

# Notes on the Flora and Vegetation of Etosha Pan, South West Africa

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## ABSTRACT

A check-list of 134 species of vascular plants found by the author in the Etosha Game Park is presented. The new species *Suaeda salina* B. Nord. of sect. *Heterosperma* Iljin is described. The vegetation of the localities visited is briefly discussed. A remarkable forest of *Moringa ovalifolia* Dinter & Berger occurs near Grünewald west of Okaukuejo.

## INTRODUCTION

Etosha Pan is the name of a salt pan in the north of South West Africa, physiographically belonging to the Kalahari Basin (Wellington 1955). The pan itself is about 80 miles long and 30 miles broad, and it lies at an altitude of approximately 3,400 feet above the sea level. Once upon a time the pan was a large lake, mainly fed by the mighty Cunene River. After the Cunene changed its course, the pan was left with a very limited supply of water — mainly the drainage of the somewhat irregular summer rainfall. The mean annual rainfall is about 450 mm, but there are large fluctuations from one year to another (Bigalke 1961). During most times of the year the pan is usually dry, and water remains only in numerous waterholes in the surrounding areas. The dry pan's surface is a flat floor of sandy clay or saline soil, and it is almost devoid of macrophytic vegetation.

The pan is surrounded by a flat country with vast areas of grassland, savannah, bush and woodland. In 1907 the area was set aside as a game reserve, which is still one of the largest of its kind in the world (c. 22,000 square miles). The game park is nowadays easily accessible and provided with three convenient rest camps, and it attracts an increasing number of tourists each year.

The main physical and climatic features of the Etosha Game Park have been described by Bigalke (1961) in a paper mainly dealing with game movements within the reserve. He also discussed the vegetation in general terms, and relying on an unpublished report of the Department of Agriculture, distinguished four main types of vegetation.

The flora of the Etosha Game Park is still poorly known, however. In the almost completed Flora of South West Africa (Merxmüller 1966—) there are very few entries from the Etosha District. No doubt the lack of information is partly due to the difficulties involved in botanizing in areas crowded with big game, but partly also to the relative monotony of the country. Nevertheless, a better knowledge of the vegetation is essential to an understanding of the conditions for wild life in the Park, especially since the largest herds of animals are herbivores. The most plentiful ungulates are springbok, Burchell's zebra and blue wildebeest, but there are also large quantities of gemsbok, kudu, eland, hartebeest, giraffe, etc. Herds of elephant frequent especially the Mopane woodlands south and east of the pan.

My visit to the Etosha Game Park lasted between May 16th and 22nd, 1963. The localities visited are indicated on the accompanying map (Fig. 1) and briefly described. A check-list of the vascular plants found follows, with the sequence and names of the families in accordance with Merxmüller (1966—). Within each family and genus the order is alphabetical. The first set of the herbarium material is preserved in the Museum of Natural History, Stockholm, Sweden. In a concluding appendix the new species *Suaeda salina* B. Nord. is described.

#### ACKNOWLEDGEMENTS

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#### BRIEF DESCRIPTION OF THE LOCALITIES VISITED

##### 1. Grünewald, at the windmill.

Apart from a group of Mopane trees near the windmill the vegetation is a grassveld with low shrubs or small trees of *Acacia reficiens*. The grassveld is short and consists mainly of two *Eragrostis* species, viz. *E. annulata* and another, possibly undescribed species related to *E. horizontalis* (N. 2736). Especially near the windmill the vegetation cover is not closed, suffering from tramping by game. On bare patches of soil *Euphorbia inaequilatera* is common.

The dominant shrub of the grassland is *Leucosphaera bainesii*, and occasional specimens of *Solanum incanum* also occur. The most frequent herbs are *Acrotome inflata*, *Aizoanthemum dinteri* and *Heliotropium giessii*.

##### 2. C. 1 mile N. of Grünewald windmill.

Northwards from the windmill the vegetation gradually changes into an open and rather tall Mopane forest. The shrub layer is lax, mainly composed of

