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REVISION OF THE GENUS *SENECIO* L.
IN ETHIOPIA

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Abstract.

In this study all species of *Senecio* occurring in Ethiopia are treated. A historical survey of the genus with some emphasis on taxa occurring in Ethiopia is given. The morphology of all species, pollen features of eight species and the anatomy of two species are discussed. A phytogeographical grouping of all species is made and their distribution mapped (except for *S. subsessilis* Oliv & Hiern, *S. ruwenzoriensis* S. Moore and *S. macroglossus* DC). Twenty-five species are recognized and keys on floral and vegetative characters are given. Two species, viz. *S. ruwenzoriensis* S. Moore and *S. macroglossus* DC are reported in Ethiopia for the first time. A new variety *S. schultzii* Hochst. ex A. Rich var. *lanatus* Mesfin & Otieno is described.

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INTRODUCTION

Senecio is one among the 100 genera now recognised within the tribe Senecioneae Cass. after the re-definition accorded to the tribe by Nordenstam (1978a). Cronquist (1981) expressed the notion that it is the largest and most diversified genus in the Asteraceae. It is also considered (Carlquist 1962, Nordenstam 1978a) to be one of the largest genera of flowering plants with about 1000 species (Jeffrey 1986) or between 1000 and 2000 species (Carlquist 1962). The genus has a worldwide distribution excluding Antarctica (Jeffrey 1986).

O. Hoffman (1897:197) divided *Senecio* into two subgenera, viz subgenus *Eusenecio* O. Hoffm and subgenus *Emilia* O. Hoffm. Later on, however, the subgenus *Eusenecio* O. Hoffm was re-examined by Hedberg (1957) who, following Haumann (1953, cited in Hedberg 1957), subdivided it into two subgenera, i.e. subdgenus *Eusenecio* O. Hoffm. s. str. and subgenus *Dendrosenecio* Haumann ex Hedberg. He defined subgenus *Dendrosenecio* as consisting of "...megaphytic, tree-like plants with woody, erect or creeping stems; lamina of ordinary leaves elliptic, oblong or ovate, at least 10 x 20 cm large..." and subgenus *Eusenecio* as consisting of "...herbs or shrubs of normal size for the genus; lamina of ordinary leaves smaller than 10 x 20 cm..." Cotton (1944, cited in Nordenstam 1978a) and later Mabberley (1973) contended that the tree-like *Senecios* are inseparable from the herbaceous ones on floral characters. However Nordenstam (1978a) in his treatment of the tribe Senecioneae Cass. expressed that with the new concept of

Senecio, this could no longer hold true and hence treated

Dendrosenecio as a genus in its own right. *Senecio* s.str. hence now only comprises of herbaceous and shrubby species. In Africa *Senecio* occurs widely, from Egypt in the north with seven species (Taeckholm 1974), through West Africa with nine species (Adams 1963), Tropical East Africa with 71 species, including the *Dendrosenecios* (Jeffrey 1986) to the southern side of the continent; Lesotho with 68 species (Guillarmod 1971) and Swaziland with 40 species (Compton 1974). The distribution of the genus in Ethiopia is extensive as well; stretching from Eritrea region in the north down to the lowlands in Sidamo region in the south and from Keffa in the west to Hararghe region in the eastern side of the country. Thirteen of the species are known only from Ethiopia and most of them comprise part of the highland flora with only a few occurring in the lowlands. The period between August and December represents the time when the majority of the species flower. Many have showy yellow flowers and hence are quite conspicuous during their flowering period.

Some of the species are known to have economic significance, e.g. *Senecio myriocephalus* Sch. Bip. ex A. Rich. is allegedly used for expelling black ants (Roth, in Oliver and Hiern 1877) and is also known to be hepatotoxic to rats (Schoental and Coady 1968). Schoental and Coady (1968) also showed that *Senecio schimperi* Sch. Bip. ex A. Rich. and *Senecio schultzii* Hochst. ex A. Rich. are hepatotoxic as well. A big interest was also noted to have developed (Schoental 1963) in Pyrrolizidine (*Senecio*) alkaloids after it was realized that they could be causative factors for some human liver diseases and could be suitable for the study of the mechanism of the evolution of liver

Kerria, Lantania and Hyptis (Det. J. L. L. L.) examined at EA. Synonymy for most of the species as given in Colson (1937) is difficult to establish as a result of the unavailability of the cited specimens or both references are spurious.

SYNOPSIS OF GENERA WITHIN SENECIONEAE

The genus *Senecio* is closely related to the genera *Emilia* Cass., *Solanecio* (Sch. Bip.) Walp. and *Cineraria* L. Jeffrey (1986) provided a key which would help in the differentiation of these genera and others in East Africa. An extract of the characters of the above genera taken from this key is provided below.

1. Involucres ecalyculate, completely devoid of bracts *Emilia*.
- Involucres calyculate, with at least one outer smaller basal bract, or if ecalyculate then leaves peltate 2.
2. Ovary wall crystals compound drusiform *Solanecio*
- Ovary wall crystals simple, plate like or needle-like or absent 3.
3. Outer (ray) achenes dorsiventrally compressed *Cineraria*.
- Outer (ray) achenes not compressed or radiate-florets absent *Senecio*.

HISTORICAL SURVEY

The genus *Senecio* was erected by Linnaeus in 1737 when he provided short descriptions of seven species one of which, *S. aegyptius* had been recorded from Africa. Later on Linnaeus (1753), published the genus and described 27 taxa within it from Europe, Asia, America and Africa. Of these, eight were described from African material, specifically from Egypt and Ethiopia. Försskal (1775) gave descriptions of five *Senecio* species from Egypt and Yemen, two of which, i.e. *S. lyratus* and *S. hadiensis* also occur in Ethiopia. Richard (1848) in the first comprehensive work on the plants of Ethiopia recorded every species then known from the country and among the taxa treated were 21 species of *Senecio*. This was followed much later by the works of Oliver and Hiern (1877) who gave the descriptions of 38 species of *Senecio* from Tropical Africa of which 27 were based on material from Ethiopia. In this study were recorded eight new species, i.e. *S. vulgaris* L., *S. coronopifolius* Desf., (= *S. gallicus* Chaix ex Villars 1786), *S. pinnatipartitus* Sch. Bip., *S. picridifolius* DC., (= *Crassocephalum picridifolium* (DC) S. Moore 1912), *S. subsessilis* Oliv. & Hiern, *S. ochrocarpus* Oliv. & Hiern, *S. steudeloides* Sch. Bip. and *S. longiflorus* Oliv. & Hiern (= *Kleinia longiflora* DC 1837) which were not included in Richards work (1848). It also provided a key to all the species described. Hoffman (1897:297) divided *Senecio* into two subgenera; subgenus *Emilia* Cass. and subgenus *Eusenecio* O. Hoffm. Earlier, Oliver and Hiern (1877:405) had however considered *Emilia* Cass. to be a genus distinct from *Senecio* with five species in Tropical Africa, one though, being of a doubtful status. Muschler (1912:1015) noted that *Senecio* was the largest genus in Compositae and also described *S. aegyptius* along with other *Senecios* occurring in

Egypt. A review variety of the aforementioned species namely *S. aegyptius* var. *discolor* Poiret. is also known from Ethiopia.

Haumann (1938, cited in Hedberg 1957), proposed a new subgenus *Dendrosenecio* Haumann within *Senecio* after noticing the great deviation in leaf size and inflorescence of those plants from the ordinary *Senecios* but however he did not publish it correctly. Hedberg (1957:226) correctly and validly published it and it became subgenus *Dendrosenecio* Haumann ex Hedberg, separate from subgenus *Eusenecio* O. Hoffm. Adams (1963) in his account of the Compositae of West Tropical Africa gave short descriptions and a key to nine *Senecio* species. Three of these i.e. *S. schimperii*, *S. ruwenzoriensis* and *S. hochstetteri* also occur in Ethiopia. In this account as opposed to Hoffmann's treatment, *Emilia* is again considered as a distinct genus from *Senecio*. Cufodontis (1967) enumerated 45 species of *Senecio* in Ethiopia but did not give any description or a key to the species. Twenty four new species which were not included in Oliver & Hierns' (1877) work are given in this checklist.

In his study of Evolution in the Giant Groundsels (*Dendrosenecio*), Mabberly (1973:80) followed the subdivision of *Senecio* L. into two subgenera as defined by Hedberg (1957). Nordenstam (1978a:40) elevated *Dendrosenecio* to the generic rank. It hence now became *Dendrosenecio* (Haumann ex Hedberg) B.Nord. He stated that in addition to the 'megaphytic' rosette-tree habit, *Dendrosenecio* could be separated from *Senecio* s.str. by "...the pyramidal paniculate synflorescence, the more or less distinctly biseriate involucre and the continuous stigmatic surfaces of the disc style." He also noted that minor differences existed in hair types and in endothelial tissue type as

well as features such as the presence of corolla hairs and a tendency towards achene compression. In his study of the Senecioneae in East Tropical Africa, Jeffrey (1986), like other previous workers (e.g. Oliver and Hiern 1877), also treated *Emilia* as a distinct genus from *Senecio* and, in addition, transferred some taxa formerly kept in *Senecio* to *Emilia*. He also provided a key to the species within East Africa. The following seven taxa included in the key are also known from Ethiopia: *S. hochstetteri*, *S. ruwenzoriensis*, *S. hadiensis*, *S. lyratus*, *S. mesogrammoides*, *S. subsessilis* and *S. inornatus*.

Material

This work is based mainly on herbarium material kept at the National Herbarium ETH, Ethiopia and that which was obtained on loan from Herbarium Upsalensis UFS, in Uppsala, Sweden. Two visits were also made to the East African Herbarium EA, Nairobi where studies were conducted on some *Senecio* material from Ethiopia kept there. Herbaria abbreviations are according to Holmgren, Keuken and Schofield (1981).

Field trips were made to Shewa, Arssi, Bale, and Sidamo regions between October and December 1989. However as a result of certain technicalities, it was not feasible to visit all the collection sites as intended and for this reason only ten of the *Senecio* species were studied in the field. Attempts to grow the seeds of some selected species in the greenhouse proved futile, suspicion for the failure falling mainly on the soils used and non-viability of the seeds i.e., if they did not germinate when initially grown in petri-dishes. For this reason, a study of seedling morphology was not conducted.

Methods

Specimen citation

All the specimens cited in this work are those collected within Ethiopia. As a rule 10 selected specimens or more were studied for each species. The selection of specimens was based on their representativeness i.e. specimens with complete flowers, fruits and as

far as possible mature leaves. The distribution of the species was also used as a basis for selection. Only in those cases where there were not enough specimens were less than 10 examined. Wherever possible specimens available at both ETH and UPS have been chosen for study. Preliminary identification of the specimens in ETH was done by my advisor after having examined the type specimens in K and P.

Measurements

Fully developed flowering capitula were selected for the measurement of floral parts. From each specimen, 10 measurements of each floral part were made except sometimes in the case of calyculi, phyllaries, ray florets and achenes when material was scarce. Measurements were always taken after boiling the parts in water. As far as possible only fruits acquired from mature fruiting capitula were measured.

A Bausch and Lomb and a Wild Heerburg M3 stereomicroscope with magnifications of X30 and X40, respectively, were used. A hand ruler calibrated in mm was used for taking measurements. The ranges of measurements and the number of floral parts counted are given in the species descriptions with rare and extreme values indicated in parentheses.

Light microscopy

A BHB Olympus microscope with a magnification of upto X1000 was used to study pollen morphology and the leaf and stem sections of some selected species. A Carl Zeiss D-7032 Oberkochen Axiophot photomicroscope with a microscope illuminator (100 Hal) and a lamp

exchange (100 Hal and HB050) and a magnification of also upto X1000 was used in taking photographs.

Pollen slides prepared at the Palynological Laboratory in Stockholm were used for the study of pollen morphology. Measurements were made on 25 grains per specimen slide.

Leaf and stem transverse sections (TS) were made from plants collected in the field. The fixed material was dehydrated, embedded in paraffin (congealing point 55° C) and sectioned (20 microns) using a rotary microtome and then stained in Fast-green and Safranin following methods outlined by Sass (1958) for prestaining operations and those by Jensen (1962, in Willey 1971) for the actual staining procedure.

