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Studies in the flora of Yemen. 4. The endemic species

S. A. GABALI

RÉSUMÉ

GABALI, S. A. (1998). Etude sur la flore du Yémen. 4. Les espèces endémiques. *Candollea* 53: 73-92. En anglais, résumés français et anglais.

183 espèces endémiques et semi-endémiques de 94 genres dans 33 familles sont énumérées avec une discussion de l'information disponible sur leur habitat et leur mode de répartition.

ABSTRACT

GABALI, S. A. (1998). Studies in the flora of Yemen. 4. The endemic species. *Candollea* 53: 73-92. In English, French and English abstract.

183 endemic and semi-endemic species belonging to 94 genera from 33 families are listed. Information on their habitats is given, and their distribution patterns are discussed.

KEY-WORDS: Flora – Endemics – Yemen – South-west Arabia.

Introduction

Yemen, in southwestern and southern Arabia, is an extremely arid to semi-arid land with a few sub humid pockets. The terrain varies considerably in latitude between sea-level on the long narrow coastal belt to pediments and foothills (200-500 m altitude) rising into highlands between 1000-2800 m alt., and up to 3000-3700 m in some places. This mountain range extends from north to south and then turns east to merge with the eastern limestone plateau, both are dissected by numerous small and large wadis.

According to WHITE & LEONARD (1991) Yemen – mainly below 1500-1800 m alt – can be regarded, phytogeographically, as an extension of the Somali – Masai floristic region, whereas the higher mountains represent an impoverished outlier of the Afromontane archipelago-like region. The geographical position of Yemen, in addition, brings it into contact with some neighbouring phytogeographical zones, e.g. Nubo-Sindian, Saharo-Arabian and Mediterranean (see WHITE, 1993: map 6). The flora of Yemen has also some interesting disjunctions with, for example, Macaronesia and South Africa.

The flora of Yemen is relatively rich in endemic species compared with other countries in the Arabian peninsula. A recent study analysing patterns of endemism in the Arabian peninsula (MILLER & NYBERG, 1991) found that out of eight local centers of endemism on mainland Arabia, four occur in Yemen. Studies on endemics are important in that they indicate the activity of the processes of speciation and the urgent needs for conservation programmes.

In the present paper, based on an extensive review of literature (GABALI, 1993) and numerous field tours by the author during 1990-1992, the endemic species in Yemen mainland, including those which extend to neighbouring Dhofar and Southern Hijaz, are listed and patterns of

their distribution are discussed. The Socotran Archipelago, which is politically a part of Yemen and has relatively high endemism, is not included in this study.

List of endemic species in Yemen
(excluding Socotra)

Acanthaceae

Anisotes trisulcus (Forssk.) Nees in DC. Prodr. 11: 424 (1847).

Frequent to occasional in all zones, in wadis and on mountain slopes, usually at 500-1500 m alt.; probably extends to southern Hijaz.

Asystasia petalidioides Defl. in Bull. Soc. Bot. France 43: 222 (1896).

Known only from Jabal Al Arays.

Barleria bispinosa (Forssk.) Vahl, Symb. Bot. Upsal. 1: 46 (1790).

Common to occasional in the western and southern highlands on mountain slopes at 1600-1900 m alt.; extends to southern Hijaz.

Barleria farinosa Defl. in Bull. Soc. Bot. France 43: 222 (1896).

Known only from J. Al Arays.

Barleria hillcoatiae J. R. I. Wood in Kew Bull. 38: 123 (1984), and validated in Kew Bull. 41: 222 (1986).

Frequent to occasional in the eastern region from Radaa to Hadramout in degraded bushland, and along drainage lines on rocky plains at 1800-2100 m alt.

Barleria spinifolia J. R. I. Wood in Kew Bull. 39: 125 (1984).

Known only from J. Jihaf near Dhala, ca. 2000 m alt.

Bentia fruticulosa Rolfe in Kew Bull. 1894: 338 (1894).

Occasional in the eastern region, Hadramout at 500-2000 m alt.; extends to Dhofar.

Justicia anisotoides J. R. I. Wood in Kew Bull. 39: 126 (1984).

Rare, north of Ibb, at 1800-2700 m alt.; and known also from one locality in Somalia?

Ruellia longicalyx Defl. in Bull. Soc. Bot. France 43: 219 (1896).

A little known plant from Surriya near J. Al Arays.

Agavaceae

Dracaena serrulata Baker in Kew Bull. 1894: 342 (1894).

Scattered colonies in Hadramout, and appears also in the drier parts of the southern highlands; extends to Dhofar and southern Hijaz.

Aizoaceae

Delosperma harazianum (Defl.) Popp & Ihl. in Mitt. Inst. Allg. Bot. Hamburg 16: 184 (1978).

