

Synopsis of the genera *Nesaea* and *Ammannia* (Lythraceae) in southern Africa

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Keywords: *Ammannia*, Lythraceae, *Nesaea*, southern Africa, taxonomy

ABSTRACT

The genera *Nesaea* Commers. ex H.B.K. and *Ammannia* L. in southern Africa, which comprises Namibia, Botswana, South Africa, Swaziland and Lesotho, were revised. In *Nesaea*, 27 species (seven new), four varieties and one new form were recognized. *Ammannia* was revised using the DECORANA computer program, and four species were recognized. Keys to the taxa are presented, as well as synonymy (restricted to the region), diagnoses and descriptions of new taxa, and notes on distribution, taxonomy and nomenclature. The following taxa are new: *Nesaea alata* Immelman, *N. angustifolia* Immelman, *N. cymosa* Immelman, *N. minima* Immelman, *N. sagittifolia* (Sond.) Koehne var. *ericiformis* Koehne forma *swaziensis* Immelman, *N. saluta* Immelman, *N. wardii* Immelman and *N. zambatidis* Immelman.

UITTREKSEL

Die genusse *Nesaea* Commers. ex H.B.K. en *Ammannia* L. in suidelike Afrika, wat uit Namibië, Botswana, Suid-Afrika, Swaziland en Lesotho bestaan, is hersien. In *Nesaea* word 27 spesies (sewe nuut), vier variëteite en een nuwe vorm erken. *Ammannia* is met behulp van die DECORANA-rekenaarprogram hersien, en vier spesies word erken. Sleutels tot die taksons, asook sinonimie (tot die streek beperk), diagnoses en beskrywings van nuwe taksons, en aantekeninge oor verspreiding, taksonomie en nomenklatuur word gegee. Die volgende taksons is nuut: *Nesaea alata* Immelman, *N. angustifolia* Immelman, *N. cymosa* Immelman, *N. minima* Immelman, *N. sagittifolia* (Sond.) Koehne var. *ericiformis* Koehne forma *swaziensis* Immelman, *N. saluta* Immelman, *N. wardii* Immelman en *N. zambatidis* Immelman.

INTRODUCTION

This synopsis of *Nesaea* and *Ammannia* in southern Africa was written during the preparation of an account of the Lythraceae for the *Flora of southern Africa* (FSA). A combined key to the taxa of the two genera in the area is provided. Synonymy is restricted to those names based on southern African material, or names which have been used by various authors within the area. Distribution and habitat are recorded. Notes on taxonomy, nomenclature and typification are provided in some cases. Eight new taxa are described.

Nesaea Commers. ex H.B.K.

The first person to give a monographic account of *Nesaea* was Koehne (1882, 1903), who dealt with the whole of the Lythraceae. He described a number of new species and transferred many more from the 'holdall' genus *Ammannia*. The two genera were distinguished for the first time on the basis of capsule dehiscence (see key to genera below). Koehne divided *Nesaea* into five sections and a number of subsections and series.

A number of partial treatments of the genus have followed, dealing with specific aspects such as pollen or with the genus within a limited region, e.g. those of Panigrahi (1976, 1979, 1980a,b, 1986), Keay (1954), Pohnert & Roessler (1966) and Fernandes (1970, 1978).

Nesaea is a widespread genus of 50–70 species, most of which occur in Africa and Madagascar with a few

species in tropical Asia, Australia, North and Central America. Twenty-seven species, four varieties and one form are recorded from the *Flora of southern Africa* region. These are all erect to prostrate herbs or small shrubs occurring either on temporarily or permanently damp open soil, or occasionally submerged.

Four of Koehne's five sections are represented in southern Africa, only the monospecific sect. *Crinipedium* being absent. Only a few species and infraspecific taxa are endemic to southern Africa, however, with the majority of species being recorded from the northern part of the region, and clearly tropical African in origin. The genus is not represented in the winter rainfall region of southern Africa.

In contrast to *Ammannia* (see below), the boundaries of species of *Nesaea* are distinct, and it is my opinion that there is little, if any, hybridisation in the southern African species of the genus.

Dimorphic flowers occur in the closely related species *N. rigidula* (Sond.) Koehne and *N. alata* Immelman. Trimorphic flowers are encountered in *N. sagittifolia* (Sond.) Koehne and *N. schinzii* Koehne, also closely related to each other (Koehne 1882, 1903).

Table 1 and Figure 1 illustrate the relative lengths of the style and stamen filaments in pin and thrum flowers of the above species (excluding *N. alata*). There are twice as many stamens as calyx lobes in these species, the filaments occurring in two different lengths. The length of the capitate stigma is not included in the measurements of style length.

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MS. received 1990-01-02.

TABLE 1.—Style and stamen filament lengths (mm) of three species of *Nesaea*

	Style		Stamens	
<i>N. rigidula</i>	1,4–2,5	6,5	7,6–8,3	
	6,5–8,6	3,6–4,0	6,5–7,2	
<i>N. schinzii</i>	1,0–1,5	3,0	4,0–5,0	
	2,0	1,0	3,5	
	3,75–4,75	1,0–2,0	2,0–3,0(–4,0)	
<i>N. sagittifolia</i> var. <i>sagittifolia</i>	2,0–3,0	2,0	5,0–6,0	
	4,5–5,0	3,0	7,0–7,5	
	6,0–7,0	2,0–2,5	6,0–8,0	

Ammannia L.

The genus was first described by Linnaeus (1753), who placed three species in *Ammannia*, one of which, *A. baccifera* L., is included here. The genus was much confused with the subsequently described genera *Rotala* and *Nesaea*. Their boundaries were first clarified by Koehne (1880) using characters of capsule dehiscence.

Subsequent treatments of *Ammannia*, as in *Nesaea*, have dealt with specific aspects of the genus, or with the genus in a restricted region. Fernandes (1978) recognized five species and two subspecies in the *Flora zambesiaca* area. Graham (1985) revised the five species occurring in the western hemisphere, of which two also occur in our area. She also provided a summary of the biology of the genus.

Ammannia comprises ± 25 species, widespread in tropical, subtropical and temperate regions, with 16 species recorded from Africa. Four species occur in the *Flora of southern Africa* region, all herbaceous and all growing in standing water or marshy areas in the summer rainfall areas. One has been recorded as a weed in rice paddies, but does not appear to be a serious problem in our region.

None of the species of *Ammannia* is endemic to the southern African region, and all are primarily tropical African (or even more widespread), extending into southern Africa at their southern limits only.

Di- or tri-stylous flowers such as seen in a few species of *Nesaea*, do not occur in *Ammannia*. The pollen of *Ammannia*, as in *Nesaea*, is prolate and tricolpate, with six well-defined pseudocolpi (Panigrahi 1979).

Despite the revisions mentioned above of some species of *Ammannia*, many specimens cannot be identified, and appear to be intermediate between the accepted species. Although some characters, e.g. style length, peduncle length and petals, seem to have parallel variation, they occasionally vary in different combinations. These exceptional specimens have made it difficult to decide where to draw the boundaries between taxa, as the position of the boundary may differ according to which characters are used as diagnostic.

Possible reasons for the great variability in *Ammannia* are that the species are autogamous, or that they may hybridise. According to Graham (1985) they are

predominantly autogamous (rarely cleistogamous), but with at least a low level of outcrossing. Species do apparently sometimes hybridise, and a well-established American taxon is probably of hybrid origin, indicating that some species are not exclusively autogamous. Graham also points out that some species have large brightly-coloured petals and basal nectaries, which would not be expected in an entirely self-fertile species.

A few species of *Nesaea* are very similar to *Ammannia*, and these add to the difficulties of determination. With some specimens it may not be possible to establish the type of capsule dehiscence. The species of the two genera are therefore treated in a combined key.

METHODS

Material from all the major and some minor South African and Namibian herbaria was examined. In *Nesaea* the traditional taxonomic methods proved sufficient to

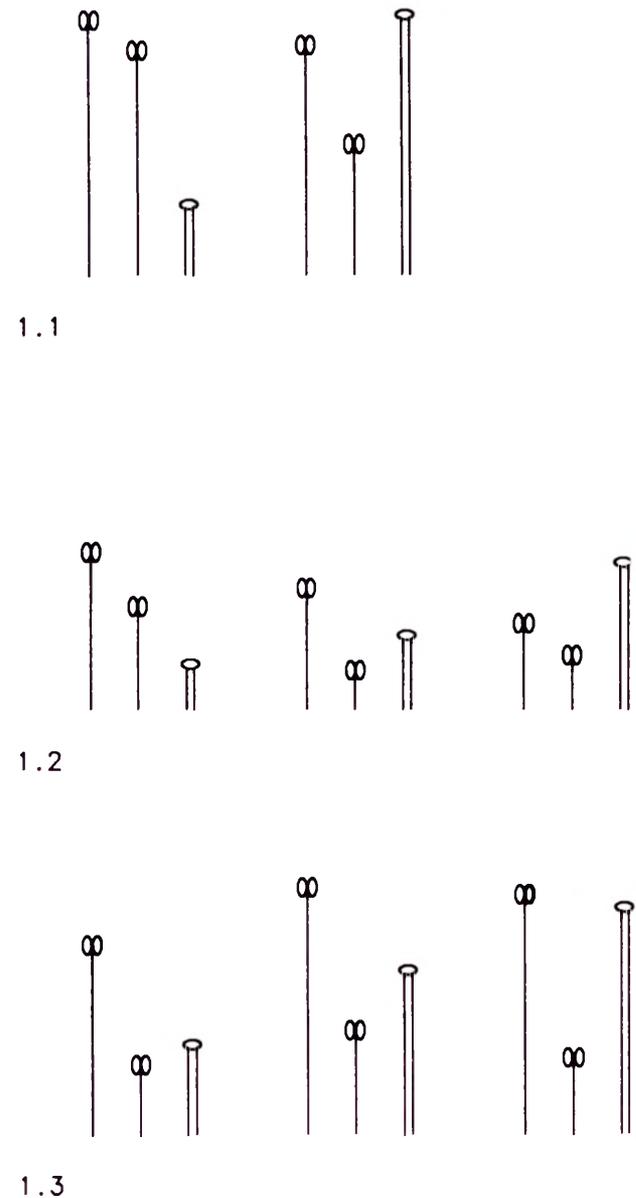


FIGURE 1.—Dimorphic and trimorphic flowers in *Nesaea*, showing relative lengths of style and one pair of stamens: measurements used are medians. 1.1, *N. rigidula*; 1.2, *N. schinzii*; 1.3, *N. sagittifolia* subsp. *sagittifolia*.