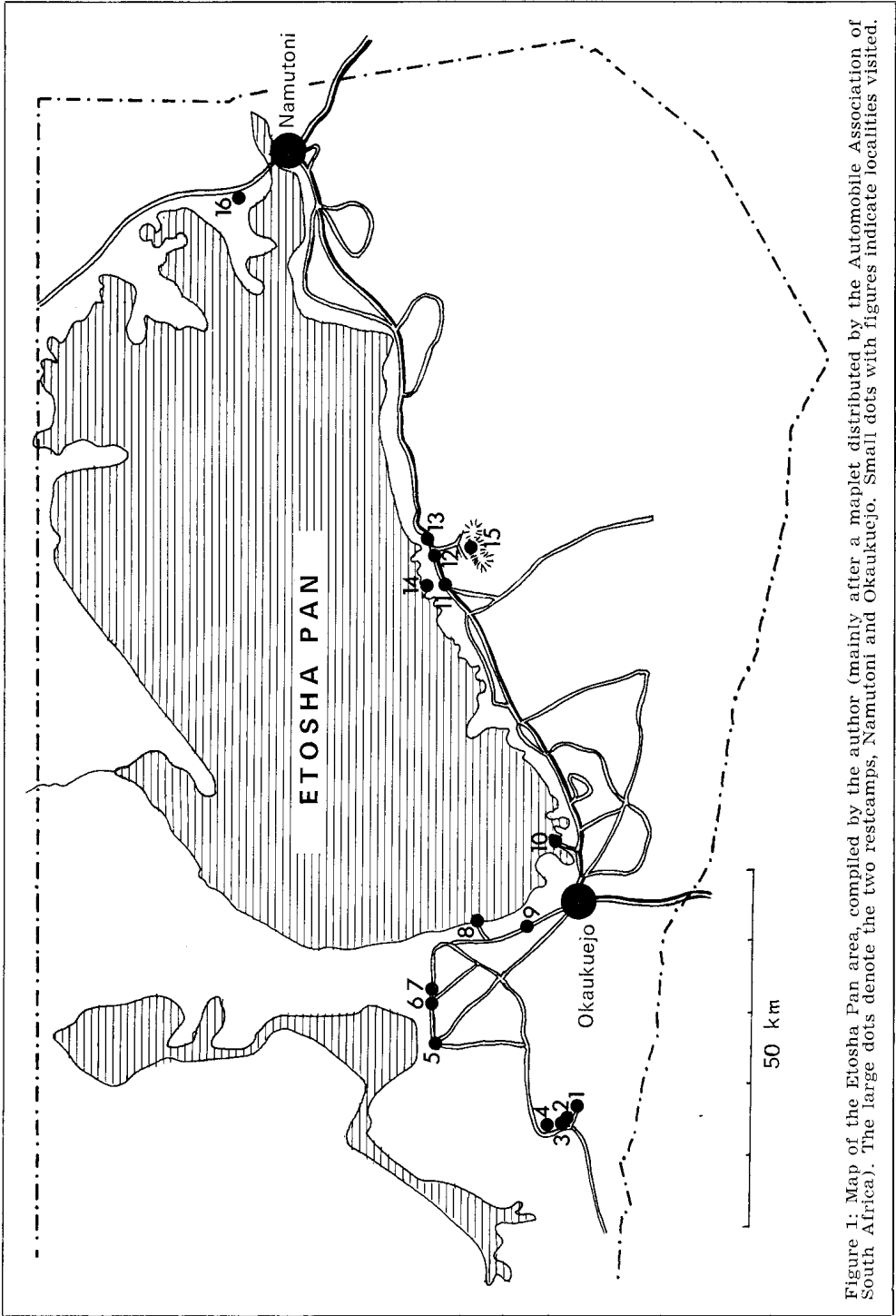


Figure 1: Map of the Etosha Pan area, compiled by the author (mainly after a maplet distributed by the Automobile Association of South Africa). The large dots denote the two rest camps, Namutoni and Okaukuejo. Small dots with figures indicate localities visited.

*Lycium* sp. (N. 2755), *Acacia mellifera* ssp. *detinens* and *Leucosphaera bainesii*. *Catophractes alexandri* occurs only locally on gravelly soil. Frequent herbs are *Geigeria ornativa*, *Crotalaria platysepala*, *Heliotropium giessii* and *Sesamum triphyllum*. *Nelsia quadrangula* and *Chloris virgata* grow in the shade of Mopane trees.

3. C. 1.5 mile N. of Grünewald windmill.

North of the Mopane woodland at Grünewald there are extensive open plains of grassland practically without trees and larger shrubs. Smaller shrubs of *Leucosphaera bainesii* are frequent, however, and locally *Monechma genistifolium* is dominant. The grasses are low-growing, mainly represented by *Eragrostis glandulosipedata* and, especially on bare soil, *E. echinochloidea*. *Stipagrostis hirtigluma* var. *patula* occurs more occasionally. The most characteristic herbs are *Aizoanthemum dinteri*, *Aptosimum lineare*, *Geigeria ornativa*, *Heliotropium giessii*, *Senecio schinzii* and *Sesamum triphyllum*. *Euphorbia inaequilatera* is frequent on bare soil patches.

4. C. 4 miles N. of Grünewald.

In this locality occurs a remarkable forest, which consists of an almost pure stand of *Moringa ovalifolia*. It is to my knowledge the only *Moringa* forest in South West Africa. This handsome tree otherwise occurs as more or less occasional specimens, mainly on mountains, kopjes and rocky outcrops in several districts of northern and central South West Africa.

The area covered by the *Moringa* forest may be estimated to about 1 km<sup>2</sup>. The trees reach a height of about seven metres and a diameter of one to two metres at the base. Remarkably enough, the trees are often several-stemmed from the base (see photo in Fig. 2). Apart from *Moringa* there are only very scattered trees or shrubs of Mopane. The undergrowth is a short and lax grass cover, and herbs are sparse (*Senecio schinzii*, *Sesamum triphyllum*, and a few other common species).

5. Adamax, 0.5 mile S. of the waterhole.

Here the vegetation is a sandy grassland with scattered thorn-trees. Noteworthy herbs are *Aptosimum lineare*, *Hermannia modesta* and *Senecio schinzii*.

6. 7 miles W. of Okondeka.

A sandy flat grassland with grey-leaved shrubs and conspicuous white-woolly plants of *Leucas pechuelii*.

7. 5 miles W. of Okondeka.

A similar veld but with *Acrotome inflata* and *Heliotropium ovalifolium* as the most characteristic herbs.

8. Wolfnes.

Here at the pan's western edge the vegetation is sparse, mainly consisting of tufts of a pungent-leaved grass, *Odyssea paucinervis*. There are also scattered