Scanning electron microscopy

A JEOL (JSM - T100) scanning electron microscope operated at 15Kv was used to examine and photograph pollen grains of some selected species. Pollen grains obtained from herbarium specimens were acetolysed following the methods outlined in Edtmann (1969) and were then mounted on brass stubs to which a double-sided adhesive tape was attached. A JEOL fine coat ion sputter (JFC-100) operated at 1Kv was employed to coat the pollen grains with gold.

GROSS MORPHOLOGY

Habit

Among the twenty five species of *Senecio* found in Ethiopia 22 are found to be perennial due to their recognisably woody habit. The



Fig. 1. Habit forms in Senecio. A: shrubby climber; B: Dwarf herb; C: Undershrub;
 D: Erect herb with unbranched stem; E: Low, little-branched herb;
 F: Erect much-branched herb; G: shrub.

remaining species, i.e. *S. pinnatipartitus*, *S. mesogrammoides*, and *S. schimperi*, are annual though uncertainty now prevails on the nature of *S. schimperi* as a result of an individual (Otieno 14, unmounted) collected near Guder in Shewa region with the woody nature of a perennial.

There is both intra- and interspecific variation in habit within the genus. Fifteen of the species are strictly herbaceous with erect or sometimes trailing stems, e.g. as in *S. inornatus*. In some species e.g. *S. aegyptius*, *Senecio* sp. A, and *S. ragazzii* the stem is usually simple whereas in others e.g. *S. mesogrammoides*, *S. schimperi* and others, the stem is little to much branched from the base. Some species e.g. *S. schultzii*, *S. unionis*, and *S. nanus* are dwarf plants that stand to a height of only up to about 40 cm. Occasionally however some individuals of *S. schultzii* have tall (ca. 1.2 m) erect stems bearing ascending branches. *S. nanus* and *S. unionis* are caespitose and at times they form a mat-like cover on the ground but often also grow singly whereas *S. schultzii* is mostly gregarious (Fig. 2A). *S. ruwenzoriensis* can be distinguished from the other herbaceous *Senecios* in Ethiopia by its succulent stem.

S. ochrocarpus, *S. farinaceus*, *S. myriocephalus*, *S. fresenii* and *S. platypleurus* are often erect, bushy, suffrutescent or at times herbaceous plants. *S. tamoides*, *S. macroglossus* and *S. hadiensis* are herbaceous or shrubby but differ from the rest in having a climbing habit. *S. lyratus* is on record and has also been seen as having a climbing habit.

Stem indumentum

A

B

Fig. 2. Growth habit in *Senecio schultzii*. A: *S. schultzii* var. *schultzii*. Note gregarious nature. B: *S. schultzii* var. *lanatus*. Note woolly indumentum covering leaves and involucral bracts. Photo: Otieno 21.XII.1989 (A,B).

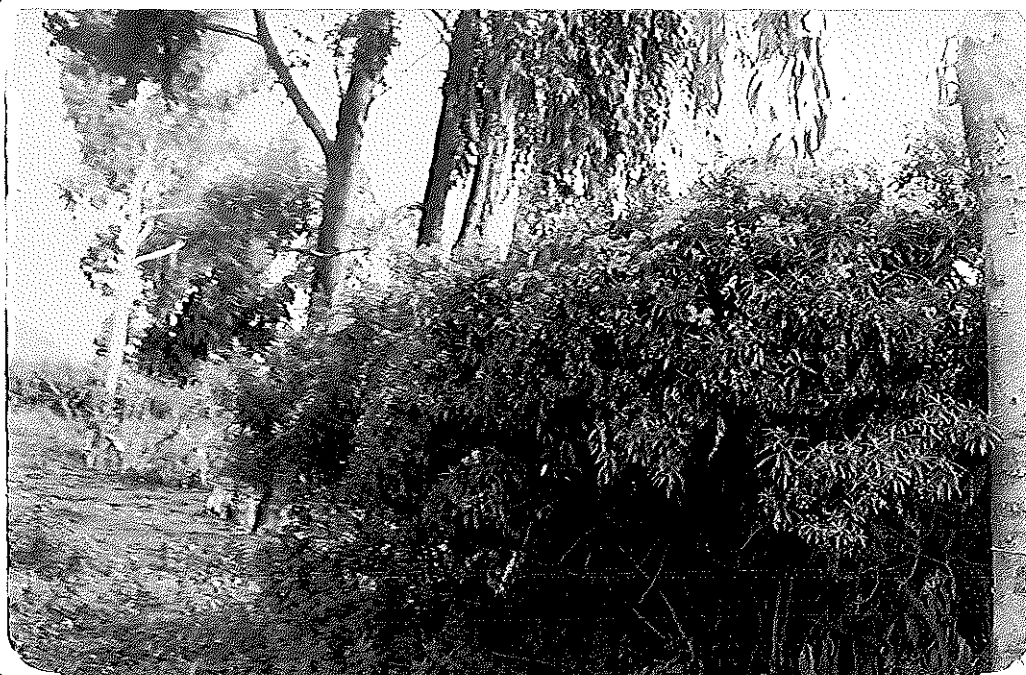
The stems of most of the species show variation in the density and extent of pubescence on them. In some species, e.g. *S. pinnatifidus*, *S. mesogrammoides*, and *S. unionis* the stems can be glabrous to densely pubescent. Other species like *S. ochrocarpus*, *S. farinaceus*, *S. fresenii*, *S. platypleurus*, *S. steudelii* and *Senecio* sp. A have stems that are variously sparsely to densely covered with white tomentum. *S. fresenii* can easily be recognized due to the greyish-white appearance of the whole plant resulting from the white tomentum covering, (Fig 3A). *S. aegyptius*, *S. myriocephalus*, *S. hochstetteri*, *S. ragazzii*, *S. confertus*, *Senecio* sp. B and *S. lyratus* are variously pubescent; *S. myriocephalus* however sometimes appears somewhat cottony on the upper stem. The stems in individuals of *S. schultzii* also show considerable variation in that some are densely pilose while others are densely white tomentose. Other species e.g. *S. tamoides*, *S. inornatus*, *S. ruwenzoriensis*, *S. schimperi*, *S. hadiensis*, and *S. macroglossus* have stems that are glabrous.

Leaves

The leaves of most *Senecio* species in Ethiopia are cauline, though in some they also occur crowded at the base. They are simple to compound, alternate or sometimes rosulate as in *S. nanus*, *S. schultzii* and *S. inornatus* or distichous on the upper or lower stem. In a few cases, e.g. *S. inornatus* and *S. schultzii* the leaves may be alternate and distichous on the upper stem and also rosulate. In most of the species e.g. in *S. myriocephalus*, *S. ochrocarpus* and others, the leaves are sessile or subsessile and in some cases, e.g. the leaves of *Senecio* sp. A. and the upper ones of *S. inornatus*, sessile



A



B

Fig. 3. Habitat and growth habit of two *Senecio* species. A: *S. fresenii* growing by roadside in a rocky place. Note huge rocks in the background (arrows). Note also greyish-white appearance of plant due to woolly covering. B: *S. myriocephalus* growing on a hedge, forming a thicket. *Eucalyptus* trees can be seen in the background. Photo: Otieno 21.XII.1989 (A). 19.XII.1989 (B).

and recurrent on the stem or stem branches. They could also be auriculate, auriculate-amplexicaule or amplexicaule as in *S. confertus*, *S. platypholus*, *S. schimper* and others. In other species e.g. *S. ragazzii*, *S. macroglossus* and *S. tamoides*, the leaves are petiolate or at times subpetiolate while in *S. hochstetteri*, *S. farinaceus*, *S. inornatus* only the basal leaves are petiolate. The petioles are sometimes dilated and clasping the stem or stem branches at the base. Young plants of *S. ochrocarpus* also have petiolate leaves.

Variation in leaf shape in *Senecio* is not quite extensive. Most of the species in Ethiopia have mature leaves that are generally elliptic, spathulate, lanceolate or ovate in outline. Exceptions are found in *S. lyratus*, *S. macroglossus*, and *S. tamoides* whose leaves are triangular or somewhat so and *S. ragazzii* whose leaves are cordiform. The leaf lamina is usually entire except in a few cases e.g. *S. farinaceus* where it is either parted or divided. There is also great variation in the absolute size of the leaves, e.g. on one extreme *S. unionis* has very small and narrow leaves (ca. 0.6-1.1 x 0.2-1.5 cm) while on the other hand *S. ochrocarpus* often has very big and wide leaves (ca. 2.5-21 x 1.6-10.2 cm). The variation in leaf size often also occurs within one species, e.g. in *S. ochrocarpus* the upper leaves are usually relatively smaller compared to the lower ones.

In most species except *S. tamoides*, *S. ruwenzoriensis*, *S. subsessilis*, *S. hadiensis*, *S. macroglossus*, *S. schimper*, or at times *S. unionis* and *S. pinnatifidus*, the leaf surfaces are pilose or white tomentose but the extent to which this is so varies. A species like *S. hochstetteri* has leaves that are densely covered with

A

B

Fig. 4. Habitat and growth habit of two *Senecio* species. A: *S. ochrocarpus* growing in a small bush by roadside. B: *Senecio* sp. B. growing on slopy ground by a gorge. Note in A and B erect stems with sessile leaves. Photo: Otieno 28.XII.1989 (A); 17.X.1989 (B).

pubescent, while in *Senecio* sp. *Senecio* sp. the leaves are sparsely pubescent and petioles are glabrous. *Senecio* sp. extreme variation is seen in that the leaves can be glabrous, sparsely to densely pubescent or thinly to densely white tomentose.

Variation is also observed in the types of leaf margins in *Senecio*. The margins are usually entire or subentire, serrulate, serrate or doubly serrate, denticulate, dentate or doubly dentate, parted or pinnatifid. Species in which some or all leaf margins are parted or pinnatifid are however few e.g. *S. pinnatipartitus*, *S. hochstetteri*, *S. platypleurus*, *S. farinaceus*, *S. aegyptius*, *S. unionis*, and *S. mesogrammoides*. In some species e.g. *S. unionis* and *S. platypleurus*, the margins are revolute as well. The presence of hairs along the margins is observed in *S. schultzii*, *S. ochrocarpus*, *S. confertus*, *S. ragazzii* and *S. hochstetteri*.

Peduncle

The peduncle varies mainly in length and the extent to which it is covered with hairs. The length fluctuates between about 0.3 and 9.7 cm, hence in some species e.g. *S. aegyptius* it can be very short while in others e.g. *S. presentii* relatively long. The surface of the peduncle ranges from being glabrous as in *S. schimperi*, *S. tamoides* and *S. ruwenzoriensis* to being variously pubescent or obseletely white tomentose. Usually it is both terete and striate-sulcate. The size and number of bracts along its length shows some variation too. In some species e.g. *S. myriocephalus* the bracts are small while in others e.g. *S. ragazzii* they are relatively big and leaf-like. In all species the peduncle holds the capitulum erect.

Conflorescence

Capitula in *Senecio* usually form loose assemblages that do not have a general cover. As used by Heppik (1979) the term confluence refers to such an assemblage. In most cases the number of capitula in a confluence varies from one, e.g. in some individuals of *S. schultzii*, *S. nanus*, *S. macroglossus* and sometimes *S. unionis* to over 100 as in *S. fresenii* and others. The shape also varies from the rounded and compact one, mostly with just a few heads that are held on short peduncles in e.g. *S. aegyptius* to the lax sometimes divaricate corymbose cyme found in the majority of the species. In the latter type the peduncles are relatively long with the longest (c. 9.7 cm) being recorded in *S. mesogrammoides*.

Capitulum

Variation occurs in the shape of the involucre part of the capitulum, usually ranging from being urceolate e.g. in *S. lyratus* to being narrowly or broadly campanulate as in the majority of the species. Almost all the members of the genus except *S. schimperii*, *S. hochstetteri*, *S. inornatus*, *Senecio* sp. A and *S. aegyptius* var *discoideus* have radiate capitulum. In the species mentioned above the capitula are discoid. The width of the capitulum, including ray florets, varies from 0.4-1.5 cm (as in *S. lyratus*) to c. 2-5.8 cm (as in *S. ragazzii*). However a lot of continuity between the species occurs in this aspect of the capitula. The involucre diameter ranges between about 2 to 24 mm at anthesis with the narrowest occurring in *S. hadiensis* and *S. aegyptius* and the widest in *S. schultzii*.