TABLE 2.—Eigenvalues for specimens of *Ammannia* (first two axes only)

Spec. no.	Axis 1	Axis 2	Spec. no.	Axis 1	Axis 2
1	291	305	27	59	153
2	370	124	28	133	111
3	316	273	29	116	138
4	400	308	30	13	156
5	299	91	31	136	172
6	302	279	32	135	132
7	309	189	33	30	141
8	304	110	34	23	154
9	142	203	35	57	129
10	142	163	36	7	173
11	162	208	37	38	123
12	331	84	38	282	129
13	328	72	39	264	146
14	72	195	40	216	181
15	252	98	41	71	176
16	318	107	42	46	133
17	59	145	43	127	93
18	0	163	44	123	125
19	30	144	45	107	200
20	40	183	46	397	0
21	34	156	47	306	75
22	78	140	48	289	73
23	113	97	49	311	176
24	175	128	50	260	171
25	48	156	51	317	66
26	25	163	52	281	144

distinguish taxa, but in *Ammannia* no clear pattern emerged. A computer program package was therefore used.

A suitable computerised method of analysing the variability encountered is the PHYTOTAB package, which includes DECORANA (detrended correspondence analysis). These programs were written by Westfall & Dednam (PHYTOTAB) and Hill (DECORANA) to ordinate and determine discontinuities in ecological data, thus determining community limits (Hill 1979). It was thought that DECORANA could be equally useful in helping to elucidate species limits in taxonomy.

Fifty-two specimens from PRE and WIND of the southern African *Ammannia* species were examined and scored for eight important characters. Characters used were those chosen by previous workers as useful in keys, i.e. shape of leaf base, peduncle and pedicel length, presence or absence of petals, length of the calyx, stamen filaments and style, and the presence or absence of calyx appendages. Before being included in the data set, the character states were aggregated into classes.

DECORANA was then used to group the specimens according to their overall similarity. This resulted in four sets of eigenvalues, of which the first two sets (Table 2) were used as the X and Y axes of a scatter plot (Figure 2). Five of the eight characters used were then individually superimposed on the common scatter plot to make a set of pictorialised scatter plots (Figures 3–7).

RESULTS

Twenty-seven species, four varieties and one form were distinguished in *Nesaea*.

In *Ammannia*, on the basis of results obtained from DECORANA alone, there are two distinct groups present, each of which can be divided into two further, if less clearcut, groups.

When the basic scatter plot was used as the basis for drawing up pictorialised scatter plots, i.e. using overall similarity of specimens combined with single characters, the boundaries between the four possible taxa became far clearer. The scatter plots which most clearly showed these boundaries proved to be those where petals (absent, small or large), style length, peduncle length, leaf bases and calyx appendages (absent, minute or clearly defined) were used. This technique also showed up a few specimens which did not fit into any group, emphasizing the variability of the taxa. Much of the confusion surrounding species delimitation probably arises from the description of intermediate specimens as formal, named taxa.

The four taxa are here recognized at species rather than subspecific rank. Synonymy is restricted to those names based on southern African material, and names which have been used by various authors within the area. Notes are provided where necessary, and distribution and habitat described.

Key to the genera

- Capsule dehiscent irregularly; flowers always monomorphic, in dense or lax cymes and subtended by large or small subulate bracts, never aggregated into heads; calyx lobes 4(5); stamens (2)4(–8) 1. *Ammannia*
- Capsule dehiscent first by a small apical operculum, then irregularly; flowers mono-, di- or trimorphic; some species with flowers aggregated into heads which are subtended by enlarged, often folded, bracts; calyx lobes 4(5)6; stamens 4(5)–8–12 2. *Nesaea*

Combined key to species of *Nesaea* and *Ammannia*

- 1a Calyx lobes regularly 5; stamens regularly 5 2.9. *N. rautanenii*
- 1b Calyx lobes 4(5)6; stamens 4(5)6–12:
- 2a Calyx lobes 6; stamens 12:
- 3a Primary bracts up to 8 mm long, folded along midline; calyx appendages 0.7–1.5 mm long; flowers homomorphic 2.10. *N. radicans*
- 3b Primary bracts ± 1 mm long, flat; calyx appendages very short to (usually) absent; flowers dimorphic or homomorphic:
- 4a Soft, probably annual herbs without woody taproot; petals pink or purple; inflorescence sessile; style of pin flowers 3.6–4.3 mm long 2.16. *N. alata*
- 4b Perennial herbs with stems woody at base, arising from a stout woody taproot; petals orange; inflorescence on peduncle 2–15 mm long; style of pin flowers 5.0–8.6 mm long:
- 5a Leaf bases cuneate to obtuse; open flowers on primary peduncles 10 mm or longer (in southern African specimens); flowers dimorphic; N & E Transvaal, Swaziland 2.18. *N. heptamera*
- 5b Leaf bases cordate to sagittate; open flowers on primary peduncles 2–5 mm long (in southern African specimens); flowers homomorphic; Namibia, Botswana and N & W Transvaal 2.17. *N. rigidula*

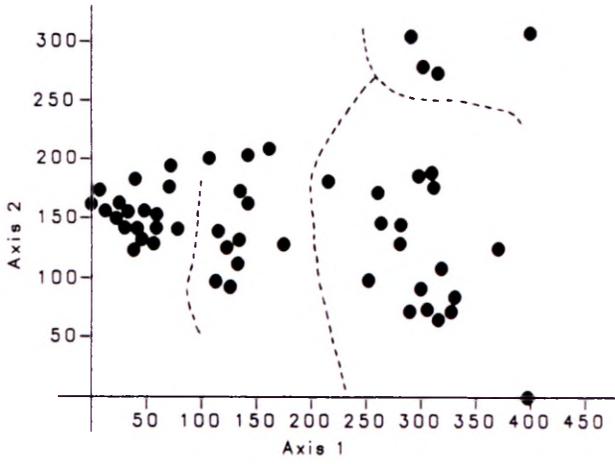


FIGURE 2.—Scatter diagram of eigenvalues for *Ammannia*, first two axes only. Possible boundaries between species, - - -.

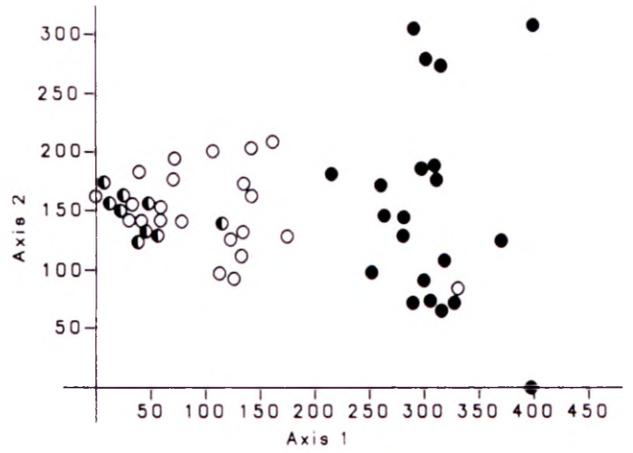


FIGURE 5.—Scatter diagram of eigenvalues for *Ammannia*, plotted against petals. Petals: large and brightly coloured, ●; small and white, ◐; absent, ○.

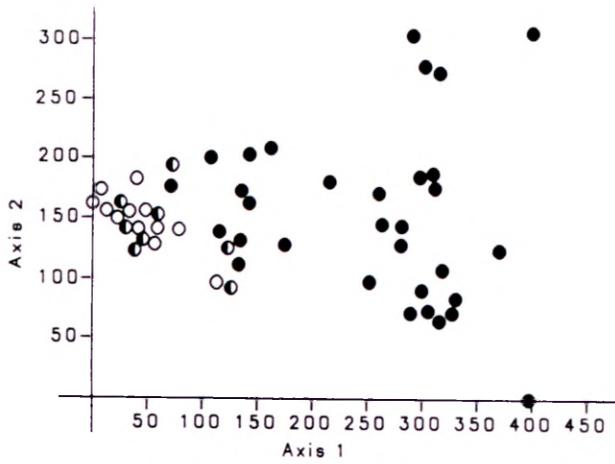


FIGURE 3.—Scatter diagram of eigenvalues for *Ammannia*, plotted against shape of leaf bases. Leaves: all auriculate, ◐; cuneate and auriculate on same plant, ◑; all cuneate, ○.

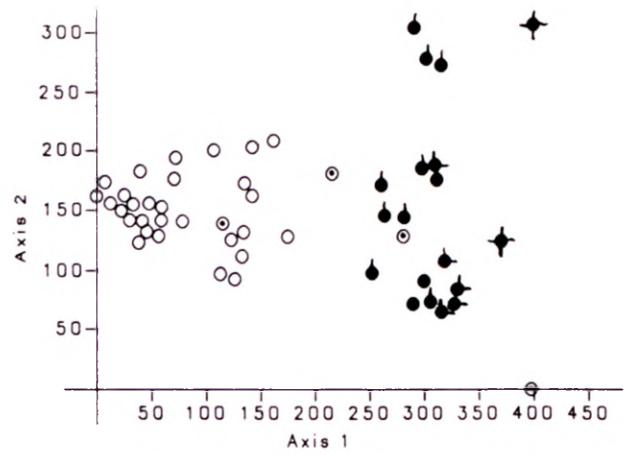


FIGURE 6.—Scatter diagram of eigenvalues for *Ammannia*, plotted against style length (mm). 0,12–0,2: ○; 0,3–0,8: ◐; 0,9–1,0: ◑; 1,1–1,6: ●; 1,7–1,8: ◐; 1,9–2,0: ◑; 2,1–2,2: ◑.

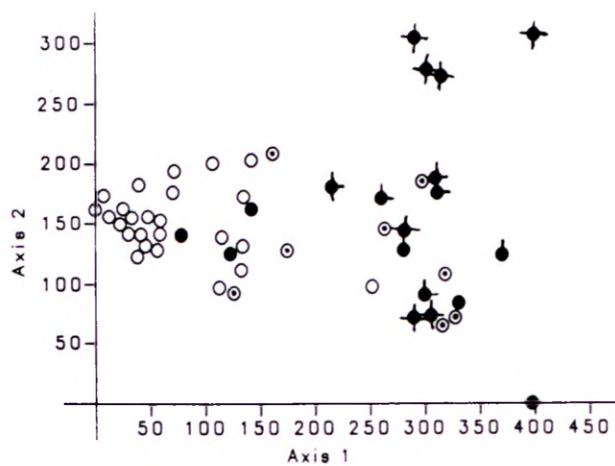


FIGURE 4.—Scatter diagram of eigenvalues for *Ammannia*, plotted against length of primary peduncles (mm). <0,4: ○; 0,5–0,9: ◐; 1,0–1,9: ◑; 2,0–2,9: ●; 3,0–3,9: ◐; 4,0–5,9: ◑; 6–14: ◑.