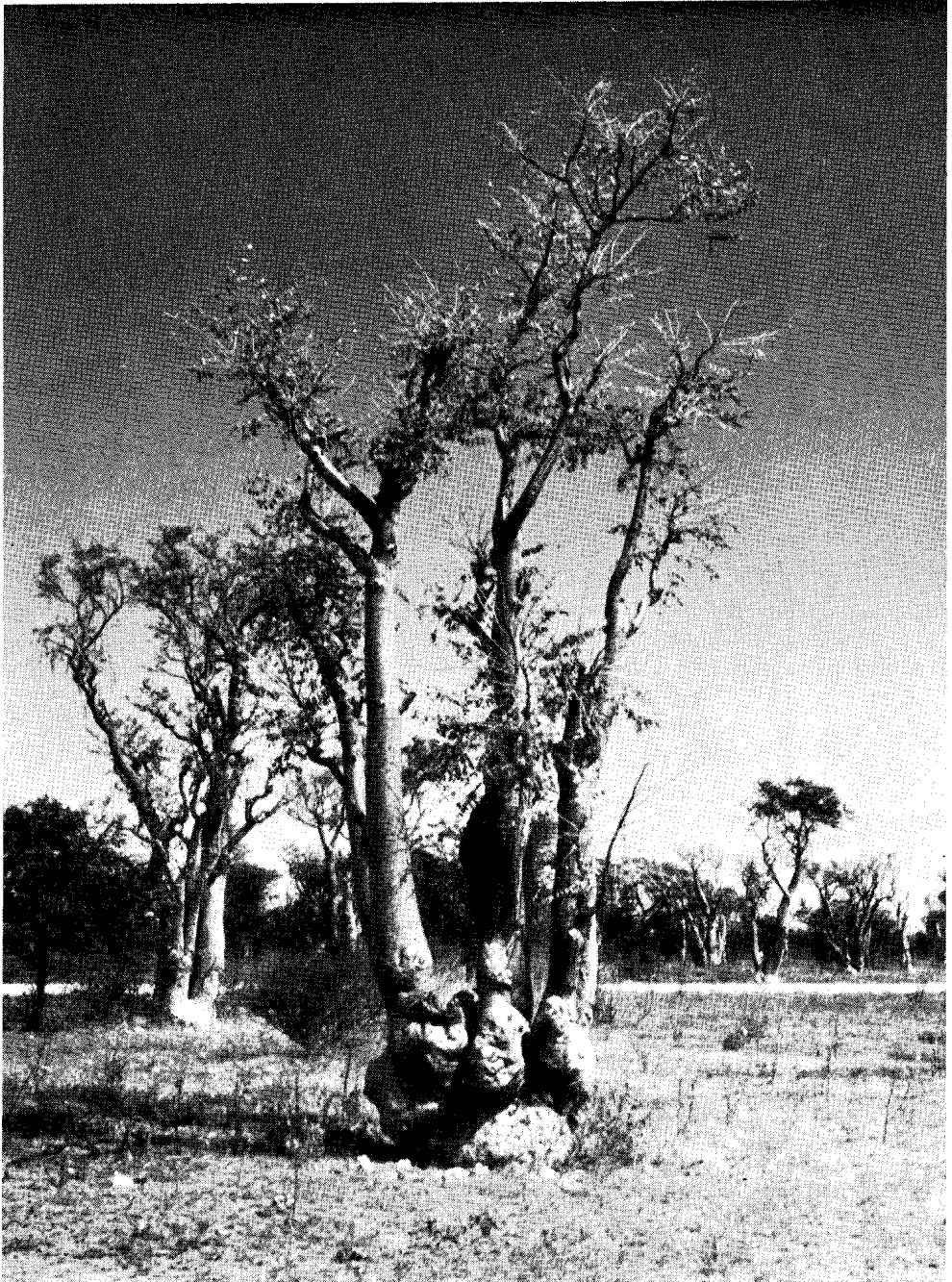


Figure 2: *Moringa ovalifolia* forest north of Grünewald, Etosha District. — Photo H. P. W. Flensburg, May 1963.

bushy clumps of *Cyathula hereroensis* and occasional plants of *Aizoanthemum dinteri*, *Eragrostis annulata*, *E. echinochloidea* and *Hermannia modesta*.

**9.** 6 miles N. of Okaukuejo on track to Okondeka.

A flat and open grassland with a well developed shrub layer and occasional thorn-trees, mainly *Acacia tortilis* cf. ssp. *spirocarpa*. The most common shrubs are all grey-leaved, viz. *Cyathula hereroensis*, *Leucosphaera bainesii* and *Pechuel-Loeschea leubnitziae*. Locally *Solanum incanum*, with large yellow berries, forms thorny bushes about one metre high. *Salsola tuberculata* is locally common in areas with more brackish soil.

The grass cover is dense and consists mainly of *Eragrostis annulata*, *E. glandulosipedata*, *Enneapogon brachystachyus* and *Monelytrum luederitzianum*. *Chloris virgata* and *Setaria verticillata* occur in patches with bare soil, together with two more or less succulent members of *Aizoaceae*, viz. *Aizoanthemum dinteri* and *Trianthema triquetra*.

**10.** Pan, 6 miles E. of Okaukuejo.

The dry pan has a flat surface layer of white and soft, almost powdery salty soil and is devoid of higher vegetation, except for very occasional specimens of *Sporobolus engleri* and a hitherto undescribed species of *Suaeda*. This species, which is apparently an annual, is described in the Appendix as *Suaeda salina* B. Nord.

The pan's edge is characterized by a narrow zone of *Suaeda articulata*, a suffrutex forming bushy clumps with short and blunt fleshy leaves, which often turn red in exposed position. A grass/sedge zone follows, dominated in parts by *Sporobolus acinifolius* and in parts by *Scirpus dioicus* with tufted culms up to 1.5 metre tall. In this zone *Oligomeris capensis* is also a frequent constituent.

**11.** Rietfontein, at the waterhole.

This waterhole is much frequented by game. At my visit a pride of eight lions was observed. The waterhole is surrounded by a dense vegetation of grass and sedges, interrupted by drier areas of naked soil and scattered shrubs. A flat area of rocky and stony ground carries a scanty vegetation of herbs and grasses.

**A.** The rocky-stony plain.

The most frequent grasses are *Eragrostis echinochloidea* and *Enneapogon cenchroides*, whereas *Triraphis ramosissima* is more occasional. Several members of *Amaranthaceae* are important constituents of the vegetation. Most common is *Cyathula hereroensis*, but *Celosia linearis* and *Sericorema sericea* also occur, and in moister situations bordering on the waterhole margin vegetation, *Aerva leucura* and *Amaranthus thunbergii*. The *Acanthaceae* are represented by *Barleria senensis*, an undershrub up to one metre tall and with conspicuous yellow flowers, and the less attractive *Monechma divaricatum* with small red flowers.

