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CHROMOSOME NUMBERS OF SOME SOUTHERN AFRICAN RUBIACEAE-RUBIEAE

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Abstract

New chromosome determinations are published for Galium thunbergianum ECKL. & ZEYH. var. thunbergianum (n = 11, 2n = 22; diploid) and var. hirsutum (SOND.) VERDC. (n = 11, 2n = 22; diploid), G. capense THUNB. ssp. garipense (SOND.) PUFF (n = 11, 2n = 22; diploid), G. spurium L. ssp. africanum VERDC. (n = 20, 2n = 40; tetraploid), Rubia cordifolia L. ssp. conotricha (GANDOGER) VERDC. (n = 11, 2n = 22; diploid), and R. horrida (THUNB.) PUFF (n = 11, 2n = 22; diploid). The previously published chromosome number of G. tomentosum (n = 22, 2n = 44; tetraploid) is confirmed by additional counts. The chromosome numbers of each taxon are shortly discussed.

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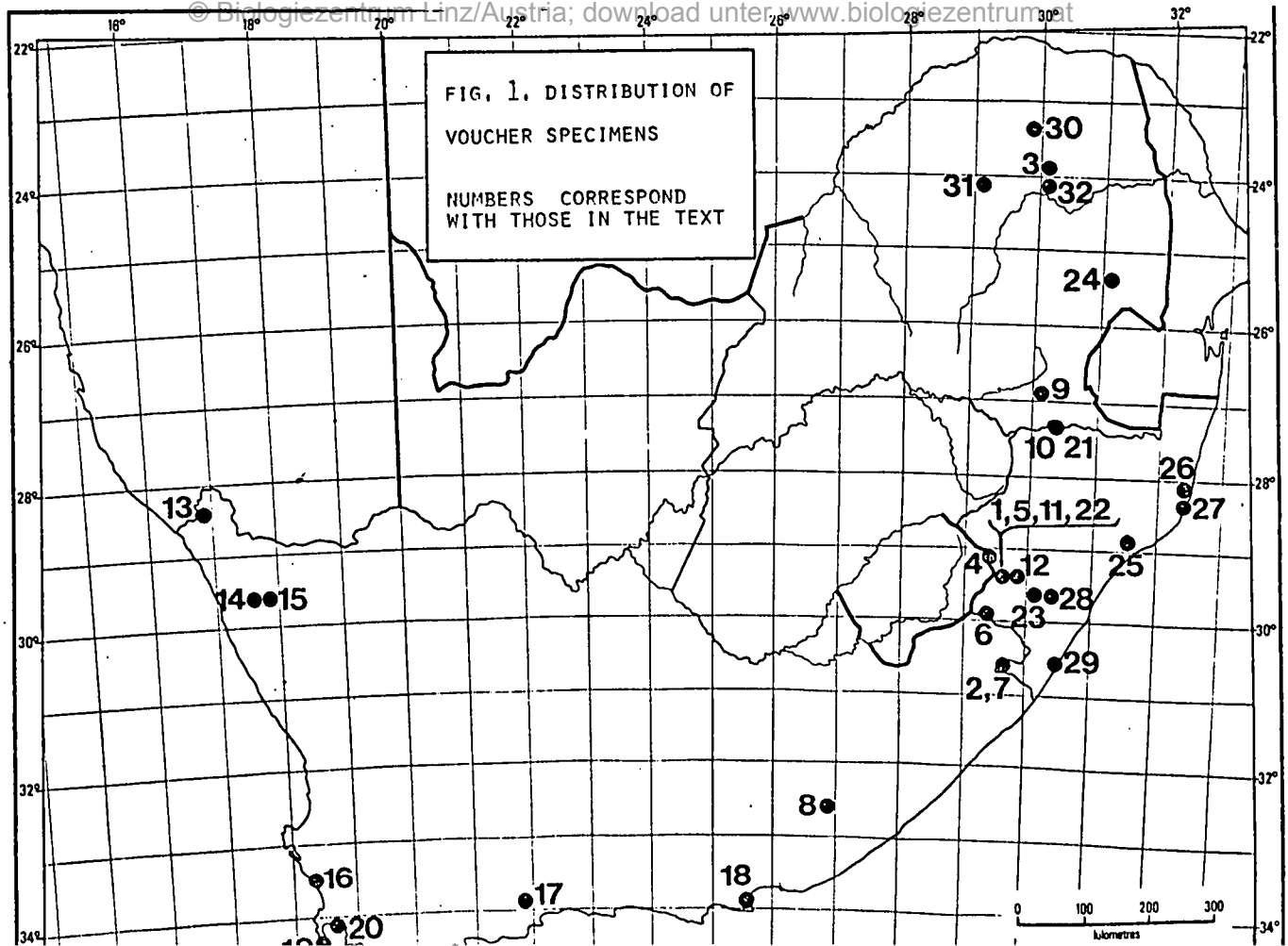