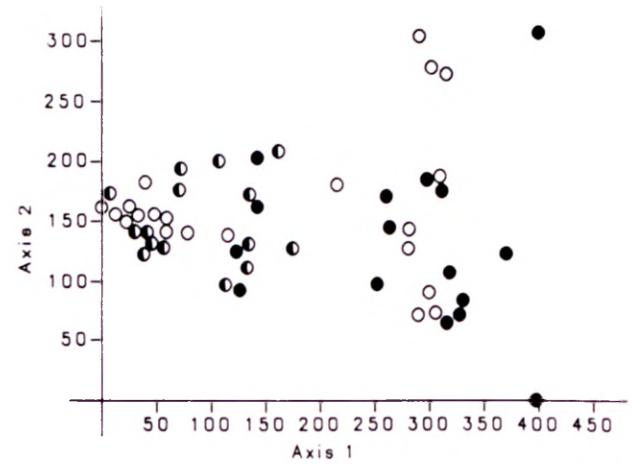


FIGURE 7.—Scatter diagram of eigenvalues for *Ammannia*, plotted against calyx appendages. Appendages: large, ●; small, ◐; absent, ○.

- 2b Calyx lobes 4(-5); stamens 4-8:
- 6a Flowers in a \pm hemispherical head subtended by large conduplicate bracts much longer than flowers, base of bracts often whitish with darker veining, apices abruptly acuminate:
- 7a Style up to 0.3 mm long; petals absent 2.14. *N. schlechteri*
- 7b Style 0.65 mm or longer; petals present:
- 8a Style 2.5 mm or longer; robust herb up to 0.6 m high; inflorescence usually sessile 2.15. *N. tolypobotrys*
- 8b Style up to 2.0 mm long; plant up to 0.2 m high; inflorescence pedunculate:
- 9a Style 1.2-2.0 mm long; calyx appendages 0.4-1.0 mm long 2.11. *N. cordata*
- 9b Style 0.65-0.85 mm long; calyx appendages up to 0.2 mm long 2.12. *N. angustifolia*
- 6b Flowers, if in a hemispherical head, not enclosed by large conduplicate bracts, bracts shorter to somewhat longer than flowers, not white with darker veining at base, concolorous or may be darker along midline with whitish membranous margins, apices obtuse, acute or attenuate, not abruptly acuminate:
- 10a Plants minute, up to 15 mm high, with \pm 2 pairs of leaves and a solitary terminal flower 2.13. *N. minima*
- 10b Plants at least 100 mm high, with numerous pairs of leaves and numerous flowers:
- 11a Primary bracts half as long to longer than calyx, usually with dark centres and whitish membranous margins:
- 12a Style longer than 0.8 mm; stamens exerted:
- 13a Petals absent or cream-coloured; stamens 4; leaves usually spiral on at least some branches, densely hirsute; SE Botswana and E Transvaal 2.19. *N. passerinoides*
- 13b Petals present, bright purple; stamens 8; leaves always opposite, glabrous; Namibia, Transvaal, Natal and E Cape:
- 14a Style 0.8-2.3 mm long; calyx appendages 0.3-0.8 mm long; bract 0.9-1.7 mm long; N Namibia 2.6. *N. teixeirae*
- 14b Style 2.6-4.0 mm long; calyx appendages 0.7-1.4 mm long; bract 4-8 mm long; Transvaal, Natal and E Cape 2.15. *N. tolypobotrys*
- 12b Style up to 0.5 mm long; stamens included:
- 15a Calyx lobes and stamens 5 2.8. *N. sarcophylla*
- 15b Calyx lobes 4; stamens 4-8:
- 16a Stamens 8; Zululand (Natal); stigma sessile 2.5. *N. wardii*
- 16b Stamens 4-8; Namibia, Botswana, Transvaal, OFS, N Cape; if stamens 8 or plants in Natal, then style 0.15-0.5 mm long:
- 17a Style 0.25-0.5 mm long; stamen filaments 1.25-2.0 mm long:
- 18a Stamens 8; small pink petals present 2.27. *N. drummondii*
- 18b Stamens 4; petals absent 2.3. *N. aspera*
- 17b Style up to 0.25 mm long; stamen filaments up to 1.2 mm long:
- 19a Stamens 8; small pink petals present 2.27. *N. drummondii*
- 19b Stamens 4; petals absent:
- 20a Style sessile; plant asperous or glabrous; primary bracts $1.0-1.5 \times \pm 0.3$ mm; N Namibia 2.2. *N. ondongana*
- 20b Style ± 0.25 mm long; plant glabrous; bracts $2.2-3.6 \times 0.65-1.45$ mm; Transvaal and N Cape 2.4. *N. cymosa*
- 11b Primary bracts less than half as long as calyx, usually of one colour:
- 21a Style 0.12-1.0 mm long (-1.8 mm in *N. zambatidis*); stamens included or shortly exerted, filaments up to 2.0(-4.0) mm long; base of larger leaves usually cuneate or cordate (except in *N. zambatidis* and *Ammannia* spp.):
- 22a Stamens 8; petals present:
- 23a Stems quadrangular with well-defined asperous ribs; style 0.2-0.4 mm long, included; mouth of calyx very slightly constricted, tube \pm cylindrical; Namibia, Botswana, N Transvaal and N Cape 2.27. *N. drummondii*
- 23b Stems terete, glabrous; style 0.65-1.8 mm long, shortly exerted; calyx widest at mouth, tube broadly campanulate; N & E Transvaal and Swaziland 2.24. *N. zambatidis*
- 22b Stamens 4; petals present or absent:
- 24a Stems usually terete, may be angled, soft, often decumbent and rooting at nodes; leaves always flat:
- 25a Leaf bases usually all auriculate, rarely auriculate and cuneate on same plant or all cuneate; pedicels (0.5-)1.5-3.0 mm long; petals absent 1.2. *A. senegalensis*
- 25b Leaf bases all cuneate or upper leaves auriculate, rarely all auriculate; pedicels 0.5(-3.0) mm long; small white or large pink petals often present:
- 26a Pedicels 0.5(-2.0) mm long; petals either absent or small and white 1.1. *A. baccifera*
- 26b Pedicels 2-5 mm long; petals either absent or large and pink:
- 27a Large pink petals present; pedicels 2-5 mm long 2.1. *N. crassicaulis*
- 27b Petals absent; pedicels 2-3 mm long 2.2. *N. ondongana*
- 24b Stems always quadrangular and sharply angled, often winged, plants erect and wiry, not rooting at nodes; leaves often with rolled margins, especially when young:
- 28a Style up to 0.25 mm long; plant up to 0.5 m high; Zululand and N Natal 2.22. *N. woodii*
- 28b Style 0.35-1.0 mm long; plant up to 0.2(-0.5) m high; Namibia, Botswana, Transvaal, OFS and N Cape:
- 29a Petals absent; calyx appendages long, acute and spreading; inflorescence sessile or peduncles and pedicels each up to 1 mm long; wings on stem usually asperous 2.7. *N. anagalloides*
- 29b Small pink petals present, at least in bud; appendages absent; inflorescence subsessile or peduncles up to 6 mm long; pedicels up to 4 mm long; stem glabrous 2.21. *N. saluta*
- 21b Style 1.3-7.0 mm long; stamens exerted, filaments 3.0 mm or longer (shorter in *Ammannia auriculata*); base of larger leaves sagittate:
- 30a Style up to 3 mm long; stamens 4-8, filaments up to 4 mm long:
- 31a Stamens 8; calyx without appendages 2.24. *N. zambatidis*
- 31b Stamens 4; calyx with or without appendages:
- 32a Petals absent; styles 1.3-1.6 mm long; stems and leaves densely hirsute over whole surface; leaf margins rolled, leaves often spirally arranged on at least some stems 2.19. *N. passerinoides*
- 32b Petals usually present (may be small); styles 0.5-2.6 mm long; stems not hirsute but may be asperous on wings only; leaves flat, always opposite:
- 33a Styles 0.5-0.75 mm (-1.3 mm in tropical Africa) long; calyx 0.9-1.1 mm long 1.3. *A. prieuriana*
- 33b Styles (1-)1.45-2.6 mm long; calyx 1.1-2.0 mm long:

- 34a Peduncles up to 6 mm long; style 1,45–2,6 mm long 2.20. *N. dinteri*
 34b Peduncles (3–)6–14 mm long; style (1–)1,3–1,5 mm long 1.4. *A. auriculata*
 30b Style (in at least some flowers in inflorescence) longer than 3,5 mm; stamens 8, at least some longer than 5 mm:
 35a Leaves spirally arranged; stems terete 2.26. *N. sagittifolia*
 35b Leaves opposite or, if spirally arranged, then stems quadrangular:
 36a Calyx 1,0–2,5(–5,0) mm long; flowers trimorphic; styles 1,0–4,75 mm long; pin flowers with the short stamens usually $\frac{1}{3}$ to $\frac{2}{3}$ the length of the long stamens; widespread but rare in Namibia 2.25. *N. schinzii*
 36b Calyx 2,5–5,0 mm long; flowers homomorphic, all with long styles; styles (4,25–)5,25–6,75 mm long; short stamens usually $\frac{2}{3}$ to equal the length of the long stamens; restricted to Namibia 2.23. *N. luederitzii*

1 *Ammannia* L., Species plantarum 1: 119 (1753).
 Type species: *Ammannia latifolia* L. (fide Britton & Brown: 577 (1913)).

Annual (possibly short-lived perennial) herbs. *Leaves* opposite-decussate, sessile, entire. *Inflorescence* pedunculate or sessile, lax or condensed dichasial cymes of (1)3–numerous flowers; bracts 2 below each flower, small, subulate. *Flowers* 4(–5)-merous, never heterostylous. *Calyx* tube broadly to narrowly campanulate, becoming globose in fruit, usually 4-lobed, lobes alternating with conical appendages or appendages absent, appendages very short to nearly as long as lobes. *Petals* 1–4 or absent, caducous. *Stamens* (2–)4(–8), inserted on calyx tube, included or exerted, subequal. *Ovary* incompletely 2–4(5)-locular, sometimes unilocular, upper portion of septa incomplete; style absent to 1,5 mm long. *Capsule* globose or ellipsoid, dehiscent irregularly; seeds numerous and small, concave-convex, often with a float of thin-walled cells on the concave side, often with hairs on the convex side and margin which evaginate in moisture.