Frequent to occasional in the western and southern highlands at 200 m to above 3000 m alt.

Amaranthaceae

Saltia papposa (Forssk.) Moq. in DC. Prodr. 13(2): 325 (1849).

Occasional in the western and southern coastal plains, foothills and highlands at 100-1200(-1500) m alt.

Amaryllidaceae

Crinum yemense Defl., Voy. Yemen 209 (1889).

Frequent in the eastern and northern highlands at 2300-3000 m alt., and probably extends to southern highlands.

Araceae

Arisaema bottae Schott, Prodr. Syst. Aroidearum 42 (1860).

Occasional in the southern and eastern highlands; extends to southern Hijaz.

Asclepiadaceae

Caralluma adenensis (Defl.) A. Berger, Stapelieen & Kleinien 79 (1910).

Occasional to rare in the southern foothills and highlands, on limestone and igneous rocks at 500-1000 m alt.

Caralluma awdeliana (Defl.) A. Berger, Stapelieen & Kleinien 81 (1910).

Occasional in the southern foothills and highlands at 500-1000 m alt.; extends to Dhofar.

Caralluma chrysostephana (Defl.) A. Berger, Stapelieen & Kleinien 115 (1910).

Occasional in the southern foothills and highlands at 500-1500 m alt., and also on J. Al Arays.

Caralluma cicatricosa (Defl.) N. E. Br. in Gard. Chron. ser. 12: 369 (1892).

Frequent to occasional in the western and southern highlands from Manakha south to Taiz, at 1500-2300 m alt., sometimes on lower altitudes.

Caralluma deflersiana Lavr. in J. S. African Bot. 29: 103 (1963).

Frequent to occasional on sandy plains near Lodar and in Dhala, at 500-1500 m alt.

Caralluma flava N. E. Br. in Kew Bull. 1894: 335 (1894).

Frequent to occasional in the eastern region, Hadramout, at 600-1500 m alt.; extends to Oman.

Caralluma foulcherii-delboscii Lavr. in J. S. African Bot. 30: 21 (1964).

Locally abundant in Hadramout, on rocky slopes at 1500-1900 m alt.; known also from Mukairas at 2100 m alt.

Caralluma hexagona Lavr. in J. S. African Bot. 29: 105 (1963).

Rare in Mukairas, on bare rocky hill at 2250 m alt.; variety *septentrionalis* Lavr. & Newton in Cact. Succ. J. Amer. 51: 233 (1979) is quite common north and north-east of Sanaa.

Caralluma kalmbacheriana Lavr. in Cact. Succ. J., Los Angeles 37: 110 (1965).

Isolated individuals in Hadramout – Mola Matar at 1600-1800 m alt.

Caralluma lavranii Rauh & Wertel in Kakt. Sukk. 16: 62 (1965).

Occasional to rare in the eastern region at 500-1000 m alt.

Caralluma luntii N. E. Br. in Kew Bull. 1894: 335 (1894).

Rare in Hadramout at 1200 m alt.; extends to Dhofar.

Caralluma petraea Lavr. in Cact. Succ. J., Los Angeles 55: 23 (1983).

Originally described from southern Hijaz; common in the north and north-east of Sanaa, on limestone and volcanic rocks.

Caralluma plicatiloba Lavr. in J. S. African Bot. 28: 211 (1962).

Rare in Mukairas, among boulders at 2100 m alt.

Caralluma quadrangula (Forssk.) N. E. Br. in Gard. Chron. ser. 3, 12: 369 (1892).

Common to occasional in many zones, among boulders and on steep slopes at 1200-2700 m alt.; extends to Dhofar and southern Hijaz.

Caralluma rauhii Lavr. in Cact. Succ. J., Los Angeles 37: 106 (1965).

Locally frequent in Hadramout at 300-1000 m alt. on limestone.

Caralluma shadhbana Lavr. in Fl. Pl. Africa 44: t. 1743 (1977).

Occasional in Hadramout at ca. 1300 m alt.; variety *barhana* Lavr. & Newton in Cact. Suc. J., Los Angeles 51: 233 (1979) is known from Al Barh on Taiz-Mokha road at ca. 500 m alt.

Caralluma solenophora Lavr. in J. S. African Bot. 29: 207 (1963).

Occasional to rare, Lodar and Mukairas at 900-2100 m alt. on rocky ground.

Caralluma subulata (Forssk.) Decne. in Ann. Sci. Nat. Bot. ser. 2, 9: 267 (1838).

Occasional in the western and southern coastal plains, foothills and highlands at 200-1500 m alt., and probably extends to Hadramout.

Ceropegia arabica H. Huber in Mem. Soc. Brot. 12: 138 (1957).

Frequent in the western and southern highlands at 700-1900 m alt.; extends to southern Hijaz.