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While in Southern Africa between March 1976 and February 1977 I was able to collect and fix a considerable amount of material of Galium and Rubia, which (with one exception) has never before been investigated karyologically. So far, chromosome numbers[1] have been determined for 5 taxa of Galium and 2 taxa of Rubia:

Galium thunbergianum ECKL. & ZEYH. var. thunbergianum

NATAL:

1 2929[2] (Underberg)[2]: Farm 'Allandale', adjacent to Kamberg Nature Reserve, ca. 2100 m (-BC)[2], Puff 761220-2/1 (WU) .. n=11, 2n=22 3[3]

2 3029 (Kokstad): Weza, Zuurberg, nr. Transkei border (-DA), Puff 760509-4/5 (WU) ..... 2n=22 2

G. thunbergianum ECKL. & ZEYH. var. hirsutum (SOND.)VERDC.

TRANSVAAL:

3 2330 (Tzaneen): Wolkberg Bosreserwe, path from the Wolkberg to the 'Knuckles' (-CC), Puff 770109-2/3 (WU) ..... n=11 3

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1) Materials and methods used for the karyological investigations are the same as those described in PUFF (1976). Voucher specimens are lodged at the herbarium of the Institute of Botany, Univ. of Vienna (WU) and- in part- also at the herbarium of the Dept. of Botany, Univ. of Natal, Pietermaritzburg, S. Africa (NU).

2) Degree reference system as outlined by EDWARDS and LEISTNER (1971); for greater accuracy quarter-degree references are given.

3) Number of individuals investigated.

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NATAL:

4[1]	2929 (Underberg): Giant's Castle Game Reserve, near 'Barnes Shelter' (-AB), Puff 761221-1/2 (WU)	n=11	2n=22	5
4[1]	-: Cathedral Peak Forest Reserve, catchment 9, ca. 1800-2000 m (-AB), Puff 760314-2/1 (WU)		2n=22	2
5	-: Farm 'Allandale', adjacent to Kamberg Nature Reserve, ca. 1900-2000 m (-BC), Puff 761220-1/1 (WU)	n=11	2n=22	6
5	-: Game Pass Farm, Gladstone's Nose ridge, at 'Game Pass' Bushmen shelter, ca. 1800 m (-BC), Puff 760418-1/5 (NU, WU)		2n=22	4
6	-: Coleford Nature Reserve, 'Sunnyside Cottage', (-CD), Puff 761225-1/1 (WU)	n=11		3
7	3029 (Kokstad): Weza, Zuurberg, near Transkei border (-DA), Puff 760509-1/7 (NU, WU)		2n=22	6

CAPE:

8	3226 (Fort Beaufort): Keiskammahoek-Hogsback rd., ca. 2 miles from Hogsback village (-DB), Puff 760904-1/1 (WU)	n=11		3

The South African material of G. thunbergianum has the same chromosome number as its extra-African close ally G. rotundifolium L. G. thunbergianum, however, is widely distributed in Africa and very polymorphic. It therefore remains to be seen whether specimens from tropical Africa (no counts known so far) also have n=11.