1.1 *A. baccifera* L., Species plantarum 1: 120 (1753); Hiern: 478 (1871); Koehne: 259 (1880); Koehne: 53, fig. 5M (1903); Burt Davy: 198 (1926); Keay: 165 (1954); Pohnert & Roessler: 2 (1966); Webb & Moore: 302 (1968); Fernandes: 177 (1970); Fernandes: 308 (1978); Graham: 405, fig. 2, map 1 (1985). Type: China, Savage H. (LINN 156/4, lecto. Graham 1985; microfiche in PRE, IDC 177.99: III.4!).

A. aegyptiaca Willd.: 6, t. 6 (1803); DC.: 78 (1828); Fernandes: 309 (1978). *A. baccifera* L. subsp. *aegyptiaca* (Willd.) Koehne: 260 (1880); Fernandes: 309 (1978). Iconotype: Willdenow in Hort. Berol. 1. 1.6 (1803). (B-WILLD: photo. in PRE!).

A. wormskioldii Fisch., C.A. Mey. & Ave-Lallemant: 42 (1840); Koehne: 256 (1880) as *A. wormskiöldii*; Koehne: 53, fig. 51 (1903); Pohnert & Roessler: 3 (1966); Fernandes: 177 (1970); Fernandes: 308 (1978). Type: Brazil, hb. Berol. (B⁺).

A. salicifolia auct. non Monti: sensu Hiern: 478 (1871).

A. wormskioldii var. *alata* Koehne: 48 (1908). Type: Namibia, Okahandja, 1 200 m, July, Dinter 253 (HBG!, SAM!).

The species occurs in N Namibia, NE Botswana, the E, central and S Transvaal, the Orange Free State and the N Cape. It was also seen by the author from Burundi, Tanzania, Kenya, Zimbabwe and Angola. Other authors have recorded it from Africa both south and north of the Sahara, possibly Madagascar, Mauritius, the Middle East, India and Ceylon, Java, the Philippines, Russia, China, Japan and Australia (Koehne 1880). It has been recorded from Italy, Guadaloupe and Jamaica as an adventive (Graham 1985). The species is found growing in moist soil near water bodies, or in water.

The iconotype of *Ammannia aegyptiaca* is poor, but shows the relevant features. Leaf bases are attenuate, the flowers are \pm sessile, there are no petals, small calyx appendages appear to be present, and the stigma is subsessile. In the description these characters are repeated, and the description of the calyx appears, with some difficulty in the interpretation, to indicate the presence of appendages.

The description of *A. wormskioldii* is short, but indicates a plant with 4-merous flowers having 4 small white petals, the flowers being in sessile axillary cymes. Although the type has not been seen, the description is adequate to identify it.

1.2 *A. senegalensis* Lam. ex Poir. in Lam., Encyclopédie Méthodique, Botanique 1,1: 130 (1783); Lam.: tab. 77 (1791); Lam.: 328 (1810); DC.: 77 (1828); Hiern: 477 (1871) p.p. excl. syn. *A. prieuriana*; Koehne: 255 (1880); Koehne: 52 (1903); Burt Davy: 198 (1926); Keay: 165 (1954); Fernandes: 176 (1970). Type: E Senegal, Roussillon s.n. (P. microfiche no. 238/18, photo. in PRE!).

The species occurs in N Namibia and N Botswana, the N and E Transvaal, Swaziland and N Natal. It was also seen by the author from Tanzania, Zambia, Zimbabwe and Angola; it is recorded by other authors from Egypt (Koehne 1880), and from West Africa and the Sudan (Keay 1954). It occurs in or near water.

The primary peduncles of the type specimen are short and the calyx appendages present, but styles are not visible in the photograph. The styles are sessile according to Koehne (1880) and in the illustration in Koehne (1903). According to Graham, *A. senegalensis* is a synonym of *A. auriculata*, but she has also seen only a photograph of the type.

1.3 *A. prieuriana* Guill. & Perr. in Guill., Perr. & A. Rich., Florae senegambiae tentamen 1: 303 (1833); Koehne: 248 (1880); Koehne: 48 (1903); Keay: 164 (1954); Fernandes: 175 (1970); Fernandes: 306 (1978). Holotype: Gambia, marshy places around Albreda, Leprieur s.n. (G!)

A. pusilla Sond.: 40 (1850). Type: wet places near Sandriver, May, Zeyher. Hb. Sonder (S; SAM, mixed specimen! with *Nesaea anagalloides* and a *Bergia* sp.).

The species occurs in E and central Transvaal, and Natal. It was seen by the author from Burundi, Tanzania, Kenya, Malawi, Zambia and Mozambique, and is also recorded from West Africa (Koehne 1880; Keay 1954). The species grows near or in water.

The type of the species has styles 0.94–1.1 mm long, the leaves auriculate and the primary peduncles short. The calyx appendages are present but there are no petals.

The type of *A. pusilla* is given in Graham (1985) as 'Senegal or Nigeria, swampy places near Sand-rivier, Zeyher 541 (B⁺)'. However, 'Senegal or Nigeria' is not in the original citation in Sonder, and his article is titled (in German) 'Additions to the flora of South Africa'. Zeyher did not collect in Senegal or Nigeria, and the specimen is certainly from a South African locality. The specimen has peduncles \pm 2 mm long, the calyx 1.5 mm long with small but well-defined appendages, there are no petals and the style is \pm 1 mm long.

1.4 *A. auriculata* Willd. in Hortus berolinensis 1: 7, t. 7 (1803); DC.: 80 (1828); Koehne: 244 (1880); Britton & Brown: 469 (1879); Koehne: 45, fig. 5B (1903); Keay: 164 (1954); Pohnert & Roessler: 2 (1966); Webb & Moore: 302 (1968); Fernandes: 175 (1970); Fernandes: 305 (1978); Graham: 403, map 1 (1985) p.p. excl. syn. *A. pusilla*. Iconotype: Willdenow in Hort. Berol. 1: t. 7 (1803), (B-WILLD; photo. in PRE!).

A. senegalensis var. *auriculata* (Willd.) Hiern: 477 (1871).

The species occurs in N Namibia, N Botswana and the E Transvaal. It was also seen by the author from Burundi, the Congo, Tanzania, Zambia, Zimbabwe, Mozambique and Angola. Other authors record it from West Africa (Keay 1954), the Middle East, India, China and Australia and as introduced in Central and North America and the Caribbean, and possibly also in South America (Graham 1985). It is found growing in vleis, moist places in grassveld, near waterfalls, etc.

This species may be confused with *Nesaea saluta*, but can be differentiated by a number of characters. The peduncles are (3–)6–14 mm long, and also have a tendency to curve upwards, especially the older ones, while those of the *Nesaea* are up to 6 mm long (but usually much shorter) and quite straight. The calyx and style are more than 1 mm long and large pink petals are present.

This species, according to Graham (1985), is one of the most important weeds of rice in India, and is controlled by raising the water level high enough to prevent it from establishing itself. It has been introduced into the New World, where the earliest record was in the 1930's from Guadaloupe. It has since been found in Jamaica, but appears to be of limited distribution.

The numerous varieties and forms of this species which were described by Koehne, Graham considers meaningless, as the species is known to be highly variable.

The iconotype of the species is very poor but, together with the description, can be interpreted as follows: leaves with bases auriculate-cordate, inflorescences with 3(–5) flowers on primary peduncles \pm 5 mm long, calyx without appendages (this is not certain), petals present, style shorter than stamens.

2 *Nesaea Commerson ex H.B.K.*, Nova genera et species plantarum 6 (quarto): 191 (1824). Type species: *N. triflora* (L.f.) H.B.K.

Annual or perennial herbs, shrublets, rarely shrubs. Leaves opposite, \pm decussate, rarely ternate or alternate (spiral), sessile or shortly petiolate, entire. Inflorescence basically a cyme, this variously condensed, reduced or aggregated, often capituliform and subtended by large bracts at base, sometimes flowers solitary. Flowers bisexual, sometimes distylous or tristylous, usually 4-, 5-, or 6-merous (in *FSA* species), bibracteolate. Calyx tube variously-shaped, lobed, lobes alternating with conical calyx appendages, these may be absent or up to as long as lobes. Petals 0 or as many as calyx lobes, caducous. Stamens 4–12 (in *FSA* species), inserted on calyx tube, in 1–2 series, subequal or long and short stamens alternating, included or exerted. Ovary sessile, 2–5-locular; style nearly absent to much longer than calyx. Capsule globose to ellipsoid, opening by an apical operculum, lower part dehiscing irregularly later; seeds numerous, small, concave-convex, without inflating wing.

2.1 *N. crassicaulis* (Guill. & Perr.) Koehne in Botanische Jahrbücher 3: 324 (1882); Keay: 166 (1954); Pohnert & Roessler: 6 (1966); Fernandes: 182 (1970); Fernandes: 287 (1978). Types: Senegal, Cape Verde, marshy places near Khann, marked 'herbarium Richard' and 'Herbier E. Drake', March, 1834, *Perrottet* (P, lecto.), here designated); Senegal, by springs at Ghiecouil, Cayor, May, 1827, *Leprieur s.n.* (G!, P!).

Ammannia crassicaulis Guill. & Perr.: 303 (1833); Hiern: 479 (1871).

The species occurs in Namibia (Caprivi) and N Botswana (Okavango Swamps). It has also been seen by the author from Portuguese Guinea, and recorded by others from Angola, Zambia, Zimbabwe and Mozambique (Fernandes 1970, 1978) and West Africa, Zanzibar and Madagascar (Keay 1954). It grows in standing or running water.

2.2 *N. ondongana* Koehne in Botanische Jahrbücher : 165 (1900a); Koehne: 78 (1900b); Koehne: 225 (1903); Pohnert & Roessler: 7 (1966); Fernandes: 182 (1970); Fernandes: 285, tab. 69 (1978). Type: Namibia, Ambo-land, Ondongana, Jan., 1886, *Rautanen 206* (Z, lecto., here designated!; H!).

Two varieties are recognized:

Calyx 1.2–2.0 mm long; plant usually asperous, usually erect
..... 2.2a. *N. ondongana* subsp. *ondongana* var. *ondongana*

Calyx up to 1.2 mm long; plant usually glabrous, usually erect
or may be decumbent
..... 2.2b. *N. ondongana* subsp. *ondongana* var. *evansiana*

2.2a *N. ondongana* subsp. *ondongana* var. *ondongana*.

The typical variety has been seen from the Kaokoveld and on the banks of the Kunene River (N Namibia). It has been seen by the author from Zimbabwe, and is also

recorded by other authors from Botswana, Zambia and Mozambique (Fernandes 1978). It grows in damp places in sand or in pans.

The species is very similar to *Ammannia baccifera* but the capsule is definitely that of a *Nesaea*.