A



B

Fig. 5. A: Conflorescence in *S. ochrocarpus*. Note leaves with white tomentum. B: *S. ragazzii* growing at the base of a cliff beside the road. Note unbranched stem with sessile leaves leaning outwards. Photo: Otieno 19.XII.1989 (A). XII.1989 (B).

Fig. 6. *Senecio unionis* growing in place with loose rocks. Note dwarf habit. Photo: Otieno 21.XII.1989.

Phyllaries

The involucre comprises of or several united bracts that are also referred to as phyllaries. They are held together by a very neat interlocking mechanism (Blair 1977) in which the margins of one bract locks into a groove under the dorsal ridge of its neighbour. The phyllary number varies between 8 and 22 per capitulum but in some cases e.g. *S. ragazzii* and *S. schultzei*, numbers as high as 24 or 25, respectively, have been recorded. Often the phyllaries are herbaceous but in some individuals of *S. nanus*, are coriaceous as well. The most outstanding variation among the phyllaries is seen in the margins. Within the same capitulum there are those with entire margins and those whose margins are scarious and white or yellowish. Sometimes the scarious margins occur on only one side of the phyllaries. *S. macroglossus* and *S. ochrocarpus* have phyllary margins that are occasionally sparsely hairy or sometimes in the latter, with very many short hairs towards the base (Fig. 13F).

In most of the species the shape of the phyllaries is more or less the same, generally ranging from linear to oblanceolate. Sometimes, however, they are also oblong, elliptic or ovate. In about half of the species the phyllaries are sometimes attenuate at the apical region though they may also taper gradually or sharply. Indumentum on the phyllaries varies between and sometimes even within the same species. Normally it varies from none or, if present, from sparse as in *S. hadiensis*, *S. aegyptius*, *S. inornatus*, *S. unionis*, *S. ruwenzoriensis*, *S. nanus*, *S. mesogrammoides*, *S. tamoides*, *S. schimperii*, *S. macroglossus*, *S. pinnatipartitus*, *S. myriocephalus* and *S. lyratus* to variously pubescent as in *S. steudelii*, *S. confortus*, *S. ragazzii*, *S.*

hochstetteri and *S. schultzii* are to variously tomentose sometimes interspersed with sparse or dense hairs as in *S. farinaceus*, *S. platypleurus*, *S. Friesenii* and *S. ochrocarpus*. In *S. schultzii* not all the phyllaries are pubescent, in some e.g. those in what is now considered a variety of *S. schultzii*, the surfaces are thinly to densely white tomentose.

The variation in phyllary length is rather continuous, usually ranging from 3 to 16 mm. In most species the phyllary apices are light to dark brown, brownish-black or black. In some e.g. in *S. nanus*, *S. ragazzii*, *S. confertus* and *S. schultzii* there is sometimes a purplish tinge immediately below the apex which occasionally also infiltrates into the apical region. The hairiness of the apices shows some variation; being papillose, bristly, ciliolate, tufted or in some cases, though rarely, glabrous e.g. in some individuals of *S. tamoides*.

Most of the phyllaries have characteristic striae, usually ranging in number between one to three. However in some individuals of *S. lyratus*, *S. pinnatipartitus*, *S. macroglossus*, *S. inornatus*, and *S. nanus* four or five striae have been recorded. According to Blurtt (1977), at full maturity, the special tissue that develops at the base of the bracts during the growth and maturation of the head shrinks and the withered bracts freed from one another become reflexed and as such set the achenes free.

Ray florets

The ray florets in *Senecio* are usually quite showy. They are light

yellow, orange or yellowish-orange. They are also pistillate except sometimes in *S. myriocephalus* where neuter ones occasionally occur. The number of striae on the lamina also vary from one species to another. In most species it varies between 3 to 8, but in some, e.g. *S. pinnatipartitus* and *Senecio* sp. B one and eleven striae, respectively, have been recorded. The apex of the lamina can be obtuse, obcordate, dentate, or 2-4-fid; rarely are they acute or attenuate. Occasionally in *S. ruwenzoriensis* and *S. steudelii*, the ray apices have deep clefts that make them a bit distinct from the rest.

The ray floret tube is usually either glabrous or pilose. In some species, e.g. in *S. ochrocarpus*, *S. pinnatipartitus*, *S. fresenii*, *S. steudelii*, *S. nanus*, and *S. ruwenzoriensis*, certain individuals can have florets that are both glabrous or pilose. This character hence proves taxonomically useful in certain species. In *S. ochrocarpus* some ray florets have tubes that are split almost down to the base (Fig. 16V).

Disc florets

The disc florets of all species of *Senecio* from Ethiopia except *S. aegyptius* var *discoideus*, have 5-lobed corollas. In *S. aegyptius* var *discoideus* 4-lobed corollas frequently occur. The style is often uniformly thin, conical, semi-bulbous or bulbous at base and apically bifurcate or rarely trifurcate as in *S. lyratus*, *S. myriocephalus*, *S. ragazzii*, and *S. inornatus*. In *S. mesogrammoides* and *S. steudelii*, the style sometimes has only one arm but this occurrence is quite rare. Occasionally the arms can be reduced as in *S. schimperi* or asymmetric

as in *S. Frosenii* and *S. hadiensis*. The apex of each branch is also provided with a ventro-marginal, discrete stigmatic line as also noted by Nordenstam (1978b). The stigmatic surfaces are discrete except in *S. ochrocarpus* and *Senecio* sp. *B* where they are continuous. Nordenstam (1978a) cited this as one among many reasons for regarding *S. ochrocarpus* as a true ally of the *Dendrosenecios*. Most of the stigmatic areas are also provided with either short or long papillae

The upper part of the tube may be tubular (12 species), funnel-shaped (8 species), campanulate as in *S. nanus*, *S. ruwenzoriensis* and *Senecio* sp. *A* or turbinate as in *S. inornatus*. There is also considerable intra- as well as interspecific variation in the length of the corolla tube. In *S. tamoides* sometimes there occurs a slight constriction of the corolla tube just below the point of filament insertion. In all the species the corolla tube is always glabrous except in *S. mesogrammoides* where at times it is sparsely hairy especially towards the base of the tube (Fig. 17Q).

The majority of the species have anthers that vary in length from 1 to 3 mm. *S. pinnatipartitus*, *S. schimperi*, *S. aegyptius* var *discoideus* have anther lengths that occasionally, if not always, are below 1 mm. The anther bases are sagittate, except in *S. schultzii*, *Senecio* sp. *B* and *S. schimperi* where they are truncate. Each anther also has a long filament which is usually attached to the corolla wall at the joint between the limb and the narrowed basal region of the tube. At the margins the margins are inflexed.

Achenes

The achenes within a species do not show much variation in size, shape or surface texture. However from one species to another there is diversity in some of these aspects, e.g. surface texture and size. No notable differences exist between the achenes of the disc and those of the ray florets, when present. In many of the species the achenes are terete; only in *S. schultzei*, *S. schimperii*, and *S. pinnatifidus* and more so in latter are there three- to four-angled achenes. In some species e.g. *S. fresenii*, *S. unionis*, *S. steudelii*, *S. ragazzi*, *S. ruwenzoriensis*, *Senecio* sp. B, *S. mesogrammoides* and *S. nanus* the achenes are narrowed towards either the apex or base or both. Somewhat flattened achenes sometimes also occur; these forms, however, can be attributed to immaturity.

In most species the base of the achene bears a narrow cartilaginous rim formed perhaps as a result of abscission from the receptacle. It may also be truncate, or have a hairy yellowish-white appendage as in some specimens of *S. pinnatifidus* (Fig. 18Z). The margins are either entire or setulose. The surface may be glabrous and striate, striate-sulcate or costate or variously pubescent and striate, striate-sulcate or costate. In some species e.g. *S. lyratus*, *S. schimperii*, *S. ragazzi*, *S. hochstetteri*, *S. platypleurus*, *S. aegyptius* and *S. myriocephalus*, the pubescence is arranged in narrowly or widely spaced rows. The achenes of *S. myriocephalus* and *S. lyratus* have caducous pubescence and hence sometimes also appear glabrous. The apex always has an annular rim to which the pappus is attached. The pappus is made up of antrosely barbed bristles and varies between 2 to 8.5 mm in length. No marked discontinuities are observed in the size of the achenes between the species. The sizes generally fall within

the range of about 1.5-5.2 x 0.1-1.2 mm. In most of the species the achene colour fluctuates between different shades of brown e.g. light to dark brown as in *S. nemus* and others, yellowish- or greyish-brown in *S. stoudellii*, creamish-brown in *S. inornatus* and *Senecio* sp. *b* and purplish-brown in *S. ragazzii*. In *S. unionis* the achenes are strictly black while in others e.g. *S. schultzii*, *S. pinnatipartitus*, *S. platypleurus*, and *S. farinaceus* range from brown, brownish-black to shiny black. *S. hadiensis* has cream coloured achenes.

Pollen morphology

Wodehouse in 1926 (cited in Skvarla and Turner 1966a) began the first detailed studies of the external morphologies of pollen walls in Compositae. His studies extended through to 1945. Stix in 1960 (cited in Skvarla and Turner 1966a), by employing ultraviolet microscopy on sectioned pollen, described for the first time the internal morphology of pollen wall in Compositae. She made her descriptions from species representing all the 13 tribes in Compositae and "... recognised 42 pollen types ..." Skvarla and Turner (1966a) in their studies of Compositae pollen wall morphology using electron microscopy recognised three ultrastructural pollen wall patterns in the tribe Senecioneae; these were:

- 1) The Helanthoid pattern.
- 2) The Senecoid pattern, which they noted was similar to the Helanthoid but differed in lacking internal foramina.
- 3) A pattern similar to that found in Anthemidae and which they tentatively considered as the "Anthemoid-like" pattern.

Out of the six *Senecio* species that they observed, five had the Senecoid pattern and one, *Senecio glabellus*, had the Helanthoid pattern. In a later study, Skvarla and Turner (1966b) made a comparison of pollen wall ultrastructure in *Blénosperma* (Heleniae) and *Crocidium* (Senecioneae). They described the pollen in the two genera as being "...triangular in polar view, tricolporate with numerous spines..." and again noted the occurrence of both the Helanthoid and Senecoid pollen types in *Senecio*. Skvarla et al. (1977) in reviewing the pollen morphological features within Senecioneae once more observed the fact that most species in the genus *Senecio* had the Senecoid pollen pattern, however another species, *Senecio heriteri* was found to be "...decidedly Helanthoid."

A discussion of some of the morphological features in the pollen of some selected species of *Senecio* is given below. A summary of the results obtained is presented in Table 1.

Size. The pollen size for the *Senecio* species studied ranges from 22x23 μm in *S. Inornatus* to 27x28 μm in *S. Farinaceus*. In species examined under LM, the pollen size was found to be more or less constant within each one of them. The shrubby *Senecios* tend to have relatively larger grains than the herbaceous ones (see Table1). However *S. schultzei*, a herbaceous species, has pollen sizes that are about equal to those of the shrubby forms.

Table 1. Summary of some pollen morphological features in *Senecio*. the values, except those asterixed, are means followed by variation ranges in parenthesis. Asterixed values have been calculated from pollen micrographs using, scale D=10 micrometres and measured D

values of 44 μm for *S. mesogrammoides*, 46 μm for *S. steudelii* and 43 μm for *S. fresenii*. VS: voucher specimen, E: equatorial diameter (μm), PA: Polar axis, SL: Spine length (μm), H: herb, S: shrub.