Ceropegia foliosa Bruyns in Notes Roy. Bot. Gard. Edinburgh 45: 293 (1988).

Occasional to rare in the southern and western highlands at 1500-1900 m alt.

Ceropegia rupicola Defl., Voy. Yemen 167 (1889).

Frequent to occasional in the western and southern highlands at 1500-2000 m alt.

Ceropegia sepium Defl., Voy. Yemen 167 (1889).

Occasional to rare in the western and southern highlands at 1900-2400 m alt.

Duvalia anemoniflora (Defl.) Dyer & Lavr.?

See Flow. Pl. Afr. 41: t. 1734 (1977).

Duvalia velutina Lavr. in Cact. Succ. J., Los Angeles 55: 24 (1983).

Originally described from southern Hijaz; known also from the neighbouring parts of the western coastal plains in Yemen.

Echidnopsis seibanica Lavr. in J. S. African Bot. 30: 88 (1964).

Locally abundant in Hadramout-Mola Matar at the foot of Kor Seiban, ca. 1800 m alt. on limestone.

Echidnopsis squamulata (Decne.) Bally in Kakt. Sukk. 14: 173 (1963).

Occasional in the southern highlands, near Taiz and Dhala, on basalt at ca. 1500 m alt.

Huernia hadramautica Lavr. in J. S. African Bot. 29: 99 (1963).

Rare in Hadramout, rocky ravines in Mola Matar at ca. 1800 m alt., among limestone boulders.

Huernia laevis J. R. I. Wood in Kew Bull. 39: 128 (1984).

Occasional, restricted to Khawlan Ash Sham, on granitic cliffs at 1500-2500 m alt.

Huernia lodarensis Lavr. in J. S. African Bot. 30: 87 (1964).

Occasional on sandy plains near Lodar, ca. 900 m alt.

Huernia marnieriana Lavr. in J. S. African Bot. 29: 97 (1963).

Isolated individuals on steep rocky slopes near Mukairas at 2050 m alt., and in Aqabat Thira above Lodar.

Rhytidocaulon macrolobum Lavr. in Cact. Succ. J., Los Angeles 39: 3 (1967).

Rare near Lodar, on stony flats at 1000 m alt.

Sarcostemma stipitaceum (Forssk.) R. Br. in Mem. Wern. Nat. Hist. Soc. 1: 50 (1809).

Occasional in the western and southern foothills and highlands at 500-1500 m alt.

Sarcostemma vanlessenii Lavr. in Natl. Cact. & Succ. J. 29: 35 (1979).

Rare in Mukairas at 2250 m alt., also known from one locality near Sanaa.

Stultitia araysiana Lavr. & Bilaidi in Cact. Succ. J., Los Angeles 43: 207 (1971).

Known only from J. Al Arays at ca. 850 m alt.

Boraginaceae

Cynoglossum bottae Defl., Voy. Yemen 173 (1889).

Occasional to frequent in the eastern and northern highlands at 2400-2800 m alt.; extends to southern Hijaz.

Cystostemon kissenioides (Defl.) A. G. Miller & Riedel in Notes Roy. Bot. Gard. Edinburgh 40: 5 (1983).

Known only from J. Al Arays at 500-600 m alt.

Echiochilon arabicum (O. Schwartz) I. M. Johnston in J. Arnold Arbor. 38: 289 (1967).

Hadramout.

Heliotropium azzanum O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 208 (1939).

Occasional in the southern coastal plains and foothills; extends to Dhofar.

Heliotropium fartakense O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 207 (1939).

Rare in Hadramout coast; extends to Dhofar.

Burseraceae

Commiphora kataf (Forssk.) Engl. in DC., Monogr. Phanerog. 4: 19 (1883).

Frequent in the western foothills and highlands, on slopes at 500-1000 m alt.

Capparidaceae

Boscia arabica Pestal. in Bull. Herb. Boissier 6, App. 3: 127 (1898).

Occasional to rare in the southern coastal plains and foothills, J. Al Arays east to Hadramout coast and foothills; extends to Dhofar.

Cleome brachydenia O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 62 (1939).

Frequent in Hadramout.

Cleome drepanocarpa O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 62 (1939).

Rare in Hadramout coast.

Cleome macradenia Schweinf. in Bull. Herb. Boissier 4, App. 2: 188 (1896).

Frequent in Hadramout coast.

Cleome pruinosa T. Anders. in Fl. Aden 3 (1860).

Rare in the southern coast and in Hadramout; extends to Dhofar.

Caryophyllaceae

Dianthus uniflorus Forssk., Fl. Aegypt.-Arab. CXI & 284 (1775).

Common in the northern highlands, on alpine pastures and meadows at 2300-2800 m alt. and above; extends to southern Hijaz.

Saponaria umbricola J. R. I. Wood in Kew Bull. 39: 130 (1984).

