

Gray

This is then filed in the reprint cabinet and the number is entered on the relevant cards as if it were a reprint. In this way, valuable information that may otherwise have been missed is easily retrieved. The indexing is now complete and the system is being entered onto the cards.

I would like to thank all those people who have spent many hours on soul-destroying tasks such as checking catalogues and typing cards. My only concern now, is that we should have achieved what we set out to do - devise and implement an easy and efficient information retrieval system. Unfortunately we have to wait some time before we can be assured of that as in this case "the proof of the pudding is in the eating"!

OPSOMMING (L. Hughes)

'n Indekskaartstelsel vir herdrukke van die Woestyn ekologiese Navorsingseenheid word beskryf. Dit is in die vorm van 'n gekombineerde 'Uniterm' en onderwerpopskrifstelsel, met 'n opspoorstelsel wat in drie seksies verdeel is.

Fog Precipitation in the Central

Namib Desert: A short-term project

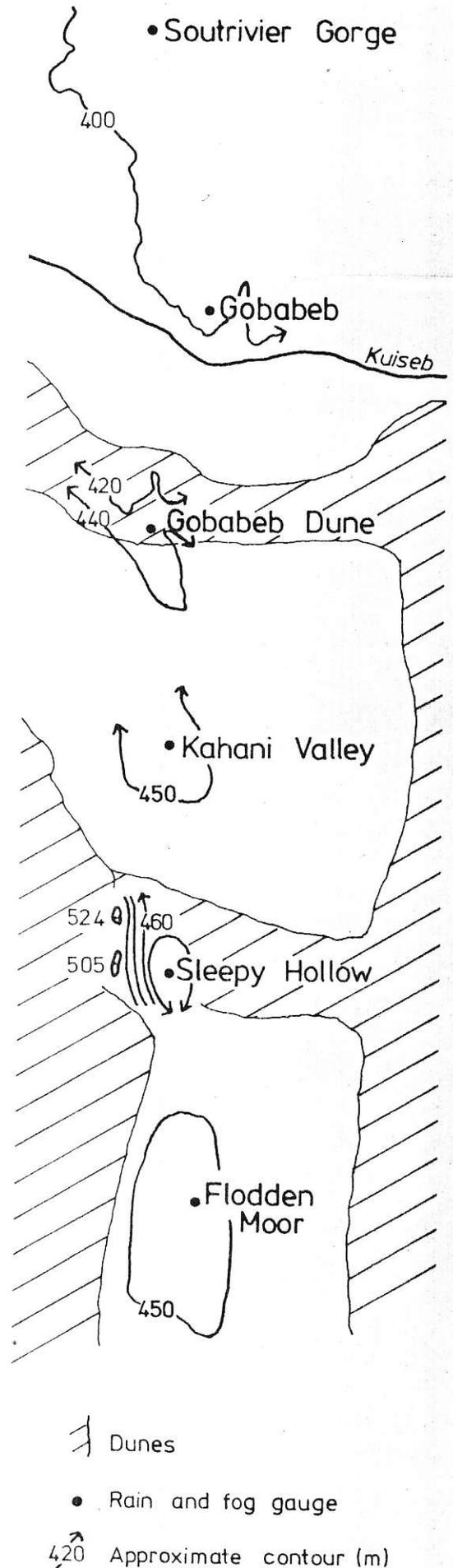
by V. GRAY

Meteorological information provides a basic background for ecological and geomorphological research in deserts. Two different types of meteorological research projects are carried out by the D.E.R.U.: the long-term projects as described by J. Lancaster in this bulletin; and the short-term projects which set out to answer specific questions. One such question which requires investigation is the small-scale variation of fog-water precipitation in the Central Namib Desert. And as fog and rain both occur in the Namib, it is necessary to differentiate between them for recording purposes. A first rain gauge with a fog-collecting screen was set up at Gobabeb which is on the Namib gravel plain (23°34'S, 15°03'E) in September 1962. For comparative purposes a second fog and rain gauge was erected in the dune field 3,7 km south of Gobabeb in October 1977. The comparison of data between the two gauges over 14 months showed that more fog precipitation was recorded by the gauge in the dunes, whereas more rain was recorded on the plains (Table 1). In order to obtain a more extensive comparison of precipitation between the gravel plains and the dune field, a transect of gauges was erected in February 1979 in a north-south direction. The gauges were set up in several different types of surroundings. The rain gauge at Narabeb, about 21 km SSW of Flodden Moor, which has been operating since 1972, is included here for further comparison (Fig. 1).

Of the seven rain and fog gauges in the system, four have seven-day clocks and three have monthly clocks. Each clock is mounted in a Fuess case together with a float cylinder, a siphon and a pen. The fog-trapping screen is mounted above the moisture collecting bowl of the gauge. It consists of fine wire mesh covering a cylinder and is 9,5 cm in diameter and 19 cm in height. Fog screen data are used for comparison only between similar gauges. Not all fogs actually precipitate and therefore data recorded by these gauges only account for precipitating fogs rather than all fog events.