*Maytenus senegalensis*, a shrub 1 to 1.5 metre high, occurs as scattered specimens. *Zygophyllum simplex* is common on bare soil, forming prostrate green mats. Mixed with this species occurs *Trianthema triquetra* with a very similar growth.

#### **B.** The waterhole margin.

Closest to the water is a zone dominated by *Juncellus laevigatus* in dense stands 2—3 dm high. A conspicuous plant in this sedge community is *Sesbania aculeata*, a tall and slender herb.

Bordering on the sedge zone comes a grass community with *Cynodon dactylon* as its most important component. Scattered herbs occur, particularly *Aizoanthemum dinteri* and in marginal positions *Aerva leucura*, *Amaranthus thunbergii* and *Trianthema triquetra*.

(The aquatic vegetation was not examined. Another waterhole near Hartebeestdraai had more clear water and a rich vegetation of *Zannichellia palustris* and *Chara vulgaris*).

#### **12.** 3 miles E. of Rietfontein.

A species of *Aloë*, probably *A. littoralis*, was seen in a stony and gravelly area with grey-leaved shrubs and half-shrubs, mainly *Petalidium engleranum* and *Pechuel-Loeschea leubnitziae*.

#### **13.** Halali area, along the main road, c. 1 mile S. of the pan's edge.

The soil is more or less brackish and covered by dense grass and grey bushes of *Petalidium engleranum* and *Cyathula hereroensis*. *Monechma divaricatum* and *Hiernia angolensis* occur more occasionally. Among the herbs *Aizoanthemum dinteri*, *Geigeria odontoptera* and *Heliotropium giessii* are especially conspicuous.

#### **14.** Between Rietfontein and Hartebeestdraai, the pan's edge.

The pan itself is devoid of higher vegetation except for scattered specimens of a grass with narrow spike-like inflorescences, viz. *Sporobolus bechuanicus*. The pan's edge is characterized by a zone of *Suaeda articulata* (cf. locality 10). Small dunes are formed around the shrubs and give the border zone a characteristic hillocky appearance. *Atriplex vestita*, a greyish half-shrub, also occurs in the border zone.

#### **15.** Twee Koppies.

A couple of rocky outcrops in the Halali area, contrasting sharply against the flat landscape of the surroundings. The rock is a hard and grey Otavi dolomite withered to very sharp contours. A couple of leopards had made this place their home.

The flora of the kopjes is characterized by several trees, which are absent or rare in the surrounding plains, e.g. *Acacia erubescens*, *Berchemia discolor*, *Combretum apiculatum*, *Commiphora pyracanthoides* and *Grewia villosa*. Most conspicuous, however, is *Moringa ovalifolia* with its large and swollen stems, light

green foliage and long hanging fruits. *Terminalia prunioides* and *Colophospermum mopane* occur on the kopjes as well as in the plains, but especially the latter is much less frequent on the rocks. Other conspicuous plants of the kopjes are *Abutilon angulatum*, *Barleria lancifolia*, *Dalechampia scandens*, *Euphorbia guerichiana* and a pink-flowered form of *Kalanchoë lanceolata*.

The surrounding plains are covered by Mopane woodland. The grass cover is fairly dense, and several annuals occur, the most striking being *Monsonia senegalensis* with beautiful pink flowers, the blue-flowered *Anticharis linearis* and the purple-flowered *Cleome elegantissima*. In more sandy areas *Dicoma tomentosa* and *Geigeria ornativa* were noted. Grey-leaved shrubs of *Catophractes alexandri* were locally dominant on gravelly soil.

**16. Okevi, c. 8 miles N. of Namutoni.**

In this area deep Kalahari sand occurs. The vegetation is a woodland with a rich flora of trees, herbs, twiners and grasses. My notes and collections are far from complete, especially as regards the trees, but it seemed that Mopane was absent, whereas *Acacia fleckii*, *Lonchocarpus nelsii* and a species of *Grewia* (N. 2681) appeared to be common. *Croton gratissimus* and *Bauhinia macrantha* formed small trees and large shrubs. Among the numerous twining or winding herbs were noted *Corallocarpus welwitschii* and several members of *Convolvulaceae*, viz. *Jacquemontia tamnifolia*, *Merremia tridentata* ssp. *angustifolia* and *M. verecunda*. Other *Convolvulaceae* included *Evolvulus alsinoides*, *Ipomoea hackeliana*, *I. obscura* and *Seddera suffruticosa*. The most frequent grasses were *Aristida meridionalis*, *Eragrostis dinteri*, *E. omahekensis* and *Rhynchelytrum repens*. A peculiar *Stipagrostis* was also collected (N. 2682), which according to Dr. B. de Winter of Pretoria (personal communication) represents a hybrid between *S. hirtigluma* var. *patula* and *S. uniplumis*.

**CHECK-LIST OF VASCULAR PLANTS**

Family	Species	Coll. No.	Locality
<b>23. Polygonaceae</b>	<i>Oxygonum alatum</i> Burch.	2664	16
<b>26. Molluginaceae</b>	<i>Limeum fenestratum</i> (Fenzl) Heimerl	2669	16
<b>27. Aizoaceae</b>	<i>Aizoanthemum dinteri</i> (Schinz) Friedr.	2613	11
	<i>A. dinteri</i> (Schinz) Friedr.	2650	13
	<i>A. dinteri</i> (Schinz) Friedr.	2714	9
	<i>Trianthema salsoloides</i> Fenzl ex Oliv.	2651	13
	<i>T. triquetra</i> Rottl. ex Willd.	2599	11
	<i>T. triquetra</i> Rottl. ex Willd.	2705	9
<b>32. Chenopodiaceae</b>	<i>Atriplex vestita</i> Thunb.	2657	14
	<i>Chenopodium hederiforme</i> (Murr.) Allen	2596	11