Frequent in the western highlands in shaded and moist places at 1800-2800 m alt., and appears also in the northern highlands; extends to southern Hijaz.

Xerotia arabica Oliv. in Hook., Icon. Pl. ser. 4, 24: t. 2359 (1895).

Rare in Hadramout coast and foothills; extends to Oman?

Celastraceae

Maytenus forskaoliana Sebsebe in Symb. Bot. Upsal. 25, 2: 67 (1985).

Occasional in the western, southern and northern highlands, on rocky hillsides and along wadis at 350-1650 m alt.

Combretaceae

Anogeissus bentii Baker in Kew Bull. 1894: 332 (1894).

Occasional to frequent in Hadramout, in the wadis.

Commelinaceae

Aneilema forskaolei Kunth, Enum. Pl. 4: 71 (1843).

Known from J. Raymah in the western highlands; extends to Dhofar.

Compositae

Anthemis yemensis Podl. in Mitt. Bot. Staatssamml. München 18: 427 (1982).

Rare in the northern highlands at ca. 2500 m alt.

Atractylis kentrophyloides (Baker) F. G. Davies in Kew Bull. 36: 142 (1981).

Frequent to occasional in the eastern region from Radaa to Hadramout; extends to Dhofar.

Atractylis yemensis Podl. in Mitt. Bot. Staatssamml. München 18: 428 (1982).

Occasional to rare in the northern highlands at 2300-2500 m alt.

Blepharispermum yemense Defl. in Bull. Soc. Bot. France 43: 105 (1896).

Rare in the southern foothills and highlands.

Centaurea schimperi DC., Prodr. 6: 596 (1838).

Rare in the northern highlands, on sandstone rocks; extends to southern Hijaz.

Centaurea yemensis Wag. in Notes Roy. Bot. Gard. Edinburgh 41: 457 (1984).

Frequent in Hojariyah in the southern highlands, on earth banks and around fields as well as on stony slopes, ca. 2000 m alt.

Centaurothamnus maximus (Forssk.) Wag. & Ditt. in Candollea 37: 111 (1982).

Occasional in the northern, western and southern highlands at 1500-3000 m alt.; extends to southern Hijaz.

Cichorium bottae Defl., Voy. Yemen 159 (1889).

Frequent to occasional in the northern highlands, on rocky slopes and volcanic deposits, and in alpine pastures at 2500-3300 m alt.; extends to southern Hijaz.

Helichrysum arwae J. R. I. Wood in Kew Bull. 39: 312 (1984).

Rare, known only from Jibla near Ibb in the southern highlands, on basaltic cliffs and sub-vertical slopes at 2900-3200 m alt.

Iphionia anthemidifolia (Baker) A. Anderb. in Nordic J. Bot. 5: 186 (1985).

Occasional in Hadramout at 300-1000 m alt.

Iphionia senecionoides (Baker) A. Anderb. in Nordic J. Bot. 5: 177 (1985).

Occasional in Hadramout; extends to Dhofar.

Kleinia deflersii (O. Schwartz) P. Halliday in Kew Bull. 39: 318 (1984).

Known only from J. Al Arays.

Macowania ericifolia (Forssk.) B. L. Burt & Grau in Notes Roy. Bot. Gard. Edinburgh 31: 376 (1972).

Frequent to occasional in the western and northern highlands at 2800-3000 m alt.

Onopordon arabicum Podl. in Mitt. Bot. Staatssamml. München 18: 432 (1982).

Rare in the southern highlands, near Dhamar at ca. 2400 m alt.

Phagnalon harazianum Defl., Voy. Yemen 150 (1889).

Frequent in the western, northern and southern highlands, on rocky hillsides and terrace walls at 2100-3000 m alt.

Phagnalon retecta Qaiser & Lack in Wildenowia 15: 8 (1985).

Rare in the western highlands, known only from Manakha, on rocky slopes and terrace walls at ca. 2500 m alt.

Phagnalon woodii Qaiser & Lack in Wildenowia 15: 6 (1985).

Frequent in the western, northern and southern highlands in rock crevices and on terrace walls at 2500-3000 m alt.

Phagnalon yerrimense Qaiser & Lack in Wildenowia 15: 17 (1985).

Rare in the southern highlands, known only from Yerrim.

Pluchea arabica (Boiss.) Qaiser & Lack in Wildenowia 15: 451 (1986).

Frequent to occasional in the southern coast and known also from Hadramout; extends to Dhofar.

Pulicaria cylindrica (Baker) O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 284 (1939).

Occasional in the southern coast and Hadramout coast and foothills.

Pulicaria grandidentata Jaub. & Spach, Ill. Pl. Orient. 4: 71, t. 345 (1852).

Occasional in the western and northern highlands.

Pulicaria lancifolia O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 284 (1939).

