

ing to the International Rules of Nomenclature. A fuller description, usually in English, German or French, is often added, and whenever possible an illustration of the plant as well. This practice has been adopted in the *Journal of South African Botany* where most of the new species described are accompanied by line drawings, including magnified dissections. This is the cheapest form of reproduction used to-day, and by making the original drawing twice as large as the finished illustration is to be, a finer line is obtained.

It is also very useful to have coloured illustrations of plants in the herbarium, as it is not possible to judge the 'set' of flowers and leaves from pressed specimens, and such drawings are done as often as material and time will permit. In past years the students and members of the staff, according to their individual talent, have made illustrations of plants which have flowered in the Gardens. Thus we are building up valuable material which will be at the disposal of future monographers.

Plant Collecting in the Kaokoveld

By H. HALL

THE Bernard Carp Expedition to the Kaokoveld, which I was privileged to join, took place during July and August, 1951. The lengthy negotiations for permits, transport arrangements, the organization of food and such things as petrol and spares, the various contacts with the necessary officials at Police Posts, etc., were but some of the 'headaches' Mr. Carp patiently endured to ensure the smooth progress of the venture. Numbering fifteen European personnel, it included several entomologists, a photographer, a prospector and a writer. My own humble ambition was to collect plants and their seeds and any suitable herbarium material for Kirstenbosch. Furthermore, there were a number of skilled workers from several museums who were indispensable for the preservation of zoological material collected. Besides these there were the Natives employed for the numerous camp duties and who were recruited from Native settlements *en route*.

The Expedition started from the Cape one cold, dark morning about 5 a.m. with rain drumming rather dismally on the roof of the truck but the rain was soon left behind us and for the remainder of the time the weather was perfect. The rest of the vehicles, there were six all told, joined us at pre-arranged towns *en route*: Upington, Windhoek, etc. Of the route traversed to the southern boundary of S.W. Africa, of the dreary vastness of the landscape between Upington and Windhoek, and the notoriously dreadful roads which provided their own thrills as the trucks lurched in the sandy ruts,

I will not dwell upon here. It was, however, quite an experience and not lightly forgotten. Whenever safe to do so I scanned the passing veld and recognized the low clumps of *Aloe claviflora* which were just pushing out their scarlet flower spikes, and groups of 'Kokerboom', *Aloe dichotoma*, richly covered with bright yellow flowers. Rounded bushes of *Euphorbia spinea* were plentiful and an occasional plant of *Hoodia Currori*, looking rather forlorn, helped to relieve the otherwise monotonous countryside. Much of the southern part of S.W. Africa is semi-desert, of course. By the time the loftier elevation of Windhoek is reached the landscape becomes more broken and the vegetation more plentiful, with grass and thorn bush covering the hills. Around S.W. Africa's capital the hills are dotted with *Aloe rubrolutea* almost as plentifully as *Aloe ferox* on the hills of the eastern Cape.

Heading further north through Okahandja and Otjiwarongo with their vast cattle farms, the grass and bush type vegetation becomes richer still and at Outjo, the last civilized place before one enters the Kaokoveld, we were well into the tropical flora with the well-known 'Mopane' (*Copaifera Mopane*), a most useful tree, everywhere.

The Mopane, together with the more bushy Combretum species, seemed to dominate most of the Kaokoveld we traversed, the latter heavily-laden with dull-red, winged fruits which are an enchanting sight when seen in the lights of the headlamps during night

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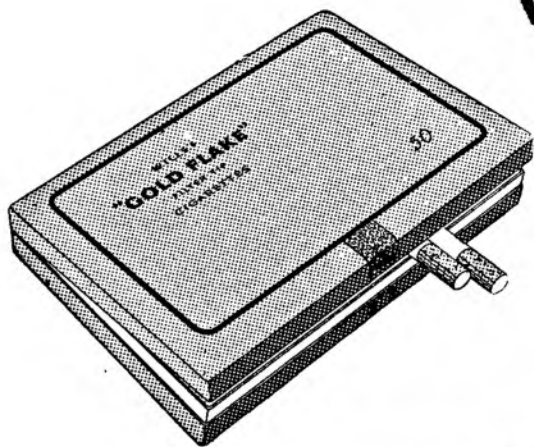
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travel. Outjo is the junction for one route to the Etosha Pan to the east, but our route was still north to Kamanjab across partly undulating country but mostly level plain of red Kalahari sand for about one hundred miles. Kamanjab is on the border of the Kaokoveld as defined at the present time, is a Police Post and also boasts a store; there is nothing more there and for miles in all directions one sees nothing but thorn bush and the distant hills.