The above results show some trends in precipitation at the various sites. Gobabeb dune has the highest fog precipitation whereas Sleepy Hollow has the lowest. The difference in the surroundings of these two gauges may contribute to these results, Gobabeb dune gauge being relatively exposed on a raised area next to low dunes, whereas Sleepy Hollow is flanked by high dunes to the west.

Figure 1 A schematic map of the rain and fog gauge transect running north and south of Gobabeb.



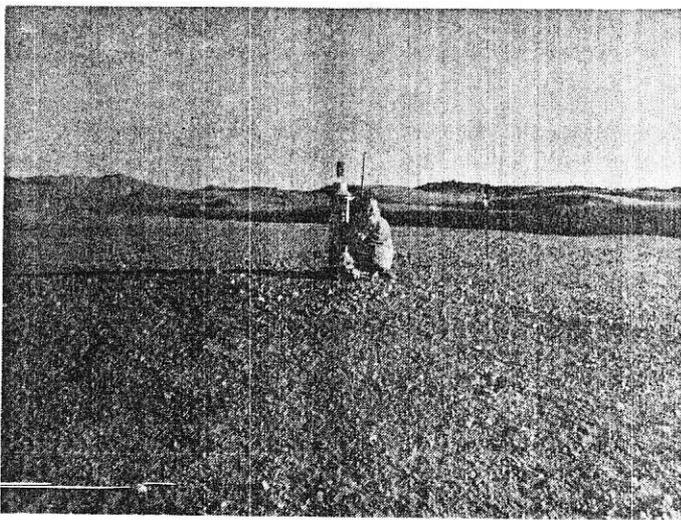


Figure 2 Gobabeb Dune rain and fog gauge is relatively exposed on a raised area next to low dunes.

Kahani Valley and Flodden Moor gauges have the most comparable data of the dune field gauges. They record almost the same number of fog events, but less fog is recorded at Flodden Moor than at Kahani Valley. They are both situated approximately in the middle of the interdune valley, Flodden Moor 7.4 km south of Kahani Valley. Narabeb, which is 21 km SSW of Flodden Moor, is also more comparable to these two gauges than to the others. It is also positioned in the middle of an interdune valley. The data from these dune gauges indicate that fog, which is usually blown inland by NW winds, may perhaps decrease in a southerly direction.

Soutrivier Gorge is situated on a slightly raised area on the gravel plains next to a wash. This position seems to expose it to more precipitating fogs than the Gobabeb gauge which is situated in a relatively flat area.

Rainfall events seem to be less uniform over the area than fog events, and one rainfall event may be recorded by one or two gauges only. For example, in February 1980 1.5 mm of rainfall was recorded at Gobabeb dune and 6.3 mm at Kahani Valley. There were no other records of rainfall. In February 1979 6.5 mm of rainfall was recorded at Sleepy Hollow, 1.05 mm at Flodden Moor and much less at three other stations. This would perhaps indicate isolated storms. January and February are usually the highest rainfall months in the Namib, but during this 1979-1980 period the highest rainfall was recorded in June.

This brief study demonstrates the advantages of a short-term project in that trends in precipitation can be extracted from data which have been collected with a minimum effort.

TABLE I:
Fog precipitation and rainfall at Gobabeb and Gobabeb Dune

		Monthly fog precipitation		Monthly rainfall	
		Gobabeb Met. W. Bureau	Gobabeb Dune	Gobabeb Met. W. Bureau	Gobabeb Dune
1977	N	5.90	20.40	0	0
	D	3.15	8.10	0	0
1978	J	3.50	8.10	1.00	7.75
	F	0	0.65	49.25	22.85
	M	1.30	2.20	41.25	26.20
	A	3.60	10.25	17.05	18.10
	M	0	0.25	0	0.30
	J	0	0	0	0
	J	2.90	6.00	0	0
	A	3.35	7.85	0	0
	S	2.25	6.70	0	0.15
	O	4.05	5.65	0	0
	N	0.70	2.45	0	0
	D	1.45	3.50	0	0
Total		32.15	82.10	108.55	75.35