Taxon	VS	E	PA	SL
<i>S. unionis</i> (H)	4	22.5 (19-24)	23 (21-25)	3.2 (3-4)
<i>S. inornatus</i> (H)	5	22 (19-23)	23 (19-26)	2.2 (1-3)
<i>S. schultzei</i> (H)	6	26 (24-28)	26 (26-28)	3.0 (2-4)
<i>S. schultzei</i> var. <i>lanatus</i> (H)	7	26 (24-28)	27 (25-29)	2.6 (2-4)
<i>S. farinaceus</i> (S)	8	27 (25-30)	28 (26-30)	3.8 (3-4)
<i>S. mesogrammoides</i> (H)	1	c. 23.1*	c. 24.0*	-
<i>S. steudelii</i> (H)	2	c. 21.5*	c. 24.3*	-
<i>S. fresenii</i> (S)	3	c. 26.7*	c. 27.4*	-

Voucher specimens: 1: Mooney 7941, Shewa (ETH). - 2: Mesfin & Kagnev 2056, Shewa (ETH). - 3: Andeberg 1705, Bale (ETH). - 4: Ash 3535, bale (ETH). - 5: Mesfin & Kagnev 2442, Illubabor (ETH). - 6: Hedberg 4214, Galama mts. (UPS). - 7: Mooney ;8332, Bale (ETH). - : Evans & Hiller 324, Gojjam (K).

Shape. The pollen grains in the eight *Senecio* species investigated were found to be radially symmetrical, isopolar, subprolate or spheroidal. The ratio of P (length of polar axis) to E (equatorial diameter) is 1-1.5.

Apertures. The pollen grains in Compositae are usually described as tricolporate with 1 alongate ora (Mesfin 1984:28). In the investigated species of *Senecio*, the pollen grains were found to have similar apertures (Figs. 29, 30 and 31).

Spines. The spines as seen in the pollen grains of the *Senecio* species that were investigated are conical, broadened at the base and usually sharp at the apex (Figs. 29, 30 and 31). In *S. inornatus* and *S.*

schantzii the grains are spinulose in the sense of Erdtman (1969) who indicated that pointed processes on pollen grains whose lengths do not exceed 3 micrometres are to be referred to as spinules. The spine length (see Table 1) varies between 2.2 and 3.8 micrometres, the smallest being recorded in *S. inornatus*. The spine bases are either perforate (Figs. 30 and 31) or non-perforate (Fig. 29). In those that are perforate, the largest holes tend to be located away from the extreme base of the spines.

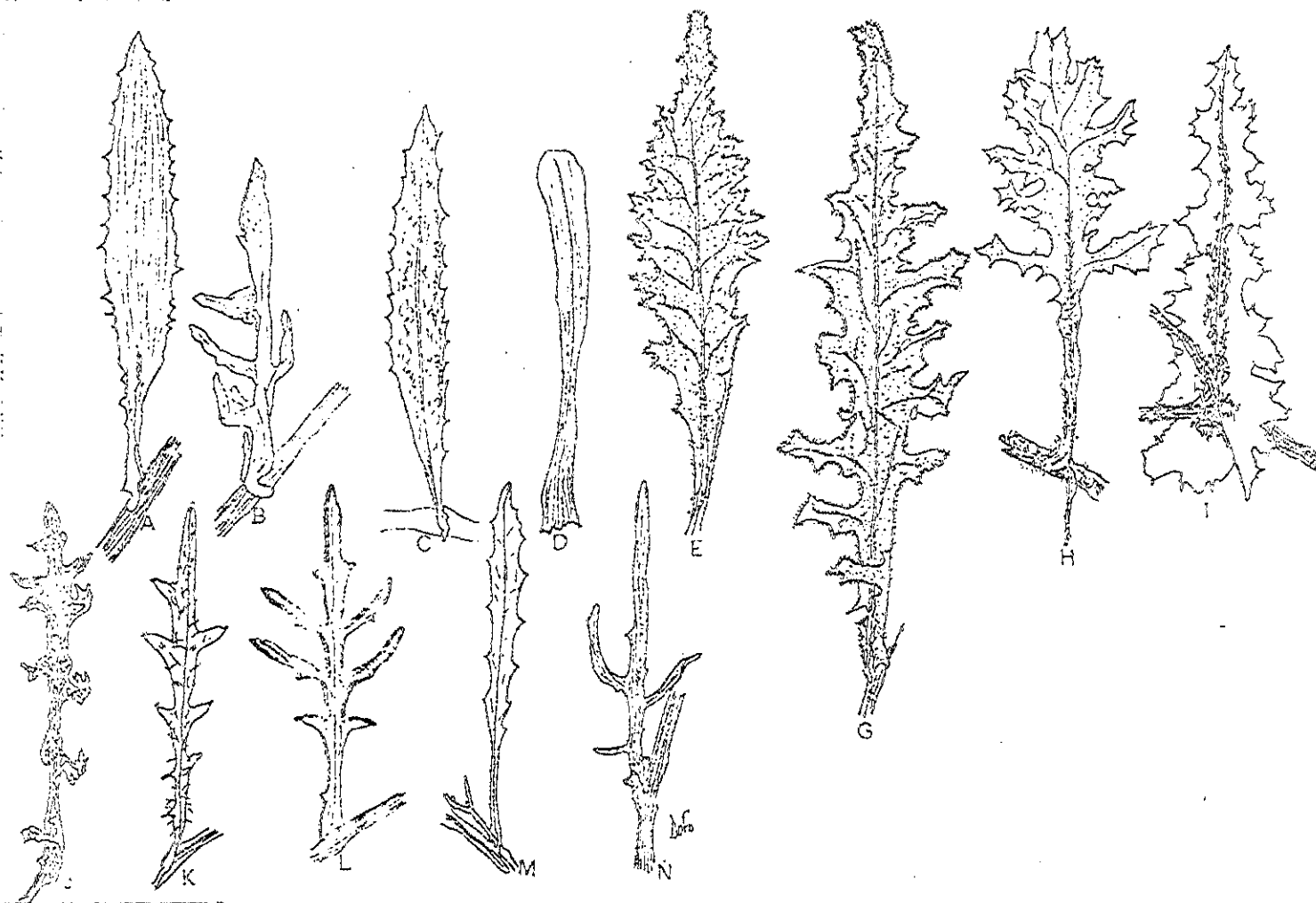


Fig. 7. Leaf variations in Senecio. See appendix for species names, magnifications and voucher specimens.

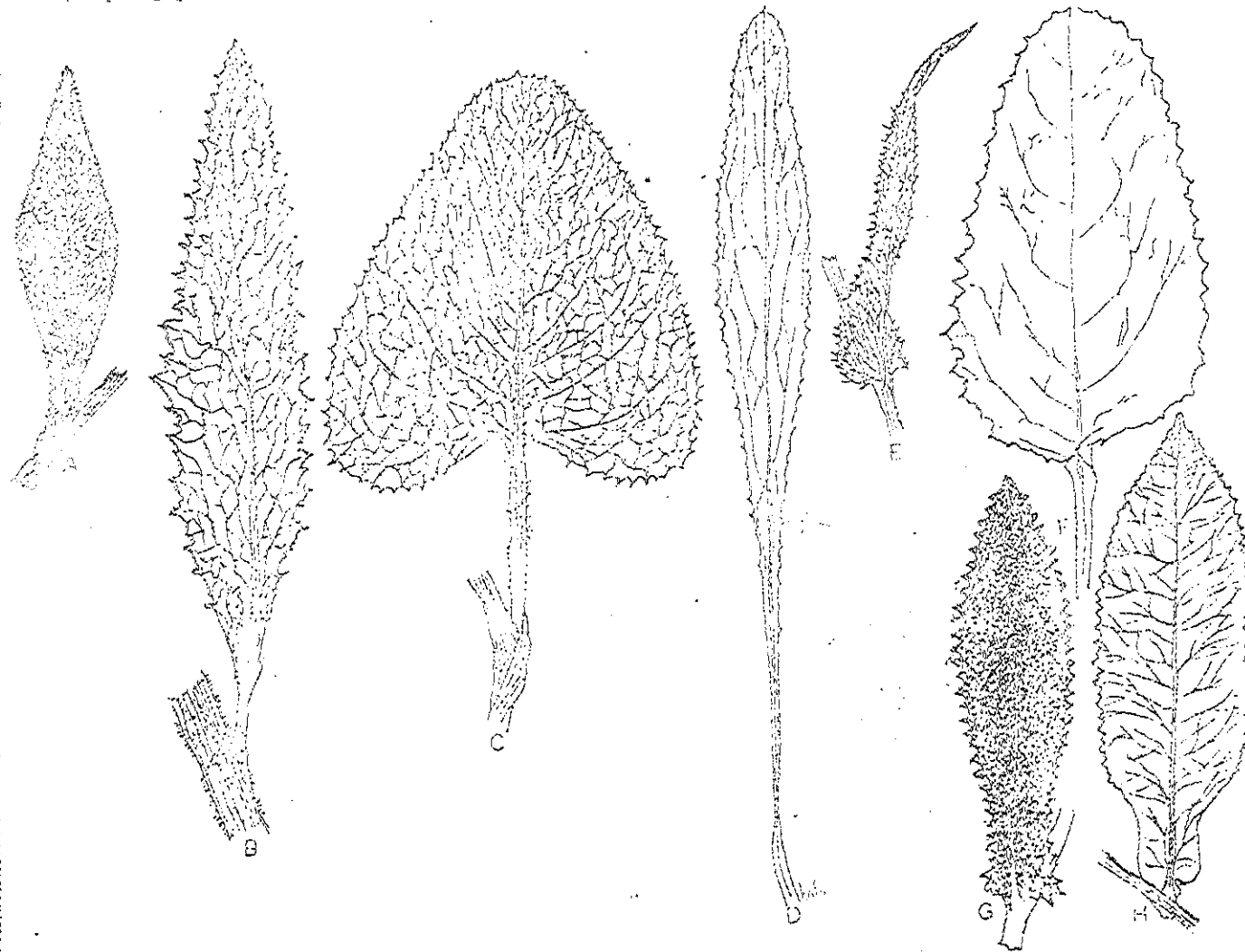


Fig. 8. Leaf variations in Senecio. See appendix for species names, magnifications and voucher specimens.

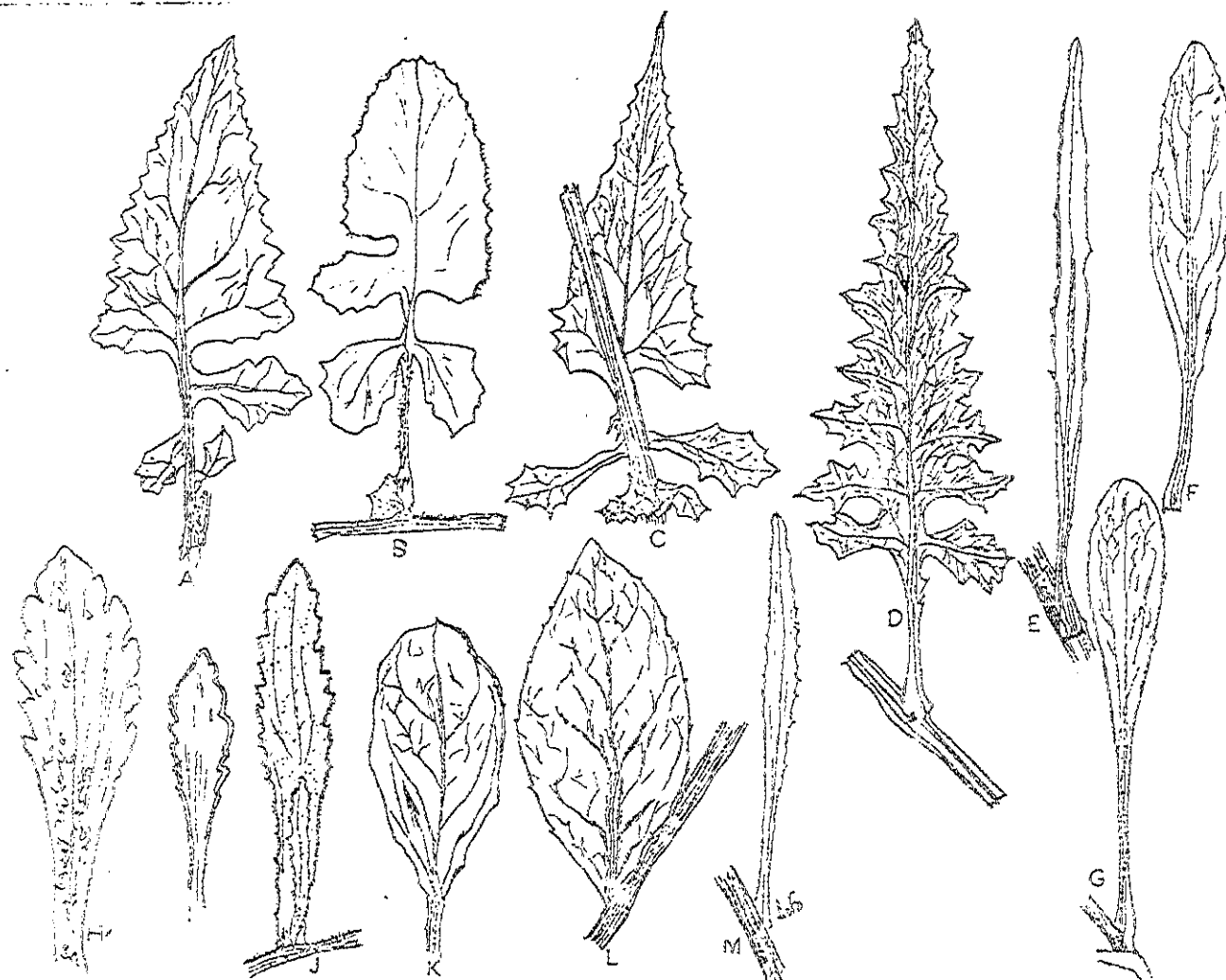


Fig. 9. Leaf variations in senecio. See appendix for species names, magnifications and voucher specimens.