The Kaokoveld is in the north-west corner of S.W. Africa and covers an area of about 25,000 square miles. It is bordered on the east by Ovamboland and the Kalahari Desert, on the north by the Kunene River which separates Angola from S.W. Africa, and on the west by Skeleton Coast. The vegetation is a tropical one which becomes more apparent as one proceeds further north. It is a region of vast, grass-covered plains, bush- and tree-covered hills and valleys, and with a high central plateau with mountain ranges up to 8,000 feet in height. As the country steps down westward to the sea the vegetation becomes scantier and of a more xerophytic type with fleshy-stemmed shrubs, thorny succulents, the ubiquitous Mopane reduced to bushes except near dry water-courses, until the Namib Desert proper is reached and where the vegetation is almost non-existent except for a few highly-specialized forms. This is due, of course, to the decreasing rainfall from east to west. The Namib, an inhospitable and waterless belt stretching from the Orange River to Angola, is, for all practical purposes, uninhabitable, and varies in width from twenty to eighty miles, narrowing only where the mountain masses thrust towards the sea. The Kaokoveld was more or less surveyed during the German occupation, evidently with the intention to settle it, but it was not under control. At Sesfontein a fort of considerable size was built but it is now rapidly crumbling away and cattle and goats wander through the passages, nibble at the weeds in the parade ground and lie in the shade of its walls. The whole territory is a Native Reserve by Proclamation of 1947 and also a game reserve. It is closed to tourists, prospectors and would-be farmers alike.

From Kamanjab our direction was still northward though the roads now became mere tracks. Throughout the country there are plenty of place names and most are given on maps, but in the main are for the water-holes, their only occupants the wild animals or primitive

Natives. As both human and animal life depend for their very existence on these water-holes in the long, dry season, they loom largely into one's sojourn in the territory and the tracks link one to another so that travel is always from one water-hole to the next.

Heading now for Ohopoho we had to cross several river-beds without a trace of water at this season, through glades of Mopane, across enormous plains which were shimmering oceans of golden grass in the bright winter sunlight. Having been advised of the abnormal height of the grass each car's radiator was screened to prevent an accumulation of seeds which could start a conflagration. We were all extremely cautious with matches and sparks from now on. Once, later on, when tramping over a stony, grass-covered plain towards some distant and inviting hills, my companion and I paused for a rest and a cigarette. My companion struck a match, the blazing head promptly flew off and fell to the ground. In an instant fire shot in all directions through the fluffy, silky layer of grass-seeds lying between the rather widely-spaced parent plants, and our prompt and very vigorous stamping only just managed to stop a serious conflagration. Had there been a breeze we should probably have failed. The tall grass between the wheel tracks slowed our progress to about ten m.p.h., for the ever-present menace of rocks and ant-bear holes, or the deep cavity from an elephant's foot made during rains might have serious consequences. Being heavily-laden, some of the trucks did not escape from a few broken springs, all the same. One advantage of keeping in close convoy was that each driver could watch the jolts or sudden swerves of the truck in front and was thus alerted for rocks and holes. Once, when the truck I was travelling in got separated from the one in front I found it advantageous, and quite a pleasant change, to ride on the left front wing for several miles to enable me to scan the left side of the track, for the height of the grass in the middle completely obscured it from the driver.

Ohopoho was reached late one afternoon after a jolting, tiring journey. Here we had to report to the Officer in Charge of Native Affairs (who is the deputy of the Native Commissioner, Ovamboland), the youthful Mr. van Zyl. His charming young wife promptly made an enormous pot of tea for us which was consumed with almost indecent haste, so thirsty were we all. Mrs. van Zyl informed us that they go shopping to Outjo, over a hundred miles away, every month and

to collect mail, in the rainy season at more infrequent intervals. Never, she said, had they had so many European visitors at one time at Ohopoho. This remote place is in two-way radio contact with Windhoek and Ondangua. Over the enormous level plain in front of the house herds of Springbok and Zebra roam at will. It is still an emergency aerodrome but the radio pylons and neat stone buildings strike an almost incongruous note in this remote part of the Kaokoveld. Ohopoho is said to be about 3,600 feet above sea-level and is the only place where rainfall records have been kept in the territory. The last few years reveal an average of about 315 mm. but the figures indicate tremendous fluctuations from one year to another. No rain falls in the winter months. It is known that rainfall is often very localized and the broken nature of the ground such that the run-off is rapid, though underground water collects in many places, giving rise to a number of permanent water-holes.