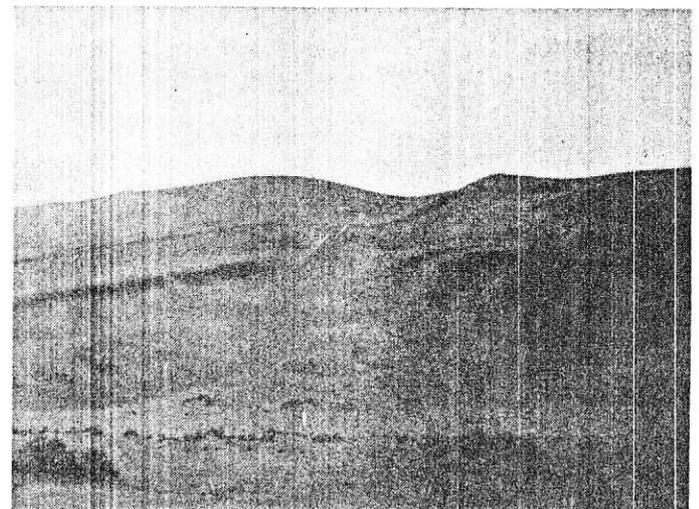


Figure 3 Sleepy Hollow rain and fog gauge is flanked by high dunes to the west.

TABLE II:
Monthly fog precipitation and events at locations near Gobabeb, Central Namib Park

	Sout- rivier Gorge	Monthly fog precipitation						
		Gobabeb •	Gobabeb dune	Kahani Valley	Sleepy Hollow	Flodden Moor	Narabeb	
1979	F	0.15	0	0.20	0.60	0.15	0.20	0
	M	6.40	2.30	3.45	5.95	2.60	5.60	4.80
	A	0.20	0	0	0	0	0	0.20
	M	3.45	0.90	3.65	3.00	0.90	1.60	2.50
	J	0	0	0.30	NR**	0.20	0.30	0
	J	7.15	NR**	11.30	9.50	5.20	7.40	7.20
	A	16.55	7.60	23.80	17.55	8.00	12.80	13.10
	S	5.90	6.75	15.00	13.20	6.75	9.05	8.10
	O	15.80	6.85	13.15	NR**	6.35	8.20	6.95
	N	9.35	2.95	10.05	6.90	3.50	6.35	4.05
	D	10.20	3.30	12.35	8.25	5.95	9.00	4.60
1980	J	9.25	4.95	16.60	12.85	6.05	8.70	3.65
	F	5.25	1.60	4.80	3.40	1.70	2.10	0.30
Totals	X	7.47	(4.13)	9.55	(8.74)	3.95	5.94	5.04

• Met. weather bureau
** NR = no record

	Sout- rivier Gorge	Number fog events/month					
		Gobabeb •	Gobabeb dune	Kahani Valley	Sleepy Hollow	Flodden Moor	Narabeb
	1	0	1	1	1	1	0
	5	4	5	6	3	4	2
	1	0	0	0	0	0	1
	2	1	2	2	1	2	2
	0	0	1	NR**	1	1	0
	6	NR**	6	5	3	4	3
	10	9	12	9	9	9	10
	5	8	10	9	6	8	8
	15	8	11	NR**	10	11	12
	9	4	9	7	6	6	5
	10	8	9	8	8	7	7
	7	7	11	10	11	9	5
	5	3	5	3	2	3	1
	76	(52)	82	(67)	60	65	56

TABLE III:
Monthly rainfall and rainfall events at locations near Gobabeb, Central Namib Park

	Total monthly rainfall						
	Sout-rivier Gorge	Gobabeb •	Gobabeb dune	Kahani Valley	Sleepy Hollow	Flodden Moor	Narabeb
1979 F	0	0,05	0,15	0,15	6,45	1,05	1,80
M	0	0	1,80	0	0	0	0
A	0,80	± 4,00	2,40	0,60	0,60	2,00	± 1,30
M	0,60	1,60	0,40	1,20	4,40	2,60	0
J	19,00	22,70	±11,70	NK**	20,80	NR**	26,90
J	0	0	0	0	0	0	0
A	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
O	3,40	3,30	2,00	1,90	1,45	1,00	0
N	0	0	0	0	0	0	0
D	0	0	0	0	0	0,40	0
J	0	0	0	0	0	0	0
F	0	0	1,50	6,30	0	0	0
Totals							

• Met. weather bureau
** NR = no record

OPSOMMING (V. Gray)

Om die Namibklimaat te verstaan, is dit belangrik om tussen reën- en misreëlsae te onderskei. Om laasgenoemde te meet, word meters toegerus met misversamelende skerm gebruik. Resultate toon, onder andere, dat groter misreëlsae in die duine en meer reën op die vlaktes aangeteken is.