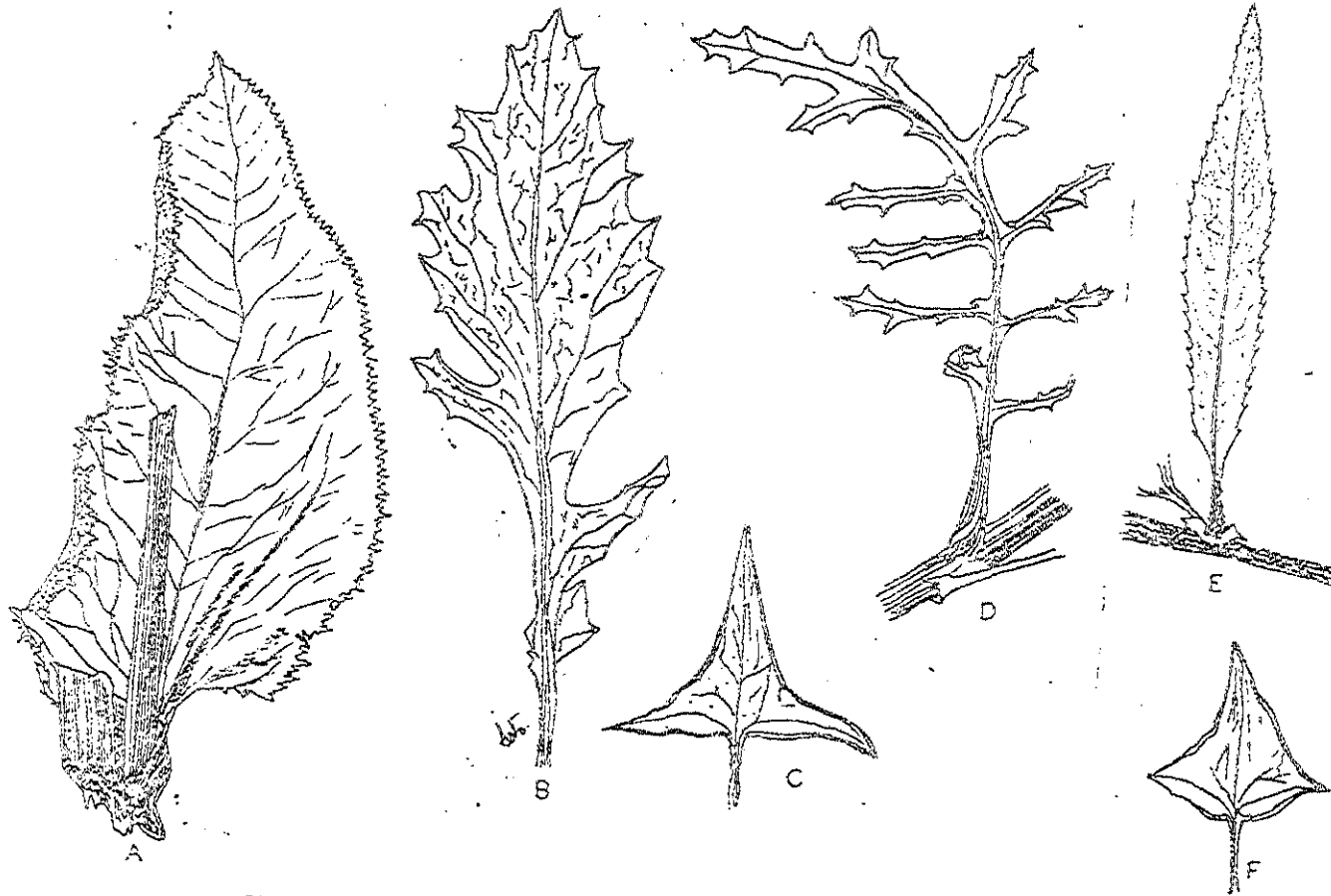


Fig. 10. Leaf variations in Senecio See appendix for species names, magnifications and voucher specimens.

Fig. 10. Contd.

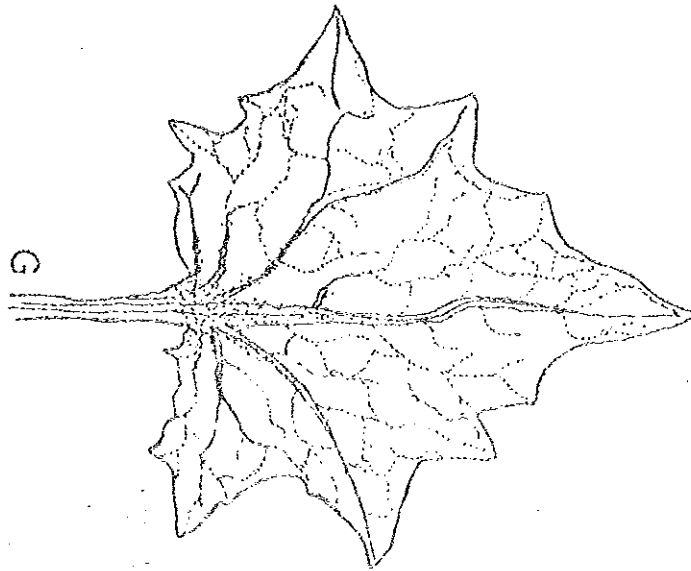
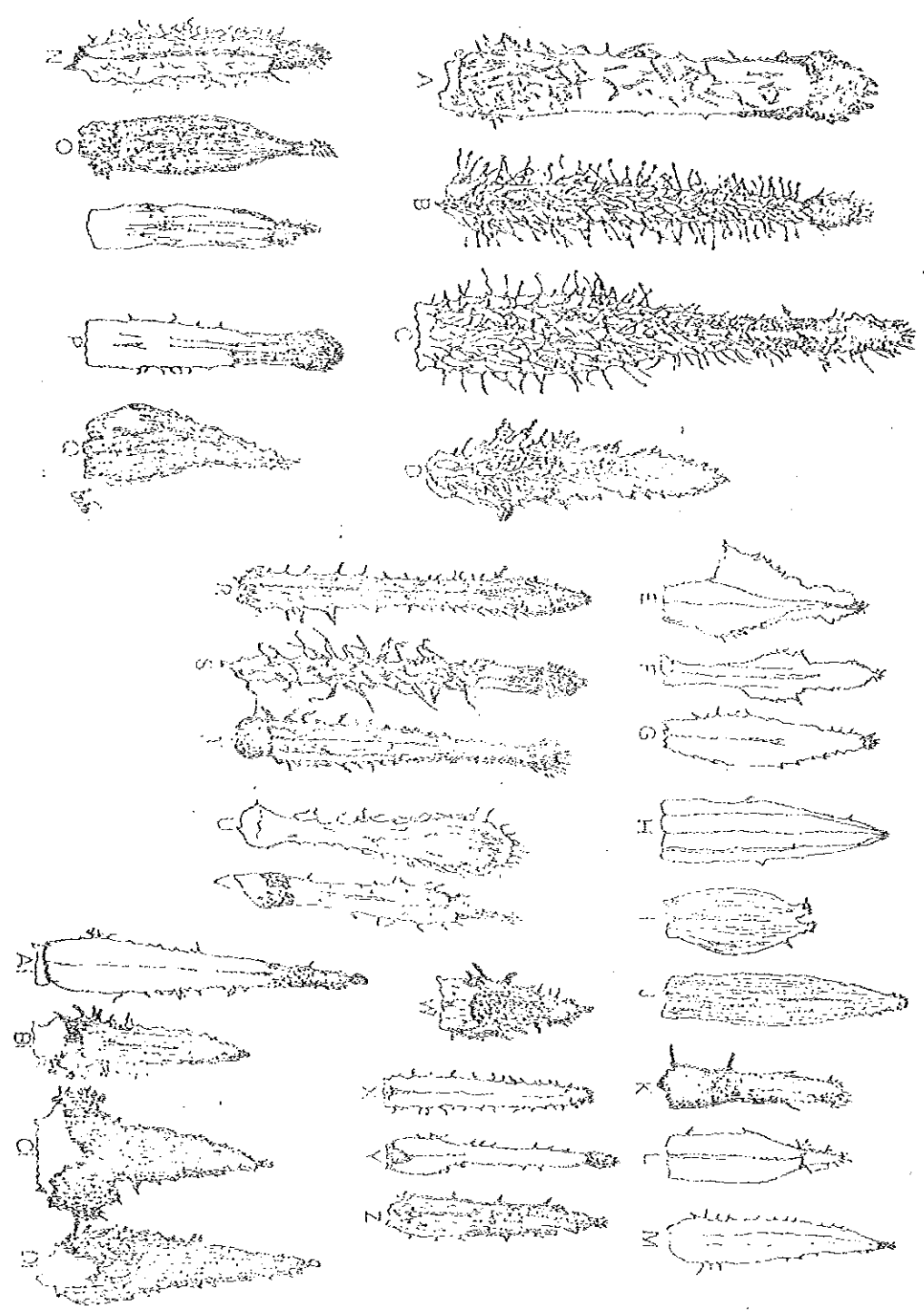


Fig. 13. Calyculus variations in Senecio. See appendix for species names, magnifications and voucher specimens.