2.2b *N. ondongana* subsp. *ondongana* var. *evansiana* (A. Fernandes & Diniz) A. Fernandes in Boletim Sociedade Broteriana Sér. 2, 48: 115 (1974); Fernandes: 285 (1978). *Ammannia evansiana* A. Fernandes & Diniz: 155 (1957). Type: Botswana, Kachikau area, swampy areas by Chobe River [\pm 36 miles N of Kachikau on road to Kazane], *Pole Evans 4187* (SRGH, holo.; PRE, iso.).

The variety has been seen from Namibia (Caprivi), Botswana and Swaziland. It has also been seen by the author from Mozambique, Zambia and Malawi. It grows on the edge of water bodies, dried-up pans and seasonal floodplains; it may be partially submerged in still shallow water, or mat-forming.

2.3. *N. aspera* (Guill. & Perr.) Koehne in Botanische Jahrbücher 3: 327 (1882); Koehne: 226 (1903); Keay: 166 (1954); Pohnert & Roessler: 5 (1966); Fernandes: 289 (1978). Holotype: (Senegambia), Senegal, Cape Verde, moist sandy areas around Kounoun, March, collector probably either *Perrottet* or *Leprieur* (not found in P).

Ammannia aspera Guill. & Perr.: 304 (1833); Hiern: 480 (1871).

The species occurs in central and N Namibia, Botswana and N Natal. It has been seen by the author from Mozambique, and has also been recorded from Angola, Zimbabwe and tropical Africa generally (Keay 1954; Fernandes 1978). It grows near pans and springs.

The type has not been seen, but our material matches the type description well.

2.4 *N. cymosa* Immelman, sp. nov., *N. asperae* proxima, sed cymis pedunculatis, bracteis integris et stylo brevior differt.

The species is most similar to *N. aspera*, but differs in having pedunculate cymes, entire bracts and a shorter style.

TYPE.—Cape Province, 2822 (Glen Lyon): Hay division, Paardekloof [Perdekloof], desiccating pool in kloof, sandy soil, 5-1942 (-DA), *Cooke s.n.* (PRE, holo.), 44378 (BOL), 6448 (KMG).

Slender annual herb, branching freely from base or along (?prostrate) stems, rooting at nodes; stems \pm 0.08 m long, probably quadrangular, glabrous, up to 1.5 mm in diameter. *Leaves* subsessile, glabrous, lanceolate, up to 17 \times 4 mm, apex broadly acute, base cuneate (lower nodes) or shallowly cordate. *Inflorescence* a lax or moderately dense axillary cyme of \pm 5 flowers, this subtended by large but not enclosing bracts, subsessile or older inflorescences with primary peduncle up to 3 mm long. *Bracts* glabrous, longer than flowers, 2.2–3.6 \times 0.65–1.45 mm, broadly lanceolate, apex acute, base

cuneate, without solid keel, margins whitish. *Calyx* 4(–6)-lobed, campanulate, glabrous, \pm 1.2 mm long, appendages large, erect, 0.4–0.6 mm long. *Petals* absent. *Stamens* 4, opposite calyx lobes, included, filaments \pm 1 mm long. *Style* \pm 0.23 mm long, included, seeds produced early.

The species is found in the N Cape and E Transvaal, in moist sand or on rock sheets by water.

NAMIBIA.—SWA, no date given, *Schoenfelder S891* (PRE).

TRANSVAAL.—2530 (Lydenburg): Lowveld Botanic Garden, on rock sheet in spray of Nels River waterfall, full sun, SE slope, 640 m, 21-5-1980 (-BD), *Kluge 2288*.

CAPE.—2724 (Taung): Vryburg, Zoetvlei Farm (PO. Box 2188, Vryburg), 1 500 m, where water has stood in Windmill canyon, 1988 (-AA), *Speedy s.n. B* (cf. 15/18) (PRE).

2.5 *N. wardii* Immelman, sp. nov., *N. asperae* proxima, sed staminibus 8, caulibus quadrialatis et stigmatibus sessilibus differt.

This species is most similar to *N. aspera* but differs in having eight stamens, 4-winged stems and sessile stigmas.

TYPE.—Natal, 2831 (Nkandla): Umfolozi Game Reserve, in moist mud at edge of pan, 130 m, 7-12-1954 (-B), *Ward 2456* (PRE, holo.; NU, iso.).

Robust decumbent herb, probably annual, glabrous, unbranched; stems rooting at nodes, \pm 0.35 m high, 4-angled and strongly 4-winged, up to 3.5 mm in diameter. *Leaves* glabrous, lanceolate, 30–40 \times 5–11 mm, base cordate-sagittate, apex obtuse. *Inflorescence* an axillary cluster of 4–5 flowers, primary peduncles very short, pedicels 1–3 mm long. *Bracts* lanceolate, up to 2.2 \times 0.3 mm but usually less. *Calyx* 4-lobed, glabrous, globular in fruit, up to 2.5 mm long, with sharply acute, long, erect appendages up to 1 mm long, calyx lobes almost obsolete. *Petals* absent. *Stamens* 8, included, fugaceous; filaments \pm 0.7 mm long. *Stigma* sessile. *Seeds* produced in bud.

Two specimens have been seen, both collected from Zululand, and growing on the edge of a pan.

NATAL.—2732 (Ubombo): Mkuzi Game Reserve, margin of Bube Pan, 107 m, 25-1-1960 (-CA), *Tinley 3* (PRE).

This Zululand species is named after Mr C.J. Ward, in recognition of his years of work and extensive collecting in that region.

2.6 *N. teixeirae* A. Fernandes in Boletim Sociedade Broteriana Sér. 2, 43: 141 (1969). Type: Angola, Huilla, Namuculungo, 1 100 m, 25-6-1957, *Teixeira 2538* (LUA, holo.; LISC, iso.).

Within the FSA area there are a few records from NW Namibia. The species has also been seen by the author from Angola. It grows in marshy areas.

Although the type has not been seen, the PRE material has been compared with a specimen from K (*Pearson 2542*) authenticated by Fernandes. It also keys to this species in Fernandes (1970).

2.7 *N. anagaloides* (Sond.) Koehne in Botanische Jahrbücher 3: 327 (1882); Koehne: 228 (1903); Burt Davy: 199 (1926). Type: Rhinosterkop, marshy places by Vaal River. May, Zeyher 541 (SAM, lecto!., here designated).

Ammannia anagaloides Sond.: 40 (1850); Sond.: 515 (1868).

N. loandensis auct. non (Hiern) Koehne: Pohnert & Roessler: 6 (1966).

The species has been recorded from scattered localities in the Transvaal and N Cape, growing in rock pools, moist areas and pans in grassveld, and on the margins of streams.

Koehne (1882) distinguished between *N. loandensis* and *N. anagaloides* as follows:

Bracteoles shorter than pedicels *N. loandensis*
Bracteoles longer than pedicels *N. anagaloides*

The name *N. loandensis* is used by Pohnert & Roessler (1966) for the material in Namibia, and a single voucher is cited. A duplicate of this voucher specimen is in PRE, and agrees well with my concept of *N. anagaloides*. None of the material seen by me from southern African herbaria, and identified as '*N. loandensis*', matches the type (BM!), which is a soft herb with terete, prostrate stems and short included styles.

Our material rather matches *N. anagaloides* as described by Koehne, except in having the bracts shorter, not as long as the pedicels. The lectotype in SAM, however, has short bracts, so that this character is presumably variable in the species.

2.8 *N. sarcophylla* (Hiern) Koehne in Botanische Jahrbücher 3: 328 (1882); Koehne: 228, fig. 43E (1903); Fernandes & Diniz: 104 (1958); Fernandes: 177 (1970); Fernandes: 284 (1978). Types: Angola, Mossamedes, Bero near Cavalleiros, 'sparsim in arenosis humidis juxta ripam fluminum,' 7-1859, Welwitsch 2365 (LISU, lecto. fide Fernandes (1970); BM!).

Ammannia sarcophylla Hiern: 479 (1871).

N. sarcophylla has been recorded twice from north and central Namibia, as well as from Angola (see type) and Mozambique. It grows in wet areas in riverbeds.

2.9 *N. rautanenii* Koehne in Bulletin de l'Herbier Boissier 6: 750 (1898a); Koehne: 165 (1900a); Koehne: 231, fig. 45B (1903); Pohnert & Roessler: 7 (1966); Fernandes: 298 (1978). Type: Namibia, Amboland, Wasserstellen, 12-6-1898, Rautanen 218 (K!).

One specimen was seen from the Caprivi (Namibia). The species is also recorded from Zambia (Fernandes 1978). It is found growing in vleis.

This is the only species of *Nesaea* in the region which regularly has 5-partite flowers.

2.10 *N. radicans* Guill. & Perr., in Guillemin, Perrottet & Richard, Florae senegambiae tentamen 8: 306,

tab. 70 (1830–33); Hiern: 474 (1871); Koehne: 231 (1903); Keay: 166 (1954); Fernandes: 188 (1970); Fernandes: 298, 299 (1978). Syntypes: Cape Verde, Khann, marshy places; Cape Verde, N'Batal; Cape Verde, Kounoun; Senegal, near N'Boro, Cayor, Perrottet or Guillemin (not seen).

Two varieties are recognized:

Plant glabrous or almost so 2.10a. var. *radicans*
Plant with ± dense crispate hairs 2.10b. var. *floribunda*

2.10a var. *radicans*

A single specimen was seen from the Flora area, from Mochudi in Botswana. It has been seen by the author from Zimbabwe, Mozambique, Zaïre, Tanzania, Senegal and Zanzibar, and is also recorded from Zambia (Fernandes 1978). The ecology is as for var. *floribunda*.

2.10b var. *floribunda* (Sond.) A. Fernandes in Boletim Sociedade Broteriana Sér. 2, 48: 117 (1974); Fernandes: 299 (1978). Type: Natal, Omblasriver, near Port Natal [Umlaas River, near Durban], April, Drège s.n. (S!).

N. floribunda Sond.: 517 (1868); Hiern: 474 (1871); Burt Davy: 199 (1926); Pohnert & Roessler: 6 (1966); Fernandes: 189 (1970).

This is the variety commonly encountered in the Flora area, having been recorded from N Namibia, N and SE Botswana, Transvaal, Swaziland, Natal and E Cape. It has been seen by the author from Mozambique and Tanzania, and is also recorded from Zambia, Malawi and Zanzibar (Fernandes 1970, 1978). It grows in moist ground near dams, vleis and streams, often among boulders or low vegetation.

2.11 *N. cordata* Hiern in Flora of tropical Africa 2: 475 (1871); Koehne: 166 (1900a); Koehne: 232 (1903); Burt Davy: 199 (1926); Keay: 166 (1954); Pohnert & Roessler: 6 (1966); Fernandes: 187 (1970); Fernandes: 302 (1978). Syntypes: Sudan, Madi, Speke & Grant s.n.; Niger, Barter s.n.; Angola, Pungo Andongo, 2400–3800 ft., Welwitsch 2327 (BM, lecto. fide Panigrahi (1976); PRE, isolecto!).