Rare in Hadramout coast.

Pulicaria nivea O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 285 (1939).

Rare in Hadramout foothills.

Pulicaria rauhii Gamal-Eldin in Phanerog. Monogr. 14: 206 (1981).

Occasional in Hadramout coast.

Scorzonera yemensis Podl. in Mitt. Bot. Staatssamml. München 18: 437 (1982).

Rare around Sanaa at 2200-2700 m alt.

Senecio asirensis Boulos & J. R. I. Wood in Kew Bull. 38: 491 (1983).

Occasional in the northern highlands at 1800-2200 m alt.; known also from southern Hijaz.

Senecio harazianus Defl., Voy. Yemen 154 (1889).

Occasional in the northern and western highlands at 1000-2800 m alt.

Senecio sumarae Defl., Voy. Yemen 154 (1889).

Known only from J. Sumara, ca. 2500 m alt. in the southern highlands.

Sonchus saudensis Boulos in Arab Gulf J. Sci. Res. 1: 21 (1983).

Occasional in the western and southern highlands, on terrace walls and shaded cliffs; extends to southern Hijaz.

Vernonia areysiana Defl. in Bull. Soc. Bot. France 43: 104 (1896).

Rare, known only from J. Al Arays.

Crassulaceae

Kalanchoe rosulata F. Raadts in Bot. Jahrb. Syst. 91. 480 (1972).

Rare in the southern highlands, near Mukairas at 2100-2300 m alt.

Cruciferae

Farsetia dhofarica Jonsell & A. G. Miller in Symb. Bot. Upsal. 25, 3: 98 (1986).

Rare in Hadramout at 0-900 m alt.; known also from southern Oman.

Euphorbiaceae

Euphorbia fractiflexa S. Carter & J. R. I. Wood in Kew Bull. 37: 75 (1982).

Isolated individuals in the northern part of the western coastal plains, on gravel mounds at 150-500 m alt.; extends to southern Hijaz.

Euphorbia fruticosa Forssk., Fl. Aegypt-Arab. 94 (1775).

Occasional to frequent in the western and northern highlands, on rocky slopes.

Euphorbia inarticulata Schweinf. in Bull Herb. Boissier 7, App. 2: 324 (1899).

Common to frequent in the western coastal plains, foothills and highlands and in the southern highlands, on cliffs, rocky outcrops and around villages, up to ca. 2000 m alt.

Euphorbia meuleniana O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 147 (1939).

Occasional in Hadramout.

Euphorbia parcircramulosa Schweinf. in Bull. Herb. Boissier 7, App. 2: 326 (1899).

Common to occasional in the western and southern highlands at 1000-1500 m alt.

Euphorbia qarad Defl. in Bull. Soc. Bot. France 43: 230 (1896).

Common to frequent in the southern foothills and highlands at 300-1000 m alt.

Euphorbia quaitensis S. Carter in Candollea 43: 564 (1988).

Rare in Hadramout, on calcareous slopes at ca. 1300 m alt.

Euphorbia rubriseminalis S. Carter in Candollea 43: 566 (1988).

Occasional in Hadramout, on stony, sandy ground of calcareous mosaic at 200-1600 m alt.

Euphorbia uzruk S. Carter & J. R. I. Wood in Kew Bull. 37: 73 (1982).

Frequent in the southern highlands, on steep rocky slopes and in gravelly wadis at 800-1300 m alt.

Gramineae

Andropogon crossotos Cope in Kew Bull. 39: 833 (1984).

Occasional in the northern and western highlands, on dry stony hillsides and wadi beds at 1700-2500 m alt.

Festuca cryptantha Cope in Kew Bull. 39: 834 (1984).

Occasional in the northern and southern highlands, on rock ledges and in open moorland at 2800-3600 m alt.

Tripogon oliganthos Cope in Kew Bull. 47: 662 (1992).

Known only from Manakha-J. Shibam in the western highlands, in wet grassland at ca. 2600 m alt.

Labiatae

Becium serpyllifolium (Forssk.) J. R. I. Wood in Kew Bull. 37: 602 (1983).

Frequent in the western and southern highlands, on volcanic rocks at 1500-2700 m alt.

Isoleucas arabica O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 223 (1939).

Rare, a little known species from Mahara coast.

Lavandula citriodora A. G. Miller in Notes Roy. Bot. Gard. Edinburgh 42: 522 (1985).

Frequent to occasional in the northern highlands at 2000-2700 m alt.; extends to southern Hijaz.

Nepeta deflersiana Schweinf. ex Hedge in Notes Roy. Bot. Gard. Edinburgh 40: 65 (1982).

Frequent in the western and southern highlands at 2000-3600 m alt.; extends to southern Hijaz.

Nepeta woodiana Hedge in Notes Roy. Bot. Gard. Edinburgh 40: 67 (1982).

