but none definitely established. George Cox from the University of California at San Diego has recently been investigating circular soil mounds in places as far apart as California, Kenya, the Cape Flats and the Namib. His conclusion is that at least some of the circular patterns, including some in the Namib, are caused by rodent activity, an important consideration for farming in many areas. Dick Yeaton of the Desert Ecological Research Unit considers other circles found in the central Namib to be formed in areas where species of *Euphorbia* have previously grown, a similar conclusion to that recently suggested to explain circular patterns in the Marienfluß further north.

*Decomposition of plant litter* — In a country such as

Namibia, where the growth of vegetation is so dependent on erratic rainfall, recycling of the nutrients incorporated into the growing plants is often overlooked. Cliff Crawford from the University of New Mexico is studying the recycling of plant nutrients in the deserts of North America and with Mary Seely of the Desert Ecological Research Unit is investigating similar problems in the Namib. In deserts, much of the sparse vegetation is not consumed by the larger herbivores but is dried out and distributed by the winds. Nutrients could remain

tied up in this dry material, called litter or wind-blown plant detritus, for years — if it were not for the detritivores of the ecosystem. These small animals, beetles, millipedes, fish-moths and other invertebrates feed upon the litter and — while doing so — return the nutrients to the soil where they can again be used by growing plants, when the rain comes. This represents one of the most important biological cycles of any ecosystem.

The biological mecca which is the Namib is thus rich with

very interesting organisms and systems. Rich, that is, as deserts go. Compared with most other ecosystems, however, a desert is a relatively 'simple' ecosystem which can be studied and understood better than a more complex system such as a rain forest or even a tropical savanna. To scientists attempting to understand the structure and function of biological systems the Namib presents a rare opportunity. And certainly it is this type of understanding which can contribute to the quality of life of all the earth's inhabitants.



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