N. cordata occurs in the northern half of Namibia, SE Botswana, Transvaal and Swaziland. It has also been seen from Mozambique, Zimbabwe, Tanzania, Nigeria and Ghana by the author, and by other authors from Angola, Zambia and Malawi (Fernandes 1970, 1978) and from West Africa (Keay 1954). It grows in seepage areas, pans and by streams or springs, usually in grassveld on their banks but occasionally submerged in shallow standing or slow-flowing water.

2.12 *N. angustifolia* Immelman, sp. nov., *N. erectae* proxima, sed calycis appendicis brevissimis, stylo breviori differt.

Most similar to *N. erecta*, but differs in having very short calyx appendages and a shorter style.

TYPE. —Transvaal, 2327 (Ellisras): Ellisras, in shallow seepage water, frequent, 25-5-1967 (–DA), Louw 4145 (PRE).

Slender annual herb, 0,06–0,17 m high, glabrous or sparsely pubescent with spreading, relatively long hairs, unbranched or branching from base, branches probably quadrangular when young, 0,5–1,0 mm in diameter. *Leaves* glabrous or pubescent, linear to linear-lanceolate, 7,0–20,0 × 1,0–1,5 mm, apex broadly acute, base cuneate. *Inflorescence* of pedunculate axillary heads, the (1–)3–13 flowers enclosed by a pair of large bracts, primary peduncle 3–23 mm long, flowers ± sessile in head. *Bracts* glabrous or hirsute, lanceolate to ovate, ± 2,5–5,8 × 0,8–3,0 mm, folded along midline with a solid keel, without a pale base or dark veining, apices acuminate and strongly recurved. *Calyx* 4-lobed, campanulate, 1,8–2,5 mm long, appendages small, up to 0,2 mm long. *Petals* ± 0,7 mm long, pink or magenta. *Stamens* 4–8, included to shortly exserted, of two different lengths (when 8), filaments 0,8–1,1 and 1,6–1,8 mm long. *Style* exserted, 0,65–0,95 mm long.

The species is recorded from the E Transvaal lowveld and central Transvaal, growing in moist places in bushveld.

TRANSVAAL.—2431 (Acornhoek): Kruger National Park, Satara, Pumbe Pan, damp soil next to pan, 3-1967 (–BB), *Van Wyk 4788* (PRE); Manyeleti Game Reserve, bushveld, 420 m, 18-3-1976 (–DA), *Bredenkamp 1585* (PRE); 2528 (Pretoria): Transvaal, Sandfontein, 19-1-1894 (–AB), *Schlechter 4243* (BOL).

2.13 *N. minima* Immelman, sp. nov., *N. cordata* proxima, sed bracteis longioribus, petalis nullis, floribus solitariis differt.

Similar to *N. cordata*, but differs in having the bracts longer, the petals absent and the flowers solitary.

TYPE.—Botswana, 1824 (Kachikau): Zwezwe 'flats' (receive the overspill of the Ngwezumba River in Feb., March), heavy white sand, open grassveld which is moist below the surface, together with sedges, 18-5-1977, (–CB) *Smith 2037* (PRE).

Annual herb, glabrous, unbranched; stems very slender, almost filamentous, 0,015 m high, less than 0,5 mm in diameter. *Leaves* in 1 or 2 pairs per plant, glabrous, elliptic to ovate-oblong, 4 × 1 mm long, base cuneate, apex obtuse. *Inflorescence* of solitary terminal flowers, primary peduncles very short, pedicels ± 0,5 mm long. *Bracts* glabrous except for a few papillae along margin, broadly lanceolate to ovate, longer than calyx, ± 2 × 1 mm long, with a solid keel but not folded along midline, apex obtuse. *Calyx* 4-lobed, glabrous except for a few hairs on appendages, broadly campanulate (only specimens in fruit seen), ± 1,5 mm long; with well-defined conical appendages, 0,3–0,4 mm long. *Petals* absent. *Stamens* 4, included, attached near base of tube, ± 1,5 mm long. *Style* not seen. *Seeds* produced in bud (flowers cleistogamous?), with evaginating hairs.

There is only a single record of this distinctive species, from N Botswana, growing in the moist grassveld of a floodplain.

2.14 *N. schlechteri* A. Fernandes in Garcia de Orta 4,2: 189, t. 1 (1980). Type: Transvaal, by Sandfontein, humid depression, 1 330 m, 19-1-1894, *Schlechter 4243* (MO, holo.; PRE, iso.!).

Within the FSA area there is one record from the Ruacana Falls (Namibia), and one from the Transvaal (type specimen). The Namibian specimen was growing on a wet boulder near the falls.

2.15 *N. tolypobotrys* Koehne in Botanische Jahrbücher 22: 151 (1895); Koehne: 166 (1900a); Koehne: 232 (1903); Burt Davy: 199 (1926); Fernandes: 297 (1978). Type: Natal, on fields by Umhlatuzaan River, 100 ft., *Medley Wood 334* (BM).

Recorded from the SE Transvaal, Natal and E Cape, as well as from Mozambique (Fernandes 1978). It grows in wet places, often in sandy soil or on rock sheets.

2.16 *N. alata* Immelman sp. nov., *N. rigidulae proxima*, sed floribus roseis vel purpureis, inflorescentia subsessili, stylis brevioribus differt.

The species is most similar to *N. rigidula*, but differs in having flowers pink to purple, the inflorescence subsessile and the styles shorter.

TYPE.—Transvaal, 2331 (Phalaborwa): Kruger National Park, Mtomene Pan, wet soil near bank of pan, 5-1977 (–AC), *Gertenbach 7006* (PRE, holo.; KNP, iso.).

Erect annual herb, glabrous, ± 0,45 m high, unbranched or with a few branches, young stems quadrangular, strongly winged, wings may be minutely asperous, up to 2 mm in diameter. *Leaves* glabrous, lanceolate to nearly linear, 25–55 × 2–7 mm, base shallowly sagittate, apex broadly acute. *Inflorescence* an axillary cluster of (1–)3–5 flowers, subsessile or peduncles up to 2 mm long. *Bracts* glabrous, lanceolate, ± 1,5 × 0,3–0,5 mm. *Flowers* dimorphic. *Calyx* 6-lobed, glabrous, broadly campanulate, 2–3 mm long, appendages very small or absent, with 12 dark green stripes. *Petals* ± 1,5 mm long, purple. *Stamens* 12, of two lengths in the flower. *Pin flowers*: stamen filaments 3,9 and 4,3–4,7 mm long, exserted; style 3,6–4,3 mm long, exserted. *Thrum flowers*: stamen filaments ± 1,5 mm long, included; style 1,5–4,0 mm long, included.

Two specimens have been seen, one from the Transvaal lowveld and one from Swaziland, in or next to still water.

SWAZILAND.—2631 (Mbabane): Lubombo Mountains, 17 km N of Siteki on road to Mhlumbe, between Farms Groenpan and Cyrildene, in shallow pool in semi-shade, 500 m, 8-5-1976 (–BD), *Culverwell 59* (PRE).

The opening mechanism of the capsule was examined and is definitely that of a *Nesaea*.

2.17 *N. rigidula* (Sond.) Koehne in Botanische Jahrbücher 3: 333 (1882); Koehne: 166 (1900a); Koehne: 235 (1903); Burt Davy: 199 (1926); Pohnert & Roessler: 7 (1966); Fernandes: 184 (1970). Type: Transvaal, Aapiers-river, Oct., *Zeyher 542* (SAM!).

Lythrum rigidulum Sond.: 42 (1850); Sond.: 516 (1868).

N. mucronata Koehne: 249 (1888); Koehne: 236 (1903). Type: Namibia, Amboland, Omatope, Feb. 1886, ?*Schinz* (not seen).

The species occurs in NE Namibia and the Transvaal (type specimen). It has been seen by the author from Zimbabwe, and has also been recorded from Botswana, Angola and Zambia (Fernandes 1970, 1978). It grows in moist open places such as margins of pans and in vleis.

It has a thick woody taproot and probably produces annual deciduous shoots.

N. mucronata is given as a synonym of *N. rigidula* by Pohnert & Roessler (1966), and by Fernandes (1978). I have not seen the type, but accept their placing the name here.

2.18 ***N. heptamera*** Hiern in Flora of tropical Africa 2: 472 (1871). Holotype: Mozambique, Zomba, and E end of Lake Schirwa, 10-1861, *Meller s.n.* (K!).

There are scattered records from the N and E Transvaal, and from Swaziland. The species is, however, more common in east tropical Africa, having been seen by the author from Zimbabwe and recorded by other authors from Zambia, Malawi, Mozambique, Zaïre and Tanzania (Fernandes 1978). It is found in moist places in grassveld, often in saline areas.

Like *N. rigidula*, it has a thick woody taproot that probably produces annual deciduous shoots: this would also enable the two species to survive grass fires.

2.19 ***N. passerinoides*** (Hiern) Koehne in Botanische Jahrbücher 3: 338 (1882); Koehne: 237 (1903); Fernandes: 296 (1978); Fernandes: 186 (1970). Type: Angola, Huilla, March, *Welwitsch s.n.* (probably 2336) (PRE!).

Ammannia passerinoides Hiern: 480 (1871).

There are a few scattered records from SE Botswana and SE Transvaal. The species has been seen by the author from Zimbabwe; it is also recorded by other authors from Angola (Fernandes 1978). It grows beside water, but little has been recorded about its habitat in our region. Fernandes (1978) gives the habitat as 'grasslands, margins of vleis and termite mounds, on black clayey or sandy soils'.

N. passerinoides is closely related to *N. sagittifolia* but can be distinguished from it by the absence of petals and the homomorphic, short-styled flowers.

2.20 ***N. dinteri*** Koehne in Botanische Jahrbücher: 166 (1900a); Koehne: 25 (1900b); Koehne: 68 (1902); Koehne: 237 (1903); Pohnert & Roessler: 6 (1966); Fernandes: 294 (1978). Type: Namibia, Hereroland, Okaruse, April, *Dinter 606* (B⁺?, not traced elsewhere).

2.20a subsp. ***elata*** A. Fernandes in Boletim Sociedade Broteriana Sér. 2, 48: 122, tab. 9 (1974); Fernandes: 294, tab. 73 (1978). Type: Zambia, Mumbwa, Chunga, Kafue National Park, *Mitchell 18/50* (LISC, holo.; COI, PRE!, SRGH).