Rare, known only from Ibb in the southern Highlands at 2500-2800 m alt.

Orthosiphon brachystemon Defl. in Bull. Soc. Bot. France 43: 228 (1896).

Rare in the southern foothills and on J. Al Arays.

Plectranthus arabicus E. A. Bruce in Kew Bull. 1935: 324 (1935).

Occasional in the western highlands and further south.

Plectranthus asirensis J. R. I. Wood in Kew Bull. 37: 601 (1983).

Frequent in northern highlands; extends to southern Hijaz.

Plectranthus hyemalis J. R. I. Wood in Kew Bull. 39: 133 (1984).

Locally abundant in the southern highlands at 1000-2000 m alt.

Salvia areysiana Defl. in Bull. Soc. Bot. France 43: 229 (1896).

Rare, a little known species from J. Al Arays.

Stachys yemensis Hedge in Notes Roy. Bot. Gard. Edinburgh 40: 71 (1982).

Occasional in the western, northern and southern highlands at 2000-3100 m alt.

Teucrium eximum O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 219 (1939).

Known only from a single gathering in Hadramout.

Teucrium nummularifolium Baker in Kew Bull, 1895: 185 (1895), incl. ***T. paulayanum*** O. Schwartz

Rare in the Mahra coast; extends to Dhofar.

Teucrium rhodocalyx O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 218 (1939).

Occasional in Hadramout at 1200-2100 m alt.

Teucrium yemense Defl., Voy. Yemen 190 (1889).

Frequent in the western and northern highlands above 1800 m alt.; extends to Dhofar and southern Hijaz.

Thymus laevigatus Vahl, Symb. Bot. Upsal.2: 65 (1791).

Common on mountain tops above 3000 m alt.

Leguminosae

Acacia campoptila Schweinf. in Bull. Herb. Boissier 4, App. 2: 208 (1896).

Occasional to rare in parts of the eastern region at 1000-1900 m alt.

Abrus bottae Defl., Voy. Yemen 132 (1889).

Common to frequent in areas of good rainfall in the western highlands at 500-1600 m alt.; extends to southern Hijaz.

Crotalaria schweinfurthii Defl. in Bull. Soc. Bot. France 32: 348 (1885).

Rare in the southern coast, around Aden.

Crotalaria squamigera Defl., Voy. Yemen 126 (1889).

Occasional to rare in the southern highlands at ca. 1400 m alt.

Ormocarpum yemenense Gillett in Kew Bull. 20: 339 (1966).

Common to frequent in the western foothills and highlands at 400-1600 m alt.

Rhynchosia flava (Forssk.) Thulin in Nordic J. Bot. 1: 37 (1981).

Occasional in the southern highlands at 2000-2800 m alt.; on grassy slopes and between rocks.

Senna hookeriana Batka in Bot. Z. 21: 263 (1863).

Syn.: *Cassia adenensis* Benth.

Occasional in the southern coastal plains and foothills to Hadramout.

Taverniera albida Thulin in Symb. Bot. Upsal. 25: 89 (1985).

Rare, known only from W. Mefaa west of Mukalla.

Taverniera schimperii Jaub. & Spach, Ill. Pl. Orient. 5: 83 (1856).

Occasional to rare, on rocky places and lava, and in wadi beds at 0-600 m alt., mainly around Aden and in Hadramout.

Liliaceae

Aloe abyssicola Lavr. & Bilaidi in Cact. Succ. J., Los Angeles 43: 206 (1971).

Known only from J. Al Arays at ca. 900 m alt.

Aloe castellorum J. R. I. Wood in Kew Bull. 38: 25 (1983).

Frequent in the northern highlands at 1400-2400 m alt.; extends to southern Hijaz.

Aloe doei Lavr. in J. S. African Bot. 31: 163 (1965).

Occasional in the southern highlands at 1100-2250 m alt.

Aloe eremophila Lavr. in J. S. African Bot. 31: 71 (1965).

Isolated individuals in Hadramout at 1300-1900 m alt.

Aloe fleurentinorum Lavr. & Newton in Cact. Succ. J., Los Angeles 49: 113 (1977).

Occasional in the northern highlands at 1500-2000 m alt., on sandstone rocks; extends to southern Hijaz.

Aloe fulleri Lavr. in Cact. Succ. J., Los Angeles 39: 125 (1967).

Locally abundant in scrub-covered sandy plains near Habban, ca. 900 m alt.

Aloe lavranosii Reynolds in J. S. African Bot. 30: 225 (1964).

Locally frequent in Dhala, on basaltic rocks at ca. 13000 m alt.

Aloe menachensis (Schweinf.) Blatter in Rec. Bot. Surv. India 8: 463 (1936).

Known only from a single locality in Haraz in the western highlands.