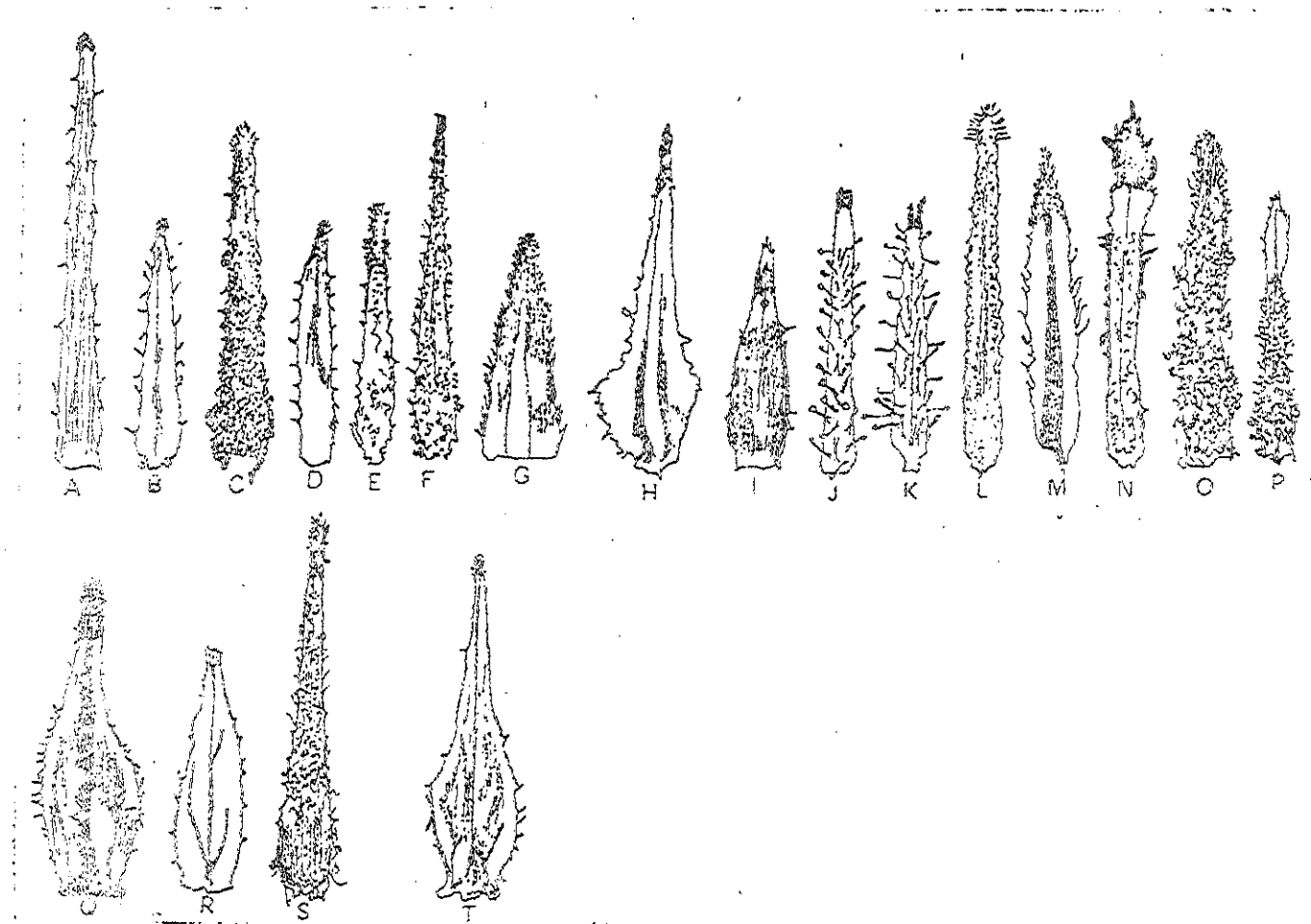
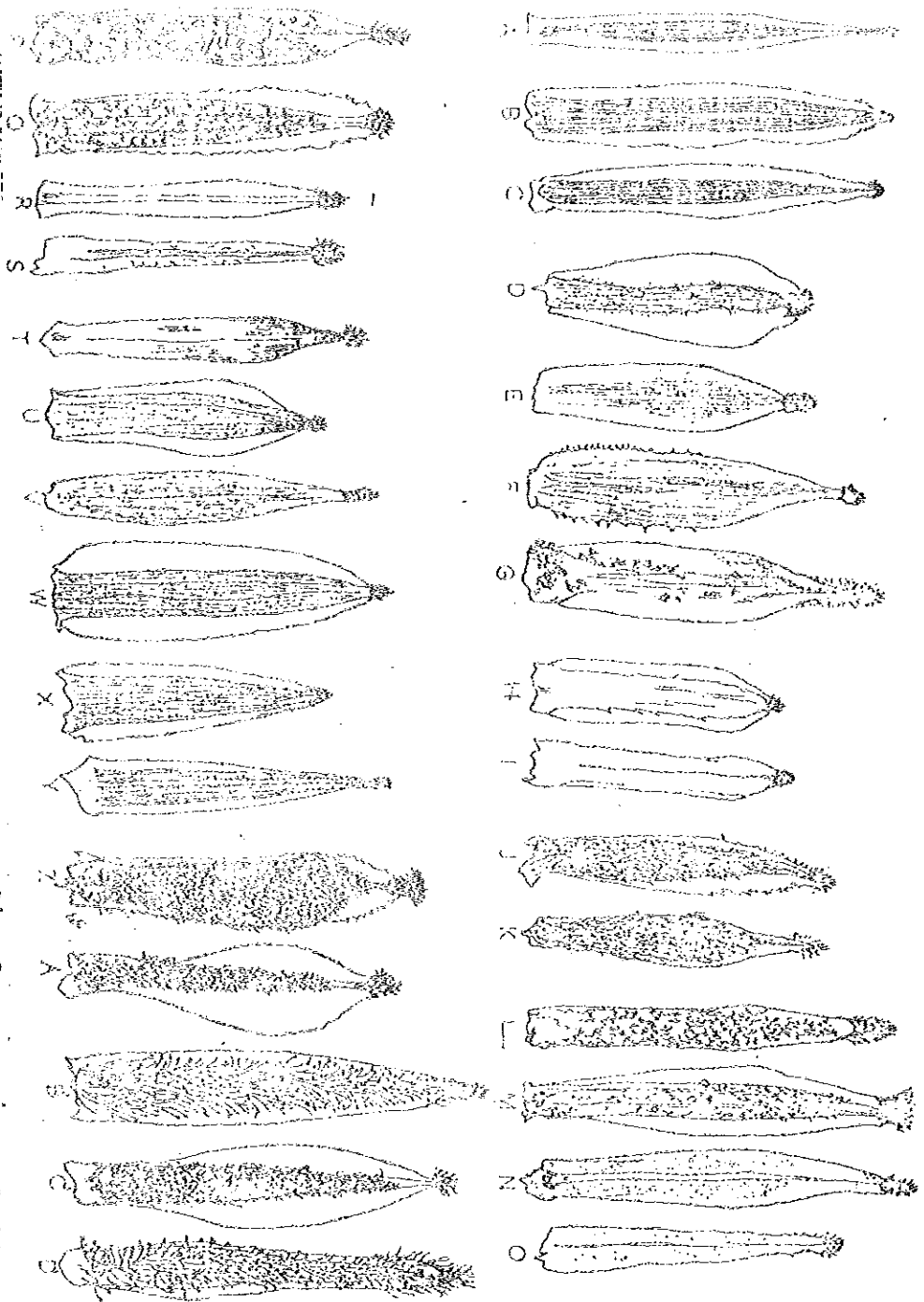


Fig. 12. calyculus variations in Senecio. See appendix for species names, magnifications and voucher specimens.

FIG. 13. Phyllary variations in Senecio. See appendix for species names
magnifications and voucher specimens.



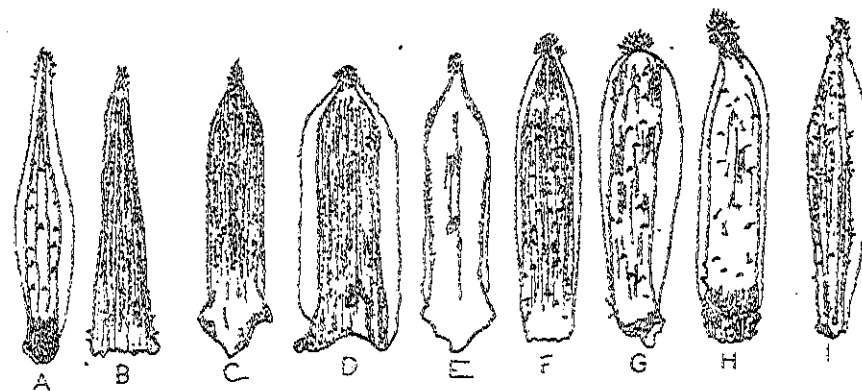


Fig. 14

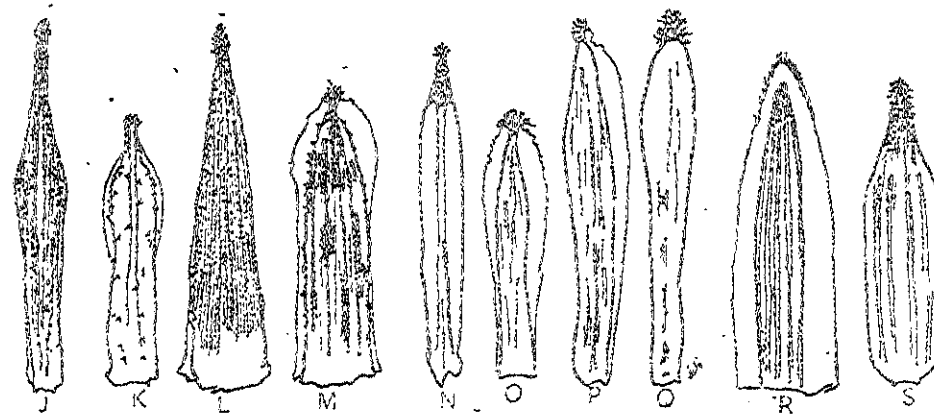


Fig. 14. Phyllary variations in Senecio. See appendix for species names, magnifications and voucher specimens.

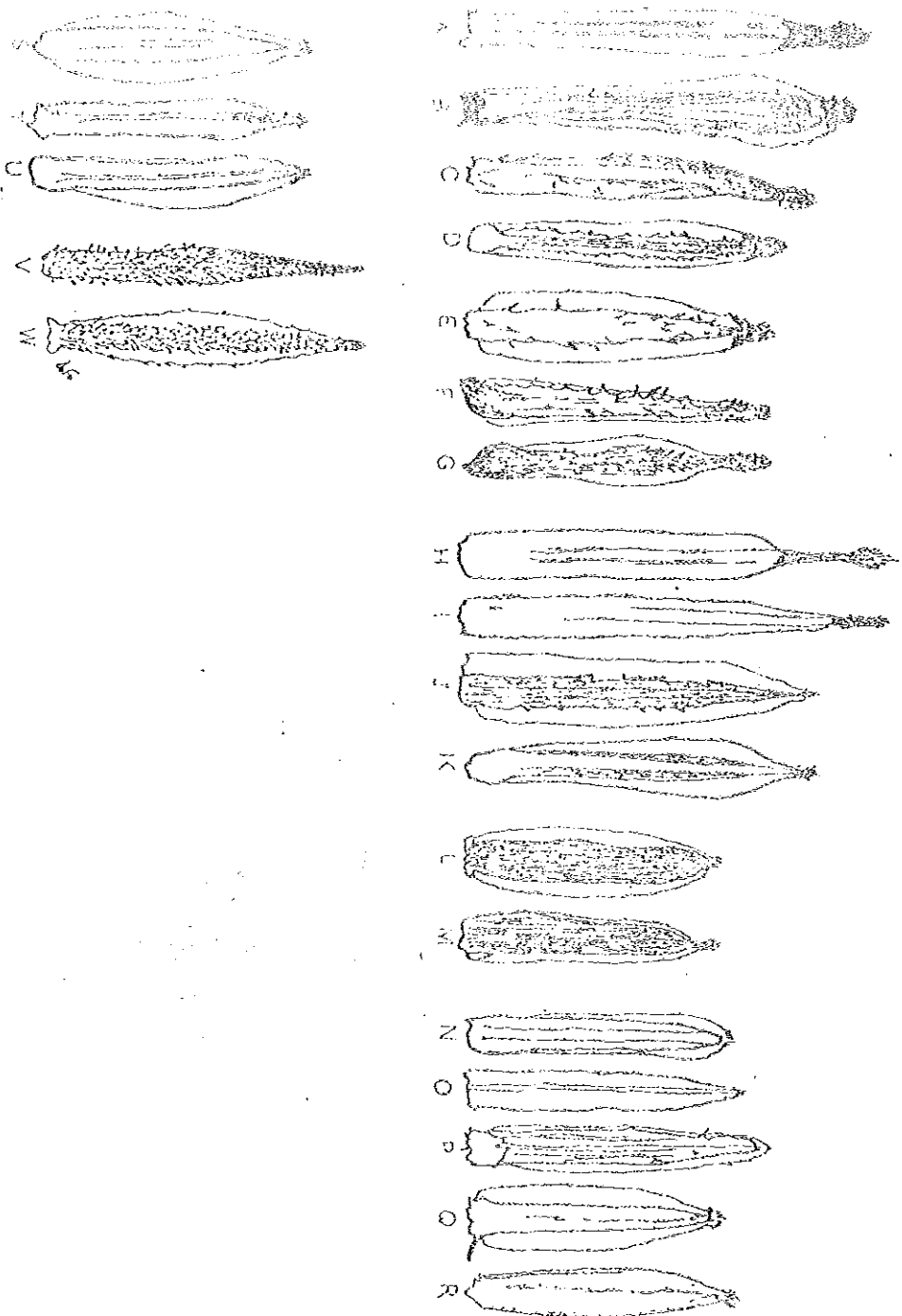


Fig. 15. Phyllary variations in Senecio. See appendix for species names, magnifications and voucher specimens.