Tenebrionid Research

by B.A. CURTIS and M.K. SEELY

Much research has been undertaken by D.E.R.U. staff and visiting scientists on the tenebrionid beetles, particularly those of the genus *Onymacris*, in the dunes and plains of the Namib Desert. These flightless insects form a substantial part of the desert fauna, both in terms of species diversity and population density. They exhibit a number of behavioural and morphological adaptations which enable them to withstand the hot, dry conditions prevalent in the desert. Being predominantly diurnal insects, they avoid desiccation by confining their activity to the cooler parts of the day. The scorching midday sun is avoided by burrowing into the sand where the temperature is always a few degrees lower than that on the surface. While they are active on the surface, their long legs keep them well away from the hot sand and they have been observed to lift alternate legs to cool off when the sand becomes very hot. Like many other Namib Desert plants and animals, tenebrionid beetles make use of fog water in various ways. Although usually only appearing on the surface when the air temperatures are warm, they will emerge during a precipitating fog and either collect water which has condensed on the sand and vegetation, or position themselves in a head-down stance facing into the fog-bearing winds, allowing the fog to precipitate on their bodies and run down into their mouths. Some species even build trenches in the sand to collect fog water. Research has been done on this fog-collecting behaviour, as well as water relations, thermoregulation and various studies on general behaviour and physiology.

Tenebrionids are rewarding animals to study for a variety of reasons. As their taxonomy is relatively well known, identification is no problem. Being predominantly black, they are easily visible against the sand or other bare substrates and therefore make field observations possible, with the aid of binoculars, as well as facilitating collection. They can be easily collected by hand throughout most of the year in statistically significant numbers for laboratory studies or for marking, release and recapture. Tenebrionids are large enough to make weighing, labelling and dissection relatively easy. Beetles can be individually marked for identification in field or laboratory experiments (Fig. 1).

	Rainfall events/month						
	Sout-rivier Gorge	Gobabeb •	Gobabeb dune	Kahani Valley	Sleepy Hollow	Flodden Moor	Narabeb
	0	1	1	1	1	1	1
	0	0	2	0	0	0	0
	2	2	3	2	2	2	3
	1	1	1	1	1	1	0
	2	2	2	NR**	2	NR**	5
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	2	2	2	2	2	1	0
	0	0	0	0	0	0	0
	0	0	0	0	0	1	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	1	1	0	0	0
Totals	7	8	12	(7)	8	(6)	9

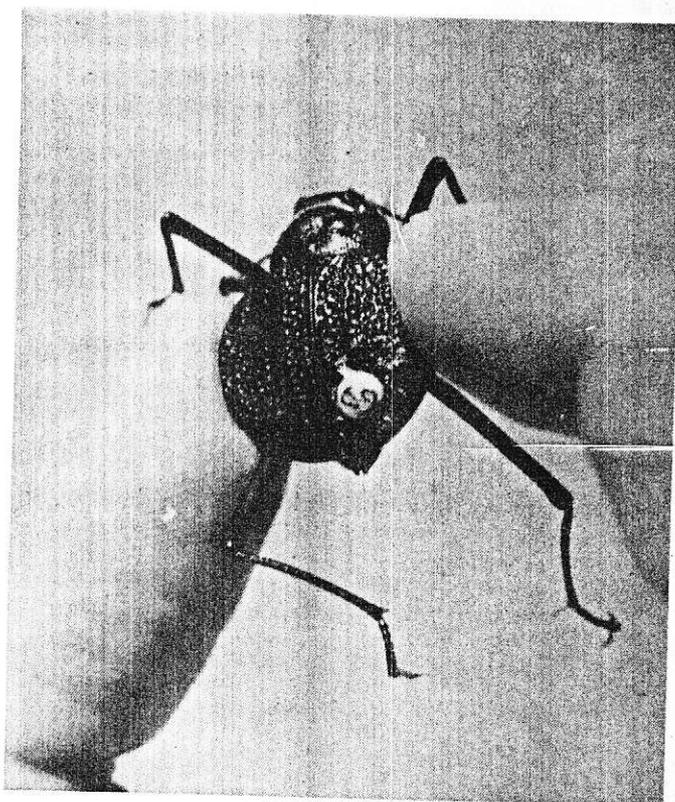


Figure 2 An *Onymacris plana* numbered for individual recognition.

One question that immediately springs to mind when observing the great species diversity of the tenebrionids is what prevents competition between these species. All apparently feed off detritus and other dead plant and animal material, and more than one species may be seen foraging together. Studies are currently in progress to determine niche occupation. Other studies include observation of individual behaviour in the field and reaction of beetles to environmental factors. The effect of desiccation on the activity of four *Onymacris* species has been studied in controlled experiments. However, there is still much to be learned about this family of beetles. Little is known about their life history and larval ecology. Detailed studies on their ecology, reproduction, general metabolism and energetics would help to place these insects into the intricate pattern of life of the Namib Desert.

OPSOMMING (B.A. Curtis en M.K. Seely)

Kewers van die toktokkiefamilie is volop in die Namib en taksonomies redelik welbekend. Hulle is dus geskikte onderwerpe vir 'n verskeidenheid biologiese studies. Een interessante vraag is hoe wrywing tussen die verskeie spesies wat van dieselfde kos leef, vermy word.