Family	Species	Coll. No.	Locality
	<i>Salsola tuberculata</i> (Fenzl ex Moq.)		
	Schinz	2715	9
	<i>Suaeda articulata</i> Aellen	2656	14
	<i>S. articulata</i> Aellen	2770	10
	<i>S. salina</i> B. Nord. (see Appendix)	2766	10
<b>33. Amaranthaceae</b>	<i>Achyranthes sicula</i> (L.) All.	2688	16
	<i>Aerva leucura</i> Moq.	2600	11
	<i>Amaranthus thunbergii</i> Moq.	2601	11
	<i>Celosia argenteiformis</i> (Schinz) Schinz	2690	16
	<i>C. linearis</i> (Schinz) Schinz	2609	11
	<i>Cyathula hereroensis</i> Schinz	2598	11
	<i>C. hereroensis</i> Schinz	2648	13
	<i>C. hereroensis</i> Schinz	2716	9
	<i>Kyphocarpa angustifolia</i> (Moq.) Lopr.	2686	16
	<i>Leucosphaera bainesii</i> (Hook. f.) Gilg	2717	9
	<i>L. bainesii</i> (Hook. f.) Gilg	2731	1
	<i>Nelsia quadrangula</i> (Engl.) Schinz	2745	2
	<i>Sericorema sericea</i> (Schinz) Lopr.	2607	11
	<i>S. sericea</i> (Schinz) Lopr.	2752	2
<b>47. Capparaceae</b>	<i>Cleome elegantissima</i> Briq.	2629	15
<b>49. Resedaceae</b>	<i>Oligomeris capensis</i> (Burm. f.) Harv.	2768	10
<b>50. Moringaceae</b>	<i>Moringa ovalifolia</i> Dinter & Berger	2623	15
	<i>M. ovalifolia</i> Dinter & Berger	2764	4
<b>52. Crassulaceae</b>	<i>Kalanchoë lanceolata</i> (Forsk.) Pers.	2624	15
<b>58. Mimosaceae</b>	<i>Acacia erubescens</i> Welw. ex Oliver	2638	15
	<i>A. fleckii</i> Schinz	2663	16
	<i>A. mellifera</i> (Vahl) Benth.		
	ssp. <i>detinens</i> (Burch.) Brenan	2749	2
	<i>A. reficiens</i> Wawra	2732	1
	<i>A. tortilis</i> (Forsk.) Hayne cf. ssp. <i>spirocarpa</i> (Hochst. ex A. Rich.) Brenan	2699	9
<b>59. Caesalpinaceae</b>	<i>Bauhinia macrantha</i> Oliver	2680	16
	<i>Cassia absus</i> L.	2677	16
	<i>Colophospermum mopane</i> (Kirk ex Benth.) Kirk ex Léonard	obs.	1, 2, 4, 15
<b>60. Fabaceae</b>	<i>Crotalaria damarensis</i> Engler	2743	1
	<i>C. platysepala</i> Harv.	2635	15
	<i>C. platysepala</i> Harv.	2753	2
	<i>C. sphaerosperma</i> Perr. ex DC.	2694	16

Family	Species	Coll. No.	Locality
	<i>Indigofera charlieriana</i> Schinz var. <i>lata</i> Gillett	2739 a	1
	<i>I. parviflora</i> Heyne ex Wight & Arn. var. <i>parviflora</i>	2739 b	1
	<i>Lonchocarpus nelsii</i> (Schinz) Schinz ex Heer.	2673	16
	<i>Sesbania aculeata</i> Pers.	2614	11
	<i>Sutherlandia frutescens</i> (L.) R. Br.	2751	2
	<i>Tephrosia dregeana</i> E. Mey. var. <i>dregeana</i>	2634	15
	<i>T. purpurea</i> L. ssp. <i>leptostachya</i> (DC.) Brummitt	2633	15
	<i>T. purpurea</i> L. ssp. <i>leptostachya</i> (DC.) Brummitt	2671	16
<b>64. Geraniaceae</b>	<i>Monsonia senegalensis</i> Guill. & Perr.	2632	15
<b>65. Zygophyllaceae</b>	<i>Zygophyllum simplex</i> L.	2597	11
<b>67. Euphorbiaceae</b>	<i>Acalypha indica</i> L.	2642	15
	<i>Croton gratissimus</i> Burch.	2665	16
	<i>Dalechampia scandens</i> L.	2637	15
	<i>Euphorbia glanduligera</i> Pax	2738	1
	<i>E. guerichiana</i> Pax	2643	15
	<i>E. inaequilatera</i> Sond.	2733	1
	<i>E. inaequilatera</i> Sond.	2756	3
	<i>Phyllanthus pentandrus</i> Schum. ex Thonn.	2641	15
	<i>Tragia okanyua</i> Pax	2703	9
<b>70. Burseraceae</b>	<i>Commiphora pyracanthoides</i> Engl.	2628	15
<b>77. Celastraceae</b>	<i>Maytenus senegalensis</i> (Lam.) Exell	2603	11
<b>79. Rhamnaceae</b>	<i>Berchemia discolor</i> (Klotzsch) Hemsley	2622	15
<b>81. Tiliaceae</b>	<i>Corchorus asplenifolius</i> Burch.	2702	9
	<i>Grewia villosa</i> Willd.	2620, 2645	15
	<i>G. sp.</i>	2681	16
<b>82. Malvaceae</b>	<i>Abutilon angulatum</i> (Guill. & Perr.) Mast.	2636	15
	<i>Pavonia clathrata</i> Mast.	2667	16
	<i>Sida hoepfneri</i> Gürke	2660	16