Aloe niebuhriana Lavr. in J. S. African Bot. 31: 68 (1965).

Frequent in the southern coastal plains and foothills at 100-700 m alt., sometimes at higher altitudes up to 1500 m in the southern highlands near Taiz.

Aloe pendens Forssk., Fl. Aegypt.-Arab. 74 (1775).

Common to frequent on rocky cliffs in the western highlands at 1500-2300 m alt.

Aloe rivierei Lavr. & Newton in Cact. Succ. J., Los Angeles 49: 114 (1977).

Locally abundant between Taiz and Turba in the southern highlands at 1000-2000 m alt., on cliffs and rocky slopes.

Aloe rubroviolacea Schweinf. in Bull. Herb. Boissier 2, App. 2: 71 (1894).

Occasional in the western and southern highlands, on rocky slopes and cliffs at 2500-2900 m alt.; extends to southern Hijaz.

Aloe sabaëa Schweinf. in Bull. Herb. Boissier 2, App. 2: 74 (1894), incl. *A. gillilandii* Reynolds

Common to frequent in the western and southern highlands, on cliffs and steep rocky slopes at 600-1800 m alt., extends to southern Hijaz.

Aloe serriyensis Lavr. in J. S. African Bot. 31: 76 (1965).

Known only from J. Al Arays at ca. 300 m alt.

Aloe splendens Lavr. in J. S. African Bot. 31: 77 (1965).

Known only from Dathina in the southern highlands at ca. 760 m alt.

Aloe tomentosa Defl., Voy. Yemen 211 (1889).

Frequent to occasional in the northern and southern highlands from Sanaa to Taiz at 2400-3800 m alt.

Aloe vacillans Forssk., Fl. Aegypt.-Arab. 74 (1775), incl. *A. dhalensis* Lavr. & *A. audhalica* Lavr.

Frequent to common in the western, northern and southern at 1400-2700 m alt.; extends to southern Hijaz.

Aloe yemenica J. R. I. Wood in Kew Bull. 38: 20 (1983).

Occasional in the western highlands, in the wetter parts on cliffs at 1000-2000 m alt.

Kniphofia sumarae Defl., Voy. Yemen 2109 (1889).

Locally abundant in narrow valleys near Ibb in the southern highlands at 2900-3100 m alt.; occurs also on J. Sabir near Taiz.

Malvaceae

Gossypium areysianum Defl. in Esquisses Géogr. Bot. 49 (1894).

Rare to occasional in the southern foothills.

Gossypium incanum (O. Schwartz) Hillc. in Empire Cotton Growing Rev. 36: 165 (1959).

Rare to occasional in the southern foothills, and known also from Mahra coast.

Pavonia subaphylla O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 161 (1939).

Rare in Hadramout.

Nyctaginaceae

Commicarpus arabicus Meikle in Kew Bull. 32: 474 (1978).

Occasional in western, northern and southern highlands at 2000-2500 m alt.

Primulaceae

Primula verticillata Forssk., Fl. Aegypt.-Arab. 42 (1775).

Scattered damp localities from Hajja south to Mukairas at 2100-2300 m alt.

Resedaceae

Ochradenus spartioides (O. Schwartz) Abdalla in Meded. Landbouwhogeschool (Wageningen) 67, 8: 67 (1967).

Rare in Hadramout, in the wadis.

Reseda sphenocleioides Defl. in Bull. Soc. Bot. France 42: 298 (1895).

Occasional, known from many localities from Aden to Saada; extends to Dhofar.

Rhamnaceae

Ziziphus leucodermis (Baker) O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 152 (1939).

Frequent in Hadramout, on calcareous rocks and in the wadis; extends to Dhofar.

Rubiaceae

Galium yemense Kotschy in Sitzb. Kais. Akad. Wiss. 32: 257 (1866).

Occasional to frequent in the western highlands at 2000-2800 m alt.; extends to southern Hijaz.

Pavetta longiflora Vahl, Symb. Bot. Upsal. 3: 12 (1794).

Common to occasional in the western and southern highlands at 1000-2300 m alt.; extends to Dhofar and southern Hijaz.

Scrophulariaceae

Campylanthus pungens O. Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10: 245 (1939).

Scattered localities in Hadramout at 600-1300 m alt.; extends to Dhofar and southern Hijaz.

Campylanthus yemenensis A. G. Miller in Notes Roy. Bot. Gard. Edinburgh 38: 378 (1980).

Rare, in two localities on Taiz – Mokha road at 100-300 m alt.

Kickxia petiolata D. A. Sutton, Revis. Antirrhineae 244 (1988).

Rare in the southern highlands.

Kickxia sabarum V. W. Sm. & D. A. Sutton, Revis. Antirrhineae 233 (1988).

Occasional to frequent in the northern highlands, 1900-2600 m alt.