*In the vicinity of Ohopoho I found the rare *Aloe Dinteri*, a stemless plant with purplish, faintly-mottled leaves. Its flowers were over but the seeds were none the less valuable for our use. The plants grew in fissures of dark-coloured dolomite and some underneath shrubs, together with a bright green leaved *Kalanchoe* with orange-yellow flowers. From Ohopoho we planned to strike westwards towards the Skeleton Coast through mountainous country more or less following the course of the Huarusib River. One afternoon, when in a very rugged gorge, we saw about five Rhinoceros far below, feeding on bushes, and a little further on several Giraffe which quickly galloped away with their peculiar, stiff-necked, swinging gait. Small groups of Impala were frequent, an occasional Steenbok darted across the track, Jackals were plentiful everywhere, as also were large herds of Zebra. Large herds of Springbok were plentiful and often a few would remain quite motionless and unafraid, within a stone's throw, watching the strange mechanical procession pass by. Although the spoor of Elephant was everywhere we rarely saw the massive animals, and it was assumed that owing to exceptionally good rains last summer there were small water-holes in the hills and thus they had no need to congregate around the permanent spots. Occasionally, in the more remote ravines, we would glimpse a herd of Hartmann's Mountain Zebra, surely one of the world's most beautiful animals, but they were extremely shy and would swiftly climb out of sight.

Amongst the hills there were large numbers of *Pachypodium giganteum*, a thorny succulent, quite leafless at this season, with fleshy trunk dull-purplish in colour. They become fifteen to eighteen feet tall and may be a yard or more thick at the base. The flowers are creamy-white in colour and not unlike a frilled *Petunia*, situated near their summits, and I spent several days planning how to climb the thorny giants to obtain specimens without becoming a casualty in the process. Another giant of the succulent world, inhabiting the same harsh dolomitic rocks, was *Cissus Kramerianus*, a relative of the Grape. The largest specimen I saw measured about six feet thick at the base, dividing into numerous stems near the summit. Its fleshy leaves and scarlet berries had all fallen. On the driest slopes occurred the thorny *Euphorbia virosa* (*E. Dinteri*) and in the interior develops to an enormous size. It is one of the most venomous of a notoriously poisonous genus.

At Orupembe, an uninhabited region, lions were proved to be around but we made camp here for several days. As this water-hole was small and muddied by the numerous animals we dug our own well lower down the river-bed and obtained only a little clearer fluid for our own use. Here we would listen to the sound of animal hooves clattering over the stones on their nightly trek to the water. The surrounding hills here were more barren of plant life and the rainfall probably very low, for we were now among the last hills before the Namib sand-dunes are reached. On the summits of the hills I gathered a rare *Euphorbia*, *E. subsalsa*, which forms low, dense bushes heavily armed with thorns, and noticed how the shrubs became more compressed and flat-topped, more succulent, and a decrease in the vegetation generally. An occasional thick-trunked *Moringa ovalifolia* was seen standing out darkly on the hot slopes, together with many types of shrubby trees like *Sterculia* and *Commiphora*. On the cool and sheltered side of a steep cliff at about 5,000 feet were various herbaceous plants in flower, including red-flowered *Salvias*, a yellow-flowered, strong-smelling *Osteospermum*, and a few clumps of a *Sutera* species densely covered with pinkish-mauve flowers. In the river-bed by the camp there were numerous clumps of a yellow-flowered parasite sprouting through the gritty bed. A smaller, bluish-flowered species occurred in similar conditions in another river-bed, but it is often difficult to discover which host their roots are preying upon. Many trees bore a red-flowered parasitic

Loranthus on their branches and to the casual glance this might be mistaken for the tree's own blooms.