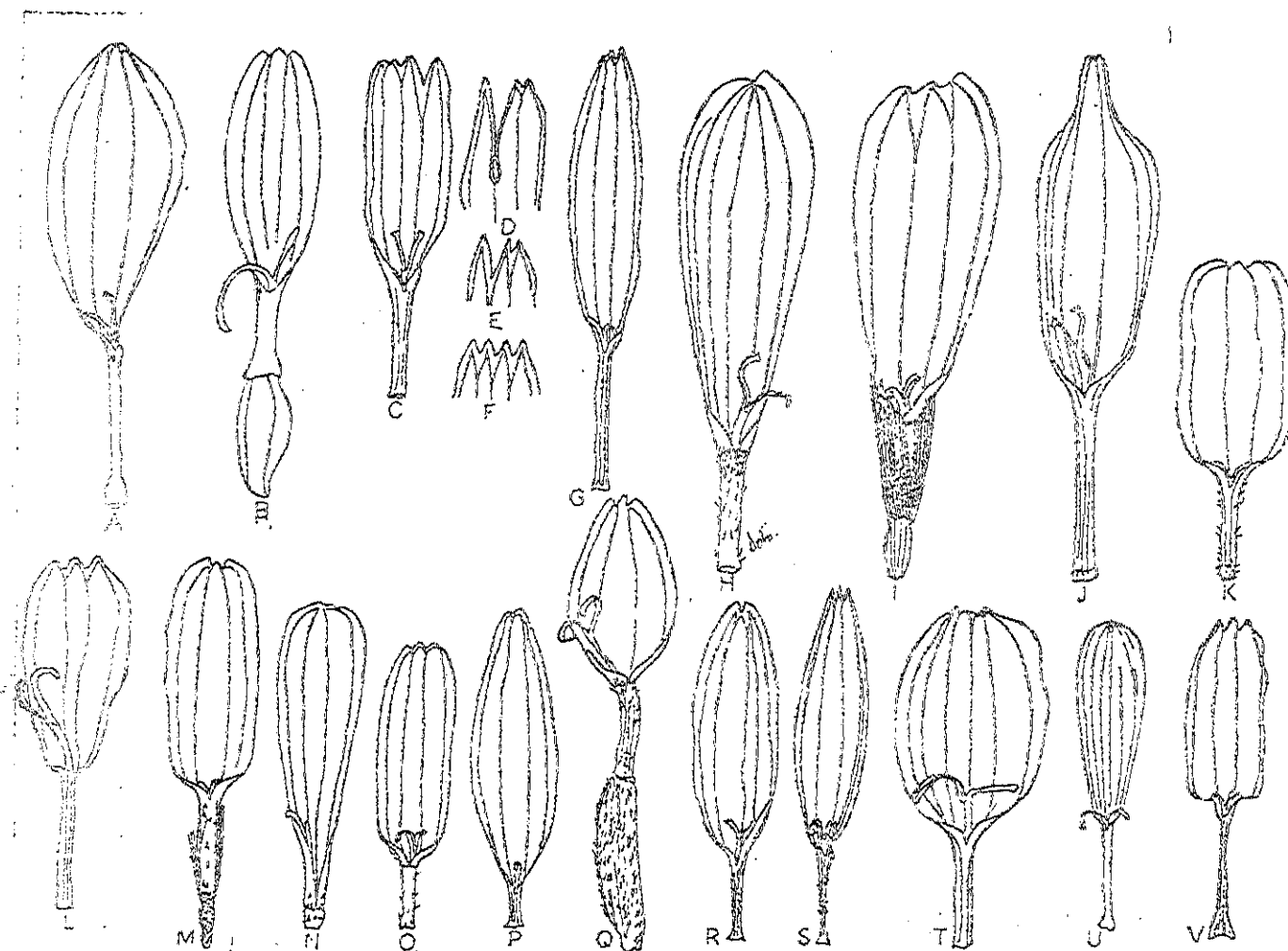
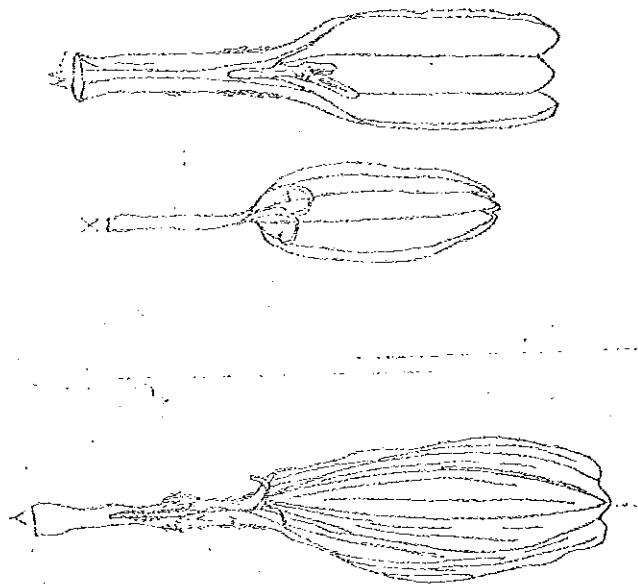


Fig. 16. Ray floret variations in Senecio. See appendix for species names, magnifications and voucher specimens.

Fig. 15. Contd.



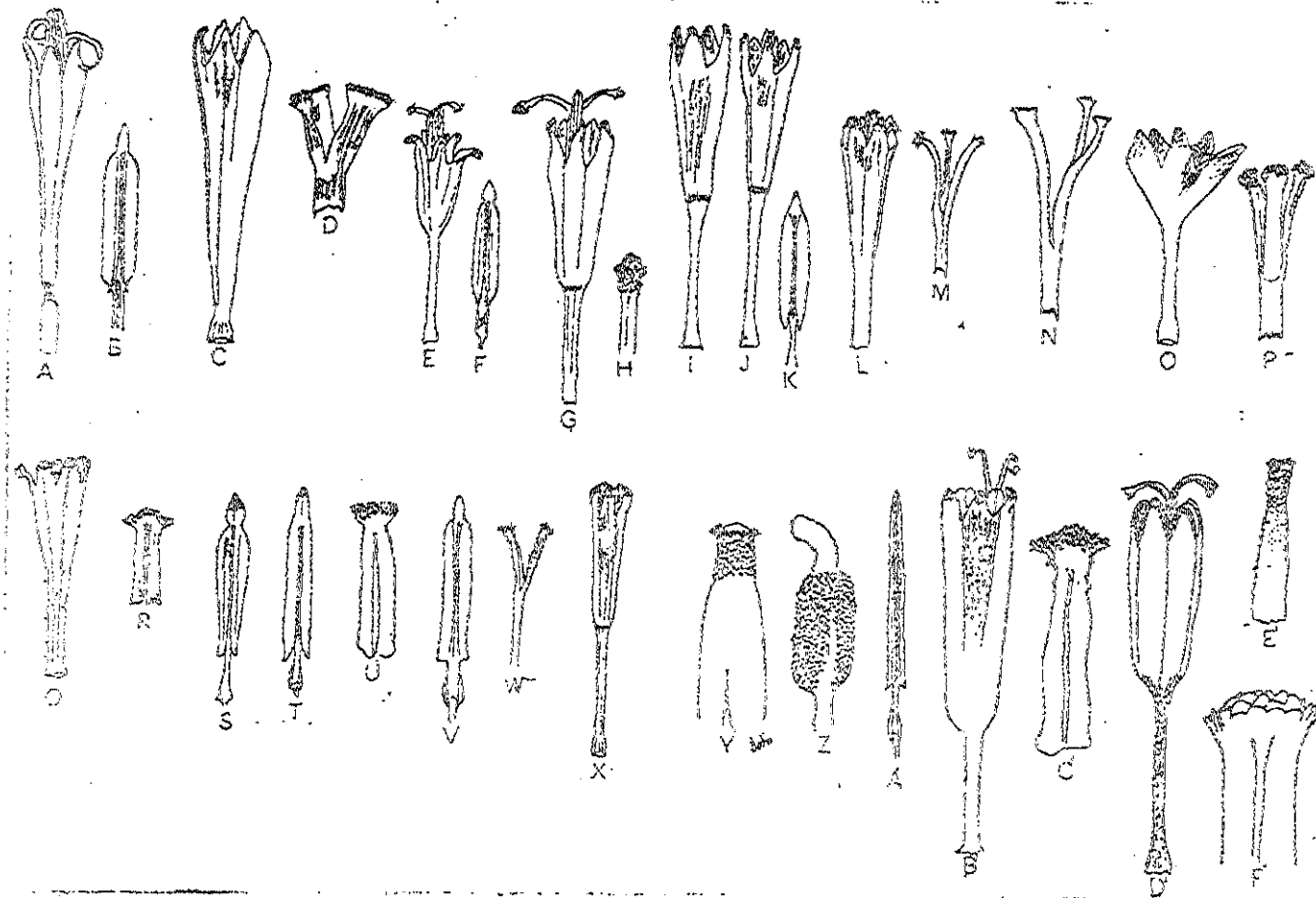


Fig. 17. Disc florets, anthers, styles and stigmatic surfaces in *Senecio*.

See appendix for species names, magnifications and voucher specimens.

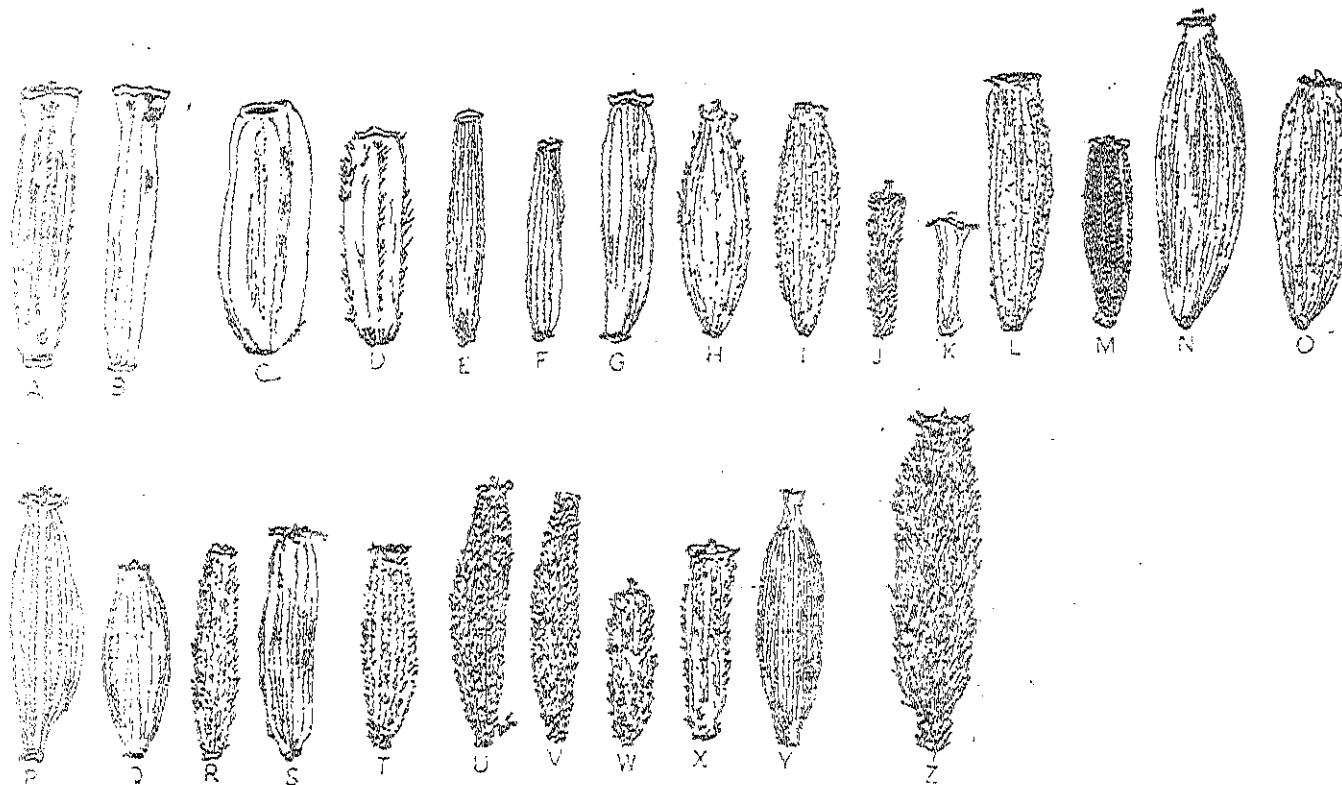


Fig. 18. Achene variations in Senecio. See appendix for species names, magnifications and voucher specimens.