Kickxia saccata D. A. Sutton, Revis. Antirrhineae 246 (1988).

Rare in western foothills.

Kickxia scalarum D. A. Sutton, Revis. Antirrhineae 237 (1988).

Occasional in the western highlands at 1200-2600 m alt.

Kickxia spiniflora (O. Schwartz) D. A. Sutton, Revis. Antirrhineae 229 (1988).

Occasional in Hadramout foothills and plateau.

Kickxia woodii D. A. Sutton, Revis. Antirrhineae 239 (1988).

Rare in the southern highlands at 1200-2100 m alt.

Schweinfurthia latifolia Baker ex Oliv. in Hooker's Icon. Pl. 24: t. 2362 (1895).

Occasional to rare in Hadramout, on gravel plains, rocky slopes and sandy wadi beds at 60-900 m alt.

Verbascum luntii Baker in Kew Bull. 1894: 337 (1894).

Rare in Hadramout.

Verbascum yemense Defl., Voy. Yemen 177 (1889).

Occasional around Sanaa in the northern highlands; extends to southern Hijaz.

Umbelliferae

Daucus yemenensis Defl., Voy. Yemen 142 (1889).

Rare in the northern highlands; extends to southern Hijaz?

Peucedanum areysianum Defl. in Bull. Soc. Bot. France 42: 305 (1895).

J. Al Arays at ca. 1200 m alt.

Peucedanum inaccessum Townsend in Kew Bull. 38: 53 (1983).

Locally frequent in the western highlands on grassy slopes at 1600-1900 m alt.

Pimpinella woodii Townsend in Kew Bull. 41: 59 (1986).

Known only from a single locality in the southern highlands – J. Baadan near Ibb at ca. 2700 m alt.

Oreoschimperella arabiae-felicis Townsend in Kew Bull. 41: 456 (1986).

Syn. *Trachyspermum arabiae-felicis* Townsend.

Occasional to rare in the southern highlands; extends to southern Hijaz.

Verbenaceae

Chascanum yemense Sebsebe in Kew Bull. 45: 137 (1990).

Known only from J. Al Arays.

Discussion

The list includes 183 species belonging to 94 genera from 33 families. Prominent among these families, with regard to the number of endemic species, are the following: *Asclepiadaceae* (34 species), *Compositae* (30), *Liliaceae* (19), *Labiatae* (16), *Scrophulariaceae* (11), *Acanthaceae*, *Euphorbiaceae* and *Leguminosae* (each with 9 species). The most important genera in this respect are: *Aloe* (18), *Caralluma* (18), *Euphorbia* (9), *Kickxia* (6), *Pulicaria* (5), *Barleria*, *Ceropegia*, *Huernia*, *Phagnalon* and *Teucrium* each with 4 species, and *Plectranthus* and *Senecio* (each with 3 species). 132 species are true endemic, while 51 species extend to Dhofar or southern Hijaz.

Trees and large shrubs are represented by 10 species; succulents by 65 species; the rest are herbs or low shrubs and a few grasses.

Analysis of the taxonomic relationships and alliances of the species listed, indicate that 64 percent show affinities with north-east and east African species, sometimes extending to South Africa; 27 percent allied to local endemics; the rest are of uncertain affinities or are allied to species outside Africa and Yemen, e.g. Peninsular India and the eastern Mediterranean. It is, of course, difficult to decide, at this stage, which of these species are palaeoendemics and which are neoendemics (see NEWTON, 1980). It is interesting, however, to note that, out of the 183 species listed, about 70 species were described as new species in the last three decades only.

The Yemen endemics exhibit certain patterns of distribution which may be summarized as follows:

1. Endemics with an eastern tendency – these are species which occur only in the eastern part of Yemen (mainly Hadramout and Mahra) – 32 species.
2. Endemics with a western tendency – ca. 150 species. Inside the western region these endemics may be unlocalized, or may show southern or northern tendency in their distribution

Within the above-mentioned groups, some endemics may show a strictly localized distribution.

These are mainly:

- a. The Jabal Al Arays group.
- b. The Hadramout Plateau group especially in the Mola Matar-Kor Seiban.
- c. The southern highlands group: Taiz, Dhala, Mukairas and Hojariyah.
- d. The Manakha-J. Rayma group.

A few species exhibit an unlocalized distribution. Prominent among these are: *Anisotes trisulcus*, *Dracaena serrulata*, *Caralluma quadrangula*.

The author is inclined to believe that the endemic flora of Yemen is in need of more intensified studies. Not a few species are known only from one-to-few gatherings and further studies may prove them to be varieties or subspecies of some known species. In addition, there is real danger of disappearance of some of these species; natural vegetation has been severely disturbed in some areas and the effects of the negative activities of man and goats are evident in many places.

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