The large water-holes seemed to occur where a limestone outcrop is formed and only in this kind of soil could I find some quite rare species of succulents. These included members of the Stapelia family such as *Tavaresia grandiflora*, *Huernia oculata*, *Stapelia kwebensis* and *S. Schinzii*. The Baobab (*Adansonia digitata*) was often seen, one unique specimen still clothed in bright green leaves for some reason unexplained. At another limestone outcrop I gathered some fine specimens of *Euphorbia Monteiroi* with its long, persistent peduncles forming quite a useful canopy from the burning sun. With these were many Hoodias which were not in flower and their seed-pods wide open and emptied of their contents. Plentiful in numerous places were the huge, thorny, leafless, fleshy bushes of *Sesamothamnus Lugardii* and an occasional specimen would be lying prone, its roots in the air. It would seem that elephants, in playful mood, push them over. I also observed similar examples of this with the *Cissus* and *Pachypodium* and, knowing the enormous root-systems of these things, no other cause could be tenable. In some of the valleys near the Namib zone the plant life may form almost impenetrable thickets of *Acacia*, *Commiphora*, *Acanthaceae* bush, etc. Amongst these were six-foot bushes of a *Ceraria* species, in the leafless stage, like most other things, but so heavily laden with small flowers that, from a distance, it resembled a faint pink cloud.

From Orupembe we made a quick venture to the coast with three trucks, the distance about forty miles, using the dry bed of the Sekumib River for much of the way. Soon we were threading our way through groups of the famous *Welwitschia mirabilis*, probably the most unique of all S.W. African plants. Their two dull-green, strap-like leaves, split into several parts by wind and weather, are the only leaves they ever possess and are unique in being able to grow fresh tissue from their bases. The trunk is barely above ground, becomes hollow in the crown with age and the flowers are borne along the rim where the leaves emerge from the woody bark. Female plants seemed far more numerous than male plants, their respective flowers being quite dissimilar. The plant's concave apex usually contains much debris, old flowers and seeds, constituting ideal homes for insect life, much to the delight of the entomologists who were soon busily at work with forceps

and test-tubes. The *Welwitschia* grew in otherwise barren surroundings in that area though elsewhere they occurred amongst small grass and low bush, some even high up in rocks, somewhat contradicting the belief that they only grow where underground streams are available and to account for their enormously deep tap-root.

On one of the last low hills before descending to the dunes themselves I collected typical Karoo plants including *Lithops Ruschiorum* (possibly the most northern specimens ever gathered), *Trichocaulon Dinteri*, a *Hoodia* sp., *Euphorbia Juttae*, *E. Schaeferi*, *E. virosa* — very dwarfed here — and small bushes of *Euphorbia gregaria* which has probably the largest fruits of all the succulent 'Spurges'. There were the papery-stemmed, inch-tall *Anacampseros Dinteri*, a *Sarcocaulon* sp. (Bushman's Candle), *Cotyledon orbiculata* which looked little different from the same species which we have on the Cape Peninsula and which extends right across the Cape Province. The interesting *Aloe asperifolia* was there with leaves the texture of fine sandpaper. On the summit of the hill, in crevices of immovable granite rocks, grew the very rare *Echinothamnus Peschuelii* with a swollen, turnip-like stem studded with pencil-like branches and small, glaucous leaves much like some *Kleinias*. Sharing these very arid conditions were many plants of a small *Helichrysum* with silvery-grey leaves covered with the softest downy hairs and showy, pinkish-red flowers. Amongst these were a few dwarf *Cotulas* with golden-yellow flower heads.

With the aid of a Native guide we pushed on through a veritable wilderness of yellow sand-dunes, some of which were as large as mine dumps, pausing now and then to spy out the direction, but only when on a down slope to avoid stalling in the soft, loose sand. On the seaward slope of the dunes grew the curious 'Naras', *Acanthocycos horridus*, a leafless, sprawling Melon with surprisingly wicked thorns at the joints. An occasional fleshy-leaved bush (*Zygophyllum* sp.) grew between the dunes, otherwise it was sheer desert as far as plant life was concerned. Eventually we reached the coast at Rocky Point, the infamous Skeleton Coast quite calm and peaceful, and somewhat hazy with the spray from the rocks. Driftwood was strewn plentifully all along the beaches which made excellent fuel for the camp fires. The notorious coast was not living up to its reputation just then but returned to its usual form the next morning, which dawned to a stiff wind from inland, carrying sand particles with painful velocity. As