N. transvaalica A. Fernandes: 121, tab. 8 (1974). Type: Transvaal, Brits, Assen area, on Farm Welgevonden, marshy area, 10-4-1936, *Obermeyer s.n.* (SRGH, holo.; PRE, iso!).

The subspecies occurs in N Namibia and N Botswana, central and E Transvaal, and Swaziland. It has been seen by the author from Zimbabwe and Tanzania, and it has also been recorded from Zambia and Malawi (Fernandes 1978). It occurs in or near water.

Superficially this species is very similar to *Nesaea saluta*, but it can be distinguished by the longer styles and the well-defined calyx appendages.

The styles of the type specimen of *N. dinteri* subsp. *elata* are 2.2–2.6 mm long, the calyx 1.85 mm, and the four stamen filaments are \pm 2.4 mm long and opposite the calyx lobes. *N. transvaalica*, on the other hand, has the calyx 1.6 mm long, with large appendages and well-defined asperous ribs and large, bright pink petals. The stamens are 1.85 mm long and opposite the calyx lobes, and the style is 1.25–1.6 mm long. The specimen is a small unbranched asperous herb. Except for the small size and short styles, this specimen is typical of *N. dinteri*; it is probably either very young or depauperate.

2.21 ***N. saluta*** Immelman, sp. nov., *N. dinteri* subsp. *elatae* proxima, sed stylis brevioribus, calycis appendicibus nullis differt.

The species is most similar to *Nesaea dinteri* subsp. *elata* but differs in having shorter styles and no calyx appendages.

TYPE. — Namibia, 1918 (Grootfontein): Grootfontein, 27-4-1934 (–CA), *Dinter 7347* (PRE, holo.; BOL, HBG, WIND, iso.).

Slender annual herb up to 0.2 m high, simple or branching freely; stems quadrangular, glabrous, up to 1.5 mm in diameter. *Leaves* sessile, glabrous, oblong-lanceolate, 8–18 \times 2–4 mm, apex broadly acute, base truncate to (usually) shallowly cordate, to slightly hastate, sometimes discoloured. *Inflorescence* very variable with age, of simple few-flowered axillary cymes on short primary peduncles becoming lax and much-branched with up to 20 flowers in fruit, primary peduncles up to 6 mm long but usually shorter. *Bracts* narrowly lanceolate, entire, \pm 0.5 mm long. *Calyx* 4-lobed, narrowly campanulate becoming globular in fruit, glabrous, 0.8–1.0 mm long, without appendages, buds often apiculate at apex where calyx lobes join. *Petals* small, soon caducous (sometimes entirely absent?), pale pink or purplish brown. *Stamens* 4, opposite calyx lobes, shortly exserted, filaments 0.5–1.0 mm long. *Style* exserted, 0.4–0.8 mm long.

Within the Flora region the species was recorded from Namibia and the E Transvaal; it was also seen from Angola. It is found growing in moist, often sandy places.

NAMIBIA. — 1917 (Tsumeb): track between Tsumeb and Abenab, 9 km from main road, small vlei, 25-4-1963 (–BD), *Kers 424* (PRE, WIND, mixed specimen). 1918 (Grootfontein): Grootfontein, Gumab, 5-5-1934 (–CA), *Schoenfelder 4419* (BOL, HBG, PRE); Farm Oliewenhof, GR 215, palm flats, grey clay soil, 8-3-1974 (–CB), *Merxmüller & Giess 30129* (PRE, WIND).

2.22 ***N. woodii*** Koehne in Pflanzenreich 17 (IV, 216): 238 (1903). Types: Natal, Zululand, by Tugela River, *Wylie*

sub Wood 5689a (PRE, lecto.! here designated; BOL!, SAM!); Natal, Zululand, by Tugela River, *Wylie sub Wood 8599* (NH!, marked as *Lythrum rivulare*).

N. woodii occurs in N Natal; it has also been seen from Zimbabwe. It grows in moist sand on pan margins, stream banks and sand dunes.

The species is closely related to *N. schinzii*, but differs in having homomorphic flowers with 4 included stamens, consistently shorter styles, and often longer and broader bracts.

2.23 *N. luederitzii* Koehne in Verhandlungen des Botanischen Vereins der Provinz Brandenburg 30: 251 (1888); Koehne: 238 (1903); Pohnert & Roessler: 6 (1966). Type: Namibia, Damaraland, Ganahomtes, Tsoa Xaubthal, 26-9-1885, *Schenk 420* (Z!).

Two varieties are recognized:

- Leaves all opposite; pedicel of median flower 5–8 mm long; style slightly longer than stamens; plant usually glabrous ..
..... 2.23a. var. *luederitzii*
- Leaves partly opposite, partly alternate; pedicel of median flower 1–1.5 mm long; style much longer than stamens; plant often hispidulous 2.23b. var. *hereroensis*

2.23a var. *luederitzii*

N. straminea Koehne: 167 (1900a); Koehne: 26 (1900b); Koehne: 239 (1903). Type: Namibia, Hereroland, Tsoachausand, Salem, September, *Dinter 139* (B⁺).

The variety is scattered throughout Namibia, and is probably the most common species there, if herbarium records are taken as representative. It is found growing in dry riverbeds and on streambanks.

N. luederitzii is closely related to *N. schinzii*, from which it can be distinguished by the characters given in the key. Sterile plants can often be distinguished from that species by the yellowish stems and exfoliating bark at the base of older stems of *N. luederitzii*. *N. schinzii* is rare in Namibia.

From the type description I consider *N. straminea* a synonym of *N. luederitzii* var. *luederitzii*. It is so treated by Pohnert & Roessler (1966).

2.23b var. *hereroensis* Koehne in Botanische Jahrbücher 29: 167 (1900a); Pohnert & Roessler: 6 (1966). Type: Namibia, Hereroland, Otjinene, on limestone, 13 April, 1899, *Dinter 613* (Z!).

This rather rare variety is recorded from central and NE Namibia. It grows in dry riverbeds.

2.24. *N. zambatidis* Immelman, sp. nov., *N. schinzii* proxima, sed floribus homomorphis, caulibus crassis teretibus differt.

The species is most similar to *N. schinzii*, but differs in the homomorphic flowers and in the stems being thick and terete.

TYPE.—Transvaal, 2229 (Waterpoort): near Waterpoort, east of Pylkop Station, north of the Soutpansberg, Farm Driehoek, in rocky outcrop in Mopane veld, growing in pools of water in rocks, 700 m, 9-5-1984 (–DD); *Balkwill 1651* (PRE, holo.; NU, iso.).

Robust, probably annual herb; stems thick, tough and spongy, up to 5 mm in diameter, glabrous, few-branched, may or may not root at nodes, ± 0.3 m high. Leaves glabrous, crowded, lanceolate, 37–65 × 6–8 mm, bases sagittate, apex broadly acute to obtuse. Inflorescence a dense subsessile axillary cluster of ± 5 flowers. Bracts glabrous, narrowly lanceolate, 0.5–0.7 × 0.1 mm. Calyx 4(5)-lobed, glabrous, broadly campanulate, 1.5–3.0 mm long, without appendages. Petals ± 4 mm long, pink. Stamens twice as many as calyx lobes, included or shortly exerted; filaments of two lengths with longest opposite calyx lobes, 1.1–1.8 and 1.8–3.9 mm long. Style shortly exerted, 0.65–1.8 mm long.

Specimens have been seen from the N and E Transvaal, and Swaziland; the species was also seen from Zimbabwe. It has been recorded as growing in standing water of rock pools and seasonal pans.

TRANSSVAAL.—2431 (Acornhoek): Timbavati Private Reserve, Farm Kempiana 90 KU, seasonal pan, in waterlogged clay, rare, 27-2-1984 (–AD), *Zambatis 1636* (PRE), 2531 (Komatipoort): Kruger National Park, Klapalankwenya, pools in rock sheets, 700 m, 25-2-1954; (–AB), *Van der Schijff 3057* (KNP, PRE); Kruger National Park, Klapalankwenya, in water, 1 350 m, 8-1-1955, *Van der Schijff 4181* (KNP, PRE); Kruger National Park, no precise locality given, 3-1960, *Brnard & Pienaar 4472* (KNP).

SWAZILAND.—2631 (Mbabane): Mlawula Nature Reserve, below dam at rhino pools, in water, aquatic, 229 m, 16-3-1987 (–BD), *Alward 91* (PRE), 2632 (Bela Vista): Lubombo Mountains, W of Umbeluzi Poort and S of Mlawula Station, Farm Mlawula, pool below airstrip, on Nkumbane Stream near junction with Mlawula River, in deep still pool, in shallow water, 170 m, 22-5-1976 (–AA), *Culverwell 94* (PRE).

The capsules are typical of *Nesaea*, though in many respects the species resembles *Ammannia baccifera* or *A. senegalensis*. It can be distinguished from these, however, by the longer styles, the presence of pink petals and the 8, not 4 stamens.

The species is named after Mr N Zambatis who has done much collecting in the Transvaal Lowveld, including one of the quoted specimens of this new species.

2.25 *N. schinzii* Koehne in Verhandlungen des Botanischen Vereins der Provinz Brandenburg 30: 250 (1888); Koehne: 239 (1903); Pohnert & Roessler: 7 (1966); Fernandes: 186 (1970); Fernandes: 292 (1978). Type: Cape Province, Upington, Oshando, March 1886, *Schinz 517* (BOL!).

N. schinzii var. *fleckii* Koehne: 409 (1895). Type: Namibia, Hereroland, Gansberg, *Fleck 231a* (not seen).

N. schinzii var. *rehmannii* Koehne: 151 (1895); Burt Davy: 199 (1926); Fernandes: 186 (1970). Syntypes: Transvaal, near Trichardtsfontein, highveld, *Rehmann 6679*; Transvaal, Bronkhorstspuit, *Rehmann 6567*; Transvaal, Pretoria, *Rehmann 4749* (BOL!).

N. kuntzei Koehne in Kuntze: 97 (1898b); Koehne: 167 (1900a); Koehne: 69 (1902); Koehne: 238 (1903). Holotype: Natal, Ladysmith, 1 100 m, *Kuntze 31*; Natal, Ladysmith, 1 100 m, *Kuntze 32* (NY; photo. in BOL!; scrap and photo. in PRE!).

Lythrum rivulare Wood & Evans ex Wood: 12 (1901a); Wood & Evans: 172 (1901b). *N. rivularis* (Wood & Evans ex Wood) Koehne: 68 (1902); Koehne: 238 (1903). Type: Natal, Zululand, near Tugela River, *Wylie sub Wood 5689* (NH!).