Family	Species	Coll. No.	Locality
84. Sterculiaceae	<i>Hermannia modesta</i> (Ehrenb.) Mast.	2722	8
	<i>H. modesta</i> (Ehrenb.) Mast.	2729	5
	<i>H. modesta</i> (Ehrenb.) Mast.	2734	1
	<i>Waltheria indica</i> L.	2698	16
94. Cucurbitaceae	<i>Acanthosicyos naudiniana</i> (Sond.) C. Jeffr.	2696	16
	<i>Corallocarpus welwitschii</i> (Naud.) Hook. f.	2695	16
	<i>Dactyliandra welwitschii</i> Hook. f.	2644	15
99. Combretaceae	<i>Combretum apiculatum</i> Sond. ssp. <i>apiculatum</i>	2627	15
	<i>Terminalia prunioides</i> Lawson	2621	15
115. Rubiaceae	<i>Kohautia azurea</i> (Dinter & Krause) Bremek.	2602	11
116. Convolvulaceae	<i>Evolvulus alsinoides</i> (L.) L.	2666	16
	<i>Ipomoea hackeliana</i> (Schinz) Hall. f.	2675	16
	<i>I. obscura</i> (L.) Ker-Gawl.	2678	16
	<i>Jacquemontia tamnifolia</i> (L.) Griseb.	2674	16
	<i>Merremia tridentata</i> (L.) Hall. f. ssp. <i>angustifolia</i> (Jacq.) Ooststr.	2661, 2689	16
	<i>M. verecunda</i> Rendle	2662	16
	<i>Seddera suffruticosa</i> (Schinz) Hall. f.	2670	16
119. Heliotropiaceae	<i>Heliotropium giessii</i> M. Friedr.	2653	13
	<i>H. giessii</i> M. Friedr.	2730	1
	<i>H. giessii</i> M. Friedr.	2750	2
	<i>H. lineare</i> (A.DC.) C. H. Wright	2707	9
	<i>H. ovalifolium</i> Forsk.	2700	9
	<i>H. ovalifolium</i> Forsk.	2725	7
122. Verbenaceae	<i>Lantana angolensis</i> Mold.	2668	16
123. Lamiaceae	<i>Acrotome inflata</i> Benth.	2631	15
	<i>A. inflata</i> Benth.	2742	1
	<i>Leucas pechuelii</i> (O.K.) Gürke	2726	6
	<i>L. pechuelii</i> (O.K.) Gürke	2761	3
124. Solanaceae	<i>Lycium</i> sp.	2755	2
	<i>Solanum incanum</i> L.	2712	9
	<i>S. kwebense</i> N. E. Br.	2691	16

Family	Species	Coll. No.	Locality
126. Scrophulariaceae	<i>Anticharis linearis</i> (Benth.) Hochst. ex Asch.	2639	15
	<i>Aptosimum lineare</i> Marl. & Engl.	2727	5
	<i>A. lineare</i> Marl. & Engl.	2735	1
	<i>Hiernia angolensis</i> S. Moore	2652	13
128. Bignoniaceae	<i>Catophractes alexandri</i> D. Don	2646	15
130. Acanthaceae	<i>Barleria lancifolia</i> T. Anders.	2626	15
	<i>B. senensis</i> Klotzsch	2604	11
	<i>Monechma debile</i> (Forsk.) Nees	2693	16
	<i>M. divaricatum</i> (Nees) C. B. Clarke	2610	11
	<i>M. divaricatum</i> (Nees) C. B. Clarke	2647	13
	<i>M. divaricatum</i> (Nees) C. B. Clarke	2685	16
	<i>M. divaricatum</i> (Nees) C. B. Clarke	2701	9
	<i>M. genistifolium</i> (Engl.) C. B. Clarke	2748	2
	<i>Petalidium engleranum</i> (Schinz) C. B. Clarke	2617	12
	<i>P. engleranum</i> (Schinz) C. B. Clarke	2649	13
	<i>Ruellia damarensis</i> S. Moore	2710	9
131. Pedaliaceae	<i>Sesamum triphyllum</i> Welw. ex Asch.	2754	2
	<i>S. triphyllum</i> Welw. ex Asch.	2758	3
139. Asteraceae	<i>Bidens pilosa</i> L.	2747	2
	<i>Blumea cafra</i> (DC.) O. Hoffm.	2615	11
	<i>Calostephane divaricata</i> Benth.	2683	16
	<i>Dicoma tomentosa</i> Cass.	2630	15
	<i>D. tomentosa</i> Cass.	2687	16
	<i>Erlangea schinzii</i> O. Hoffm.	2692	16
	<i>Geigeria odontoptera</i> O. Hoffm.	2618	12
	<i>G. odontoptera</i> O. Hoffm.	2654	13
	<i>G. odontoptera</i> O. Hoffm.	2719	9
	<i>G. odontoptera</i> O. Hoffm.	2741	1
	<i>G. ornativa</i> O. Hoffm.	2625	15
	<i>G. ornativa</i> O. Hoffm.	2711	9
	<i>G. ornativa</i> O. Hoffm.	2746	2
	<i>G. ornativa</i> O. Hoffm.	2757	3
	<i>Hirpicium gazanioides</i> (Harv.) Roessler	2763	3
	<i>H. gorterioides</i> (Oliv. & Hiern) Roessler ssp. <i>gorterioides</i>	2679	16
	<i>Pechuel-Loeschea leubnitziae</i> (O.K.) O. Hoffm.	2619	12
	<i>P. leubnitziae</i> (O.K.) O. Hoffm.	2704	9