no purpose would be served by remaining there we retraced our tracks of the previous day but found the wind had obliterated much of them and we had a few anxious moments at times, for visibility was down to about twenty yards for much of the time. The sun was almost obliterated by the whirling sand and I shall long remember the picture of the great dunes being blown away, the plumes of sand being driven high in the air as they were worn away, to be built into another dune elsewhere. Yet there was animal life in them and the entomologists made a rapid haul of rare beetles which spend their lives in these dunes. It was quite fascinating to watch the minute creatures frantically digging themselves back into the dune as they became exposed by the wind. Once more on solid ground after a few spells of concerted heaving when we got stuck, we proceeded back to Ohopoho. From here we worked north to the Kunene River at Swartbooisdrif, where we spent several days exploring up- and downstream. The river was abnormally high for the season and we had no means of crossing it in the time at our disposal. However, as debris was lodged some twelve feet in the trees above the water level it was adequate proof of the tremendous flow in flood times. Spoors of Crocodile and Hippopotamus were plentiful and Mr. Carp wisely dissuaded would-be swimmers from using the main stream. The river banks were lined with giant palms, *Hyphaene* sp., and their lofty fronds, silhouetted against the blue sky, made an enchanting tropical scene. Enormous specimens of *Acacia albida* were common and covered with pale yellow flowers, and nearly every tree was festooned from top to base with a white-flowered Jasmine. A common shrub or small tree there was a species of *Gardenia*. In rocky outcrops I gathered the rare *Adenium Boehmianum*, a succulent shrub with pale lilac flowers which are produced in winter when the plants are leafless. *Aloe zebrina* grew under bush and among thickets of trees were plants of a *Hoodia* nearly six feet in height, and nowhere have I seen any described so tall. Covering many rocky slopes were large numbers of a *Vellozia* which in the dormant state looks rather like a succulent of some kind. It was easy to picture what they would be like in summer, for their flowers are very showy.

As we moved southwards towards Sesfontein a few days later we saw many plants of the lovely *Aloe hereroensis* and many rocky slopes were dotted by countless plants of *Myrothamnus flabellifolia*, the

'Resurrection Plant', which look quite brown and dead until moisture resurrects them once more. A member of the Expedition informed me that it is sometimes used as an adulterant in tea and imparts a pleasant aroma to the beverage.

At Sesfontein, on the fringe of the Namib, a large Native settlement has turned the once fertile and well-wooded valley into a sea of deep, loose dust with their hordes of cattle and goats. Enormous and flourishing Date Palms, traces of Banana and Papaw, bushes of Cotton and an avenue of gaily-flowering Oleander, all uncared for now, still testify to the industry of its earlier occupants, the Germans. A huge fig tree with a canopy of more than 60 yards provided an ideal camp site and a permanent stream of pure water flowed beneath from one of the six springs. A few miles away, at Warmquelle, a hot spring gushes from the earth, and though it was once conveyed by well-planned aqueducts to a large cultivated area below, it is now utterly neglected by the Natives. We, however, all indulged in most welcome hot baths. The Natives were considerably alarmed by nightly raids on their flocks by lions and we saw many traces of them in the dusty tracks from the surrounding hills. The kraals looked quite picturesque after dark with their ring of small fires to try to ward off the beasts.

Then it was time to shake the dust of the Kaokoveld from our feet and head for home. At Outjo we said farewell to the policeman who had been with us by order of the S.W.A. Administration and who had, I think, thoroughly enjoyed the break from routine. The Expedition was virtually at an end.

I would like to stress, in conclusion, that as it was the winter season and because the area is in the summer-rainfall belt the vegetation was almost entirely dormant. But it was equally obvious that the summer flora, especially in the north-east, must be a very rich one after rains. Ironically, however, it is extremely doubtful whether much progress could be made by normal motor transport, for every river would be impassable and the vast plains would very likely be bogs. Malaria would be another problem and there are no doctors in the Kaokoveld. It is likely to remain, for a very long time to come, a little-known part of Southern Africa.

Kirstenbosch,

September, 1951.