This very common species, probably the most common one of the genus in southern Africa, is distributed over Namibia, NW Botswana, the Transvaal and the E OFS. It has been seen by the author from Zimbabwe, and by other authors from Angola and tropical east Africa as far north as Zaïre and Kenya. It grows in damp open grassveld.

The species has a stout woody taproot that produces annual shoots, and which probably enables the plants to survive grass fires. *N. schinzii* may be confused with *N. luederitzii* in the Namibian region. It is, however, rather rare in Namibia and can be distinguished by the trimorphic flowers. Also the styles of the long-styled (pin) flowers are shorter than the styles of flowers of *N. luederitzii*, and proportions of the short to the long stamens in one flower are different (see key to species).

N. schinzii may also sometimes be confused with *N. sagittifolia* as these two species are closely related, and their distributions overlap in the Transvaal and OFS. The following distinguishing characters are considered most reliable and easy to use:

<i>N. sagittifolia</i>	<i>N. schinzii</i>
Stems terete	Stems quadrangular
Leaves spiral	Leaves usually opposite, sometimes spiral
Leaves sessile, imbricate, except in var. <i>ericiformis</i>	Leaves shortly petiolate, spreading
Leaves with sagittate clasping bases except in var. <i>ericiformis</i>	Leaves with base hastate to cuneate, not clasping stem

A scrap of the type specimen of *N. kuntzei* is in PRE. The only significant difference seen between it and specimens of *N. schinzii* with mid-styled flowers is the four rather than eight stamens; this is also the only difference given by Koehne (1903) in his key. All other differences seen are differences only of size. I consider it to be very probably a depauperate specimen of *N. schinzii* with mid-styled flowers. The reduction in number of stamens may also be due to the depauperate state. The gynoeceium is definitely that of a *Nesaea*.

N. rivulare also had four stamens in Koehne's account: otherwise there seems to be no fundamental difference between it and *N. schinzii*. According to Koehne it is differentiated from *N. woodii* by the much longer leaves.

The type of *Nesaea schinzii* var. *fleckii* was not seen, but on the basis of the description I consider it a synonym of *N. schinzii*.

2.26 *N. sagittifolia* (Sond.) Koehne in Botanische Jahrbücher 3: 339 (1882); Koehne: 240 (1903); Burt Davy:

199 (1926). Type: Transvaal, boggy places near Magaliesberg, *Zeyher 543* (BM, lecto. fide Panigrahi (1976); D, K, S!).

Lythrum sagittifolium Sond.: 41 (1850); Sond.: 516 (1868).

This attractive species appears to be endemic to the eastern part of South Africa. Two varieties and two forms are recognized:

- la Calyx 3–4 mm long; inflorescence usually subsessile
 2.26a. *N. sagittifolia* var. *sagittifolia*
 lb Calyx 1–2 mm long; inflorescence subsessile or pedunculate:
 2a Leaves erect and imbricate, sometimes spreading, rather narrower than usual for the species; pedicels and primary peduncles less than 2 mm long; Swaziland with one record from Barberton (E Transvaal)
 .. 2.26ba. *N. sagittifolia* var. *ericiformis* forma *swaziensis*
 2b Leaves spreading, small; whole plant wiry and much-branched; primary peduncles and pedicels 2–3 mm long; East Griqualand, E Cape, Transkei, and Natal
 .. 2.26bb. *N. sagittifolia* var. *ericiformis* forma *ericiformis*

2.26a var. *sagittifolia*

Koehne: 152 (1895a); Koehne: 240 (1903).

Nesaea sagittifolia var. *glabrescens* Koehne: 152 (1895); Koehne: 240 (1903); Burt Davy: 199 (1926). Type: Transvaal, near Standerton, highveld, *Rehmann 6796* (Z!).

Nesaea sagittifolia var. *salicarioides* Koehne: 152 (1895); Koehne: 241 (1903); Burt Davy: 199 (1926). Type: Natal, *Schulze 1887-40* (not seen).

The typical variety occurs in the Transvaal, Natal and E OFS. It is found growing in damp open grassveld.

Like *N. schinzii*, it has a stout woody taproot which produces annual shoots, and which is important in enabling the plants to survive grass fires.

Koehne described a number of varieties of *N. sagittifolia*, but I have maintained only var. *ericiformis*. The calyx of the type specimen of *N. sagittifolia* var. *glabrescens* is ± 3 mm long. Although the leaves are clearly of the *sagittifolia* type, on the young stems they are spreading and not at all imbricate, and are often flat with less deeply sagittate bases, as is found in var. *ericiformis*. However, the large calyces as well as the distribution, distinguish it from that variety.

2.26b var. *ericiformis* Koehne in Botanische Jahrbücher 22: 152 (1895); Koehne: 241 (1903); Burt Davy: 199 (1926). Type: Natal, Pietermaritzburg, *Rehmann 7599* (Z!).

Var. *ericiformis* occurs in two separate areas: Swaziland, with one record from Barberton; and E Griqualand, Transkei and the E Cape, with one record from the Natal midlands (the type specimen).

The populations from these areas are morphologically partly distinct, though the distinction between the two forms is not clearcut. The type of the variety, for instance, matches some aspects of each. Differences can be seen in the leaves, primary peduncles and pedicels. Neither of these forms can be hybrids of *N. sagittifolia* with *N. schinzii*, though they do resemble the latter species in many

respects, as *N. schinzii* does not occur in these areas. The typical variety also is absent from these areas, with the exception of Barberton.

2.26bb forma *ericiformis*

Stems slender and wiry. *Leaves* spreading, 7.0–12.0 × 1.5–2.5 mm. *Inflorescence*: primary peduncle 1.0–2.5 mm long, pedicel 1.0–2.5 mm long. *Calyx* glabrous or minutely puberulous on ribs and at apices on calyx-lobes, 1.5–2.0 mm long. *Petals* 1.5–3.0 mm long, pink. *Thrum flowers*: filaments 3.0–5.0 and 2.0 mm; style 0.7–1.0 mm. *Mid-style flowers*: filaments 4 and 2.0–2.5 mm; style 3.0–3.5 mm. *Pin flowers*: filaments 4.0–5.5 and 1.5 mm; style 5.0–5.5 mm. Otherwise as for forma *swaziensis*.

Occurs in E Cape, E Griqualand, Natal and the Transkei. It grows in damp places in the mountains.

Occasionally a plant of var. *sagittifolia* will be found having 1 or 2 weak side branches showing the slender stems and loosely arranged leaves typical of var. *ericiformis* forma *ericiformis*. They can easily be distinguished, however, by the difference in flower size, and by the fact that the stems and leaves of forma *ericiformis* are consistently as given in the description.

2.26ba forma *swaziensis* *Immelman*, forma nov., formae *ericiformae* simillima, sed foliis erectis imbricatis, pedunculis et pedicellis brevioribus differt.

Similar to forma *ericiformis* but differs in the erect imbricate leaves and shorter peduncles and pedicels.

TYPE. — Swaziland, 2631 (Mbabane): Manzini District, Mpisi Government Farm, swamp, 500 m, 22-6-1962 (–BC), *Karsten s.n.* (49640 in PRE, holo.; NBG, iso.).

Stems slender, often wiry, may be minutely striate under the microscope, hairs dense and retrorse. *Leaves* may be spreading near base of branches, otherwise imbricate, hairs dense, 7.0–12.0 × 1.5–2.5 mm. *Inflorescence*: primary peduncle 1.5 mm long, pedicels ± 1.0 mm long. *Bracts* puberulous, lanceolate, 0.7–1.5 × 0.2–0.4 mm. *Calyx* usually glabrous, sometimes minutely puberulous on ribs and at apices of calyx-lobes, rarely hirsute, 1.5–2.0 mm long. *Petals* 1.5–3.0 mm long, pink or magenta. *Thrum flowers*: filaments 4.5–6.0 and 2.0–3.5 mm; style 1 mm. *Mid-style flowers*: 5.5 and 1.5 mm; style 4 mm. *Pin flowers*: filaments 5.0–5.5 and 2.0 mm; style 5.5–6.5 mm.

Occurs in SE Transvaal and Swaziland. It grows in vleis and damp places in open grassveld.

TRANSSVAAL. — 2531 (Komatipoort): Barberton, Concession Creek, 830 m, 18-1-1891 (–CC), *Galpin 1273* (PRE).

SWAZILAND. — 2630 (Carolina): Mbabane District, Little Usutu Valley, swamp, 10-4-1955, (–AC CB) *Compton 25099* (NBG, PRE); Mbabane District, Little Usutu River, swamp, ± 1 000 m, 10-3-1961, *Compton 30583* (NBG). 2631 (Mbabane): Mbabane District, Kirkhill, moist ground, 1 170 m, 9-3-1956 (–AC), *Compton 25753* (NBG, PRE).

2.27 *N. drummondii* *A. Fernandes* in *Boletim Sociedade Broteriana* 48: 124, t. 10 (1974); *Fernandes*: 304 (1978). Type: Botswana, Namibian border, 16 km west of Knau Knau, Chadum Valley, wetter patch in flat valley-bottom, 14-3-1965, *Wild & Drummond 7019* (SRGH, holo.!, COI, K!).

The species is distributed from central to N Namibia, Botswana, N Transvaal and N Cape. It has been seen by the author from Zimbabwe and is also recorded from Mozambique (*Fernandes* 1978). It grows near water, on dam margins and moist areas in grassveld.

Species incertae sedis:

Ammannia crassissima *Koehne* in *Botanische Jahrbücher* 4: 391 (1883); *Koehne*: 53 (1903); *Burt Davy*: 198 (1926). Type: S Abyssinia, Delhi-Dikeno, collector unknown (B[†]). *Burt Davy's* concept of the name could fit *A. baccifera*. Type not seen.

Ammannia multiflora *Roxb.* in *Carey, Flora Indica* 1: 447 (1820), non *Fernandes & Diniz* (1956); *DC.*: 79 (1828); *Koehne*: 247 (1880); *Pohnert & Roessler*: 3 (1966). *A. senegalensis* forma *multiflora* (*Roxb.*) *Hiern*: 477 (1871). *A. senegalensis* var. *multiflora* (*Roxb.*) *Koehne*: 48 (1903). Type: open lands around Calcutta, *Roxburgh s.n.*, two specimens from Herbs. *Forsyth* and *Röttler* respectively (K!). The type could not be matched with any species of *Ammannia* or *Nesaea* in the FSA region, and it seems probable that *Pohnert & Roessler* misapplied the name.

ACKNOWLEDGEMENTS

I thank Dr Taciana B. Cavalcanti of the University of São Paulo in Brazil and Dr Shirley A. Graham of the Kent State University in Ohio, for critically reading the MS; and Mr G.B. Deall and Mr M. Panagos, who gave much help in making DECORANA work and in interpreting the results.

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