Family	Species	Coll. No.	Locality
	<i>Pegolettia senegalensis</i> Cass.	2608	11
	<i>Senecio schinzii</i> O. Hoffm.	2728	5
	<i>S. schinzii</i> O. Hoffm.	2740	1
<b>145. Zannichelliaceae</b>	<i>Zannichellia palustris</i> L.	2659	Hartebeest- draai, in waterhole
<b>147. Liliaceae</b>	<i>Aloë cf. littoralis</i> Bak.	obs.	12
	<i>Asparagus nelsii</i> Schinz	2640	15
<b>160. Poaceae</b>	<i>Aristida meridionalis</i> Henr.	2697	16
	<i>Chloris virgata</i> Sw.	2709	9
	<i>C. virgata</i> Sw.	2744	2
	<i>Cynodon dactylon</i> (L.) Pers.	2612	11
	<i>Enneapogon brachystachyus</i> (Jaub & Spach) Stapf	2720	9
	<i>E. cenchroides</i> (Licht.) Hubbard	2605	11
	<i>Eragrostis annulata</i> Rendle	2718	9
	<i>E. annulata</i> Rendle	2721	8
	<i>E. annulata</i> Rendle	2737	1
	<i>E. dinteri</i> Pilg.	2672	16
	<i>E. echinochloidea</i> Stapf	2606	11
	<i>E. echinochloidea</i> Stapf	2724	8
	<i>E. echinochloidea</i> Stapf	2760	3
	<i>E. glandulosipedata</i> de Winter	2713	9
	<i>E. glandulosipedata</i> de Winter	2759	3
	<i>E. omahekensis</i> de Winter	2684	16
	<i>E. sp. aff. horizontalis</i> Peter	2736	1
	<i>Monelytrum luederitzianum</i> Hack. emend. Schweick.	2708	9
	<i>Odyssea paucinervis</i> (Nees) Stapf	2723	8
	<i>Rhynchelytrum repens</i> (Willd.) Hubb.	2676	16
	<i>Setaria verticillata</i> (L.) Beauv.	2706	9
	<i>Sporobolus acinifolius</i> Stapf	2765	10
	<i>S. bechuanicus</i> Goossens	2655	14
	<i>S. engleri</i> Pilg.	2767	10
	<i>Stipagrostis hirtigluma</i> (Steud.) de Winter var. <i>patula</i> (Hack.) de Winter	2762	3
	<i>S. hirtigluma</i> (Steud.) de Winter var. <i>patula</i> (Hack.) de Winter		
	x <i>S. uniplumis</i> (Licht.) de Winter	2682	16
	<i>Triraphis ramosissima</i> Hack.	2611	11
<b>165. Cyperaceae</b>	<i>Juncellus laevigatus</i> (L.) C. B. Clarke	2616	11
	<i>Scirpus dioicus</i> (Kunth) Boeck.	2769	10

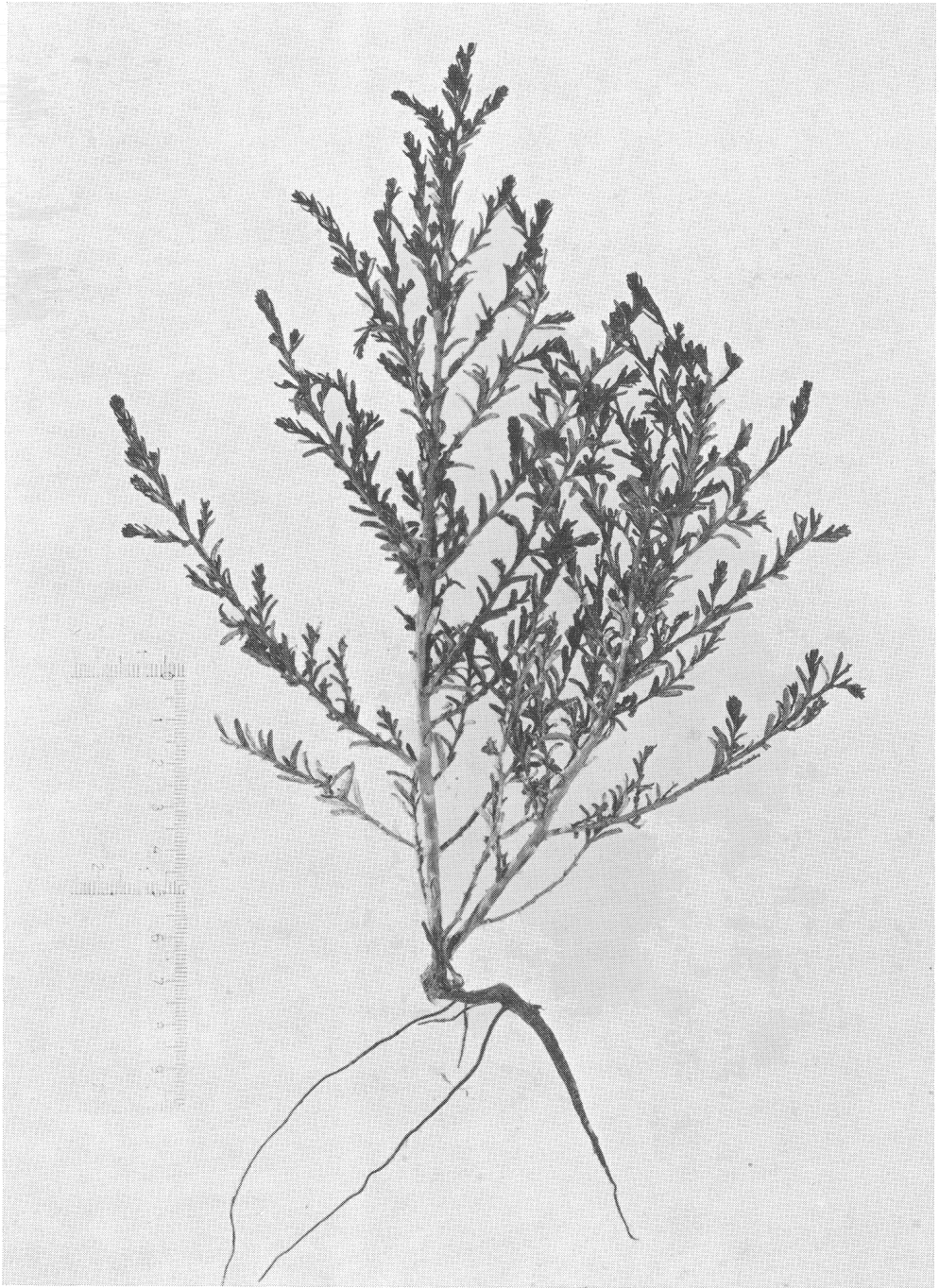


Figure 3: *Suaeda salina* B. Nord., photograph of holotype, Nordenstam 2766 (LD).