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[1] Two or more localities from within the same quarter-degree have been given one number only!

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G. capense THUNB. ssp. garipense (SOND.) PUFF (= G. garipense SOND.)

TRANSVAAL:

9 2630 (Carolina): Ca. 21 miles E of Amersfoort on Piet Retief rd. (-CC), Puff 770103-1/1 (NU, WU) ..... n=11 2n=22 7

10 2730 (Vryheid): Farm 'Oshoek' near Wakkerstroom, ca. 2000 m (-AC), Puff 770102-1/1 (NU, WU) ..... n=11 2n=22 6

NATAL:

11 2929 (Underberg): Kamberg Nature Reserve, Stillerust Vlei (-BC), Puff 761218-1/1 (WU) ..... n=11 3

11 Puff 761218-2/1 (WU) ..... n=11 2n=22 3

12 -: Kamberg (-BD), Puff 761219-1/2 (NU, WU) ..... n=11 2n=22 5

12 Puff 761219-2/1a (WU) n=11 2

12 Puff 761219-3/2 (NU, WU) ..... n=11 2n=22 4

G. garipense SOND. (better considered a subspecies of G. capense, as it is not morphologically distinct from the latter: PUFF, under preparation) is endemic to South Africa (E. Cape Prov., Drakensberg area, Transvaal). At present it, unfortunately, is not known whether its close S. African allies G. capense (ssp. capense), G. wittbergense SOND., and G. namaquense ECKL. & ZEYH. (all in habit very similar to the North hemispherical G. verum L. s.l.) also are diploid with n=11.

G. tomentosum THUNB.

CAPE:

13 2816 (Oranjemund): Koeboes-Grootderm road, ca. 7-10 miles from Koeboes (-BD), Puff 760911-1/1 (WU) ..... 2n=44 3

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14	2917 (Springbok): Springbok-Kleinsee road, ca. 1 mile from turn-off to Komaggas, near Buffelsrivier (-DA), Puff 760912-1/1 (NU, WU)	n=22	2n=44	6
14	-: Spektakelbergpas, ca. 8 miles from Springbok (-DA), Puff 760912-6/4 (NU, WU)		2n=44	2
15	-: Hester Malan Flower Reserve near Springbok (-DB), Puff 760910-1/1 (NU, WU)	n=22		4
16	3318 (Cape Town): near Darling, ca. 100 m (-AD), Puff 760915-1/1 (NU, WU).	n=22	2n=44	7
17	3321 (Ladismith): Bergkloof, ca. 7 miles from Herbertsdale (-DD), Puff 760922-1/1 (NU, WU)	n=22		4
18	3325 (Port Elizabeth): Uitenhage-Coega road, ca. 1.3 miles from Coega (-DC), Puff 760924-1/1 (NU, WU)	n=22	2n=44	5
19	3418 (Simonstown): Cape of Good Hope Nature Reserve, nr. Cape of Good Hope (-AD), Puff 760917-1/1 (WU)	n=22		2
20	-: Swartklip, ca. 20 m (-BA), Puff 760919-2/14 (NU, WU)		2n=c.44	1

My counts of G. tomentosum confirm FAGERLIND's (1937) determination of 2n=44. His material (origin unknown) was identified as 'G. asperum THUNB.', but there is no reason to believe that he dealt with a different species: the name 'G. asperum' has for a long time been given to male plants of the dioecious G. tomentosum.