## A P P E N D I X

*Suaeda salina* B. Nord., sp. nov.

Holotypus: South West Africa, Etosha Distr.: Pan, 6 miles N. of Okaukuejo, 22.V.1963, Nordenstam 2766 (S).

Illustr.: Figs. 3—4.

Herba veros. annua erecta ramosa glabra. Folia carnosa, semiteretia, anguste oblonga — linearia, obtusa, basi leviter tumida. Flores solitarii vel in glomerulos axillares sessiles paucifloros dispositi. Perianthium depresso urceolatum; segmentis a medio connatis, parte libera ovato-triangularibus obtusis leviter carinatis. Stigmata 3, subulata, divergentia, papillis brevissimis. Pericarpium tenue. Semen horizontale, ovoideum, valde convexum, rostellatum, laeve, nigrum, nitidum.

Annual (?) erect glabrous herb 2—6 dm high, richly branching from the somewhat ligneous base; branches erecto-patent — ascending, evenly and moderately densely foliated; young branches carnose, drying blackish and striate — sulcate, older branches straw-coloured.

Leaves erecto-patent, narrowly oblong — linear, 5—8 (—10) mm long, 1.2—1.8 mm wide, carnose, semiterete, adaxially flattish and abaxially convex, glabrous, green or often turning reddish, obtuse; leaf-base somewhat swollen and of firmer texture.

Flowers solitary or in few-flowered axillary clusters, 1.5—2 mm in diam. Bracteoles minute, subscarios. Perianth depressed — urceolate, enclosing the fruit; perianth segments connate to about the middle; the free parts ovate-triangular, c. 0.7 mm long and 0.8 mm wide at the base, thickish and somewhat keeled in the middle, with narrow membranous margins, obtuse. Stigmas 3, subulate, 0.3—0.4 mm long, divergent — spreading from a short columnar base, with very short papillae. Pericarp thin, brownish. Seed horizontal, ovate in outline, shortly beaked, somewhat compressed but with rounded margins and convex faces, 1.6 × 1.3 mm wide, 0.8 mm thick, shiny black, smooth.

*Suaeda salina* B. Nord. fits in to sect. *Heterosperma* Iljin (Iljin 1936, p. 46), the most well-known member of which is *S. maritima* (L.) Dumort. The seeds, even the first formed ones, of the latter species are more or less distinctly reticulated, whereas in *S. salina* they are quite smooth. In this respect the new species resembles *S. confusa* Iljin, which differs, however, by its acute or acuminate leaves. From *S. inflata* Aellen, a related species from southern South West Africa, the new species is distinguished by its more erect growth, the length and number of stigmas (*S. inflata* has only two, 0.5—0.75 mm long stigmas, cf. Fig. 4 B), and the obtuse, not mucronate leaves.

*S. articulata*, a common plant of the pan's border zone, is somewhat similar in leaf-shape to *S. salina* but easily distinguished by the fruticose habit and the very different pistil (Fig. 4 C), which serves to place the species in another section of the genus.

*S. salina* grows in the soft, whitish, salty soil of the dry flat pan surface, which otherwise is practically devoid of vascular plants.

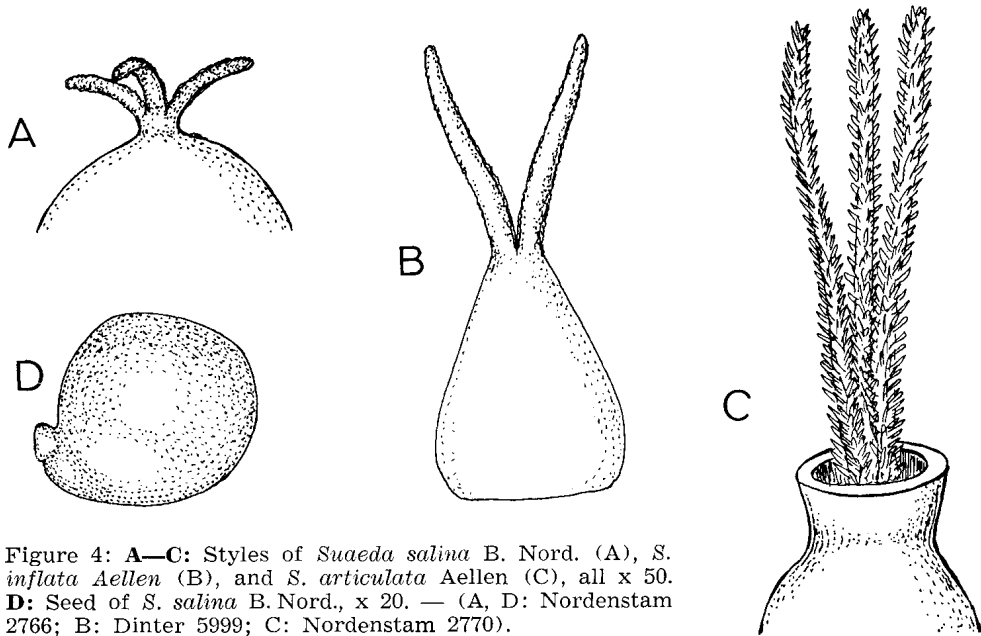


Figure 4: **A—C:** Styles of *Suaeda salina* B. Nord. (A), *S. inflata* Aellen (B), and *S. articulata* Aellen (C), all x 50. **D:** Seed of *S. salina* B. Nord., x 20. — (A, D: Nordenstam 2766; B: Dinter 5999; C: Nordenstam 2770).

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