G. spurium L. ssp. africanum VERDC.

TRANSVAAL:

21	2730 (Vryheid): Farm 'Oshoek' near Wakkerstroom, ca. 1900 m (-AC), Puff 770102-3/1 (NU, WU)	n=20	2n=40	5

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NATAL:

22 2929 (Underberg): Kamberg Nature Reserve, Gladstone's Nose ridge, ca. 1830 m (-BC), Puff 760418-1/6 (NU, WU) ..... 2n=c.40 2

22 -: Farm 'Game Pass', Gladstone's Nose ridge, next to border to Kamberg Nature Reserve, ca. 1980 m (-BC), Puff 760418-1/1 (NU, WU) ..... n=20 3

22 Puff 760418-1/3 (NU, WU) ..... n=20 2n=40 5

23 2930 (Pietermaritzburg): near Dargle on Lion's River-Dargle road (-CA), Puff 761125-1/1 (WU) ..... n=20 3

The chromosome number of n=20 firmly supports VERDCOURT's (1975) opinion that ssp. africanum is to be grouped with G. spurium L., and not G. aparine L.! G. spurium has a (derived) chromosome base number of x=10, while the base number of G. aparine is x=11 (the most common base number in Galium). Also the subspecies status seems justified: ssp. africanum is tetraploid (n=20), its extra-African counterpart ssp. spurium (n=10) is diploid.

VERDCOURT's (1976, p. 390, footnote) suggestion that ssp. africanum must, after all, be transferred to G. aparine is based on a misunderstanding: a count of material from Jimma/Ethiopia (KRENDL, unpublished) did not, as stated by VERDCOURT, yield 2n=44, but 2n=c.40 (according to KRENDL, personal communication, the fixation was of poor quality so that the exact chromosome number could not be established with certainty).

Rubia cordifolia L. ssp. conotricha (GANDOGER)VERDC.

TRANSVAAL:

24 2531 (Komatipoort): Plaston near White River, Farm 'Cascades' (-AC), Puff 770112-1/1 (WU) ..... n=11 3

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NATAL:

25 2831 (Nkandhla): Zululand: Ngoye Forest (-DC), Puff 770125-2/1 (WU) ..... n=11 2n=22 4

26 2832 (Mtubatuba): Zululand, Hyphaene natalensis-Phoenix reclinata Palm Veld nr. Hluhluwe village (-AB), Puff 760617-5/1 (WU) ..... 2n=c.22 1

27 -: Zululand, sandforest between Lake St. Lucia and Indian Ocean (-AD), Puff 760610-4/4 (WU) ..... 2n=22 3

28 2930 (Pietermaritzburg): Queen Elisabeth Park near Pietermaritzburg (-CB), Puff 760425-1/1 (WU)..... 2n=22 2

29 3030 (Port Shepstone): S. Coast, near mouth of Umzumbe River (-DA), Puff 761216-2/1 (NU, WU) ..... n=11 2n=22 4

R. cordifolia L. is a most complex, highly variable and widely distributed (Asia, Africa) species that is badly in need of a thorough revision. At present it therefore seems most appropriate to follow VERDCOURT's (1975, 1976) suggestion to preliminarily call the African plants ssp. conotricha. The chromosome number of the counted African plants, however, does not differ from that of Asiatic material (HARA and KUROSAWA 1963, HSU 1968, KHOSHOO and BHATIA 1963) and that of garden material with unknown origin (FAGERLIND 1934, HOMEYER 1935). Amongst the karyologically investigated allies of R. cordifolia only R. cordata THUNB. (tropical Asia) is tetraploid (2n=44: FAGERLIND 1934).

R. horrida (THUNB.) PUFF

TRANSVAAL:

30 2329 (Pietersburg): Bush(Thorn)veld between Bandelierkop and Soekmekaar (-BD), Puff 770107-1/10 (WU) ..... n=11 2n=22 5

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31 2429 (Zebediela): Percy Fyfe Nature Reserve (-AA), Puff 770105-1/1 (WU) ..... n=11 3

32 2430 (Pilgrim's Rest): Letaba Forest Reserve, track to Wolkberg Mountain Hut (-AA), Puff 770108-1/1 (WU) ..... n=11 2n=22 7

R. horrida (recently transferred from Galium to Rubia: PUFF 1977) is closely related to both, R. cordifolia (also diploid, see above!) and R. petiolaris DC. (endemic to S. Africa; chromosome number unknown).

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