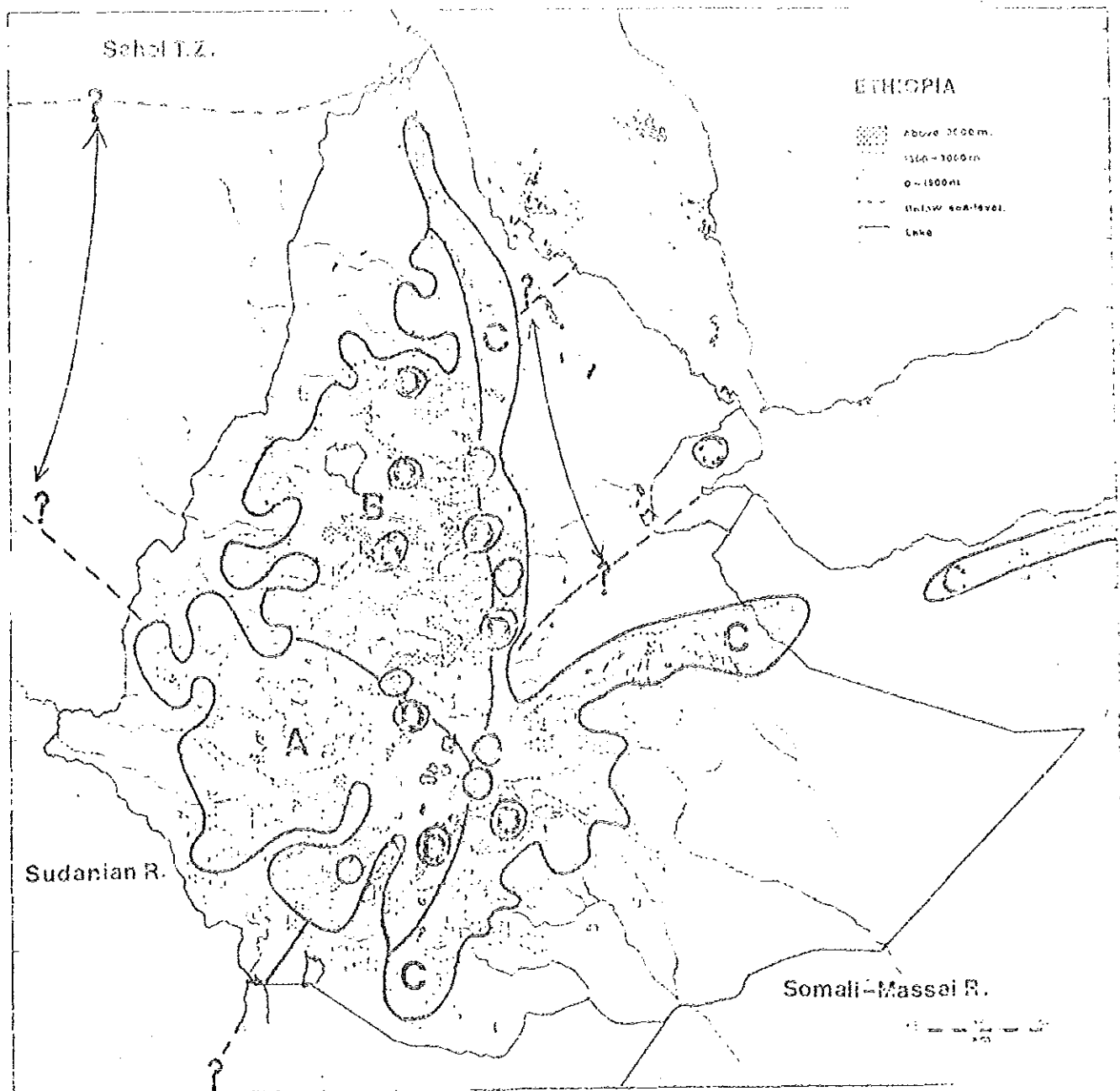


Fig. 19. Map of Ethiopia showing the local phytochoria. Sahel T.Z.: Sahel transition Zone. Sudanian R.: Sudanian regional centre of endemism. A: Southwestern centre of endemism. B: Central Plateau centre of endemism. C: Eastern escarpment, southeastern slope and Somalian mountain centre of endemism. D: High mountains centre of endemism. Somali-Masai R.: Somalia-Masai regional centre of endemism. Copied from Friis (1986).

PHYTOGEOGRAPHY

The distributions of all, except three, species of *Senecio* within Ethiopia are given in Fig. 20-27. The distributions have been compared with the subdivision of Ethiopia into centres of endemism as discussed by Friis (1986:79), see Fig. 19. On the basis of this comparison, the species are grouped according to the centres of endemism under which they fall. Many of the species are found in the High mountains centre of endemism. The rest are distributed in the Central Plateau centre of endemism, the Eastern escarpment, Southeastern slope and Somalian mountain centre of endemism and in the Southwestern centre of endemism. Two species are widespread, each being found in three of the centres of endemism.

Species in the High mountains centre of endemism

The High mountains centre of endemism occurs at an altitude of above 3000 m. Besides having many endemic plants, it also has a number of non-endemic species restricted to it (Friis 1986:81). The following taxa are of common occurrence in this centre:

S. fresenii (Fig. 27), *S. ragazzii* (Fig. 26), *S. schultzei* var. *lanatus* (Fig. 21), *S. inornatus* (Fig. 20). These taxa are distributed mainly in the Southern highlands of Ethiopia. *S. fresenii* and *S. schultzei* var. *lanatus* are restricted to the higher altitudes, the latter only being found above an altitude of 3900 m.

S. unionis (Fig. 23), *S. schultzei* var. *schultzei* (Fig. 21), *S. nanus* (Fig. 22). The distribution of these species is mainly confined to the high altitudes of the northern and southern highlands.

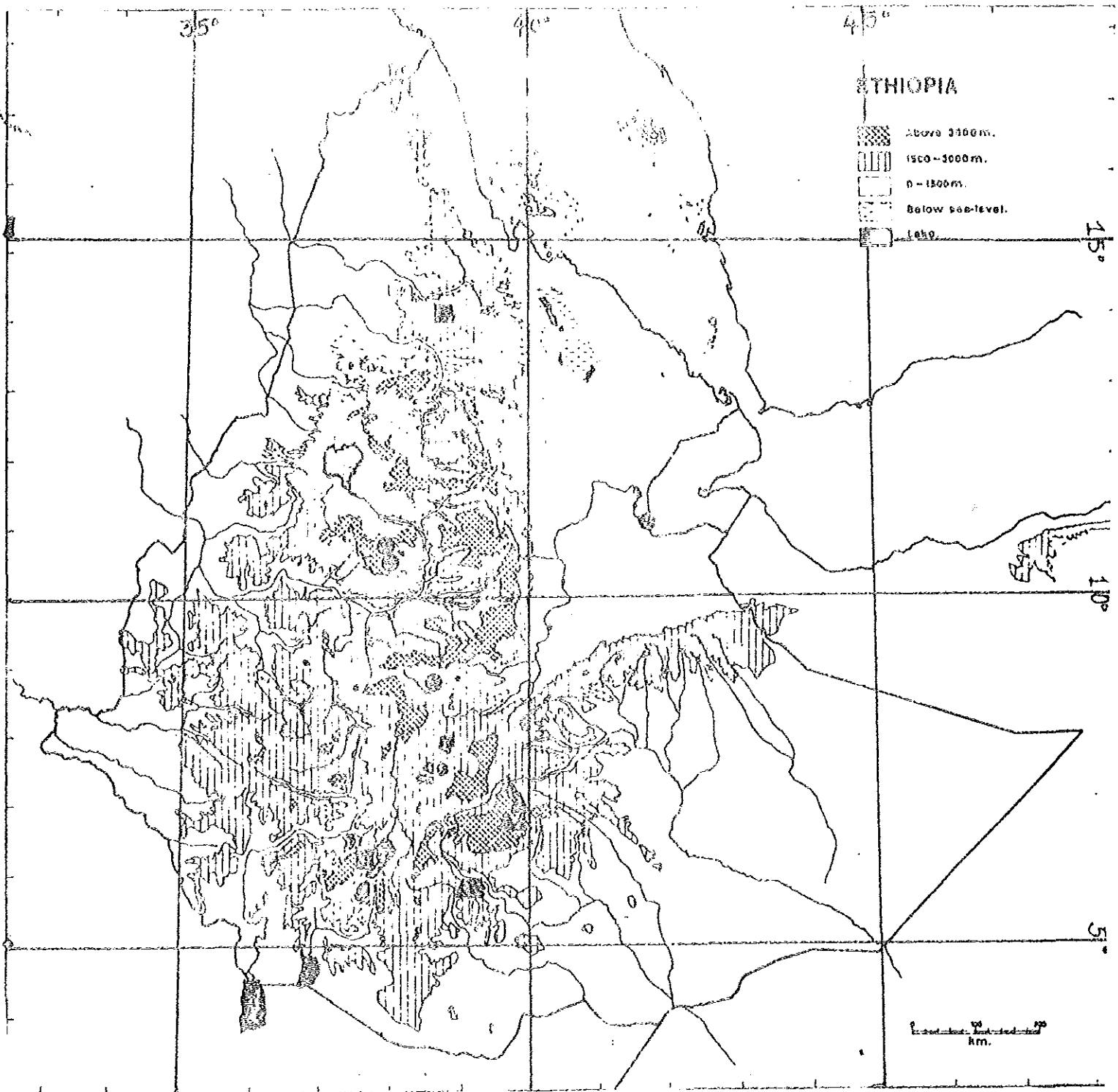


Fig. 20. Map of Ethiopia showing distribution of *Senecio inornatus* (▲), *S. confertus* (●) and *S. hochstetteri* (■).

S. confertus (Fig. 20), *S. farinaceus* (Fig. 24), *Senecio* sp. B (Fig. 26). These taxa are presently only known from the northern highlands and the central plateau region. *Senecio* sp. B is known only from few localities, some of which fall within this centre.

S. ochrocarpus (Fig. 23) is a species which occurs, though restrictively, in the central highland region. However, its distribution also extends down to the southern highlands.

Species in the Central Plateau centre of endemism

The Central Plateau Centre of endemism is an area with an altitude of between 1500-3000 m. It appears to contain a few endemic species (Friis 1986:81) and the ones which are endemic are mainly associated with bushland and wooded grasslands. *Senecio* species occurring in this area are : *S. pinnatipartitus* (Fig. 24), *S. mesogrammoides* (Fig. 24), *S. tamoides* (Fig. 25), *S. aegyptius* var. *discoideus* (Fig. 25), *S. schimperii* (Fig. 27). The first four are of common occurrence in the plateau regions of central Ethiopia. The fifth one however has its distribution extending to the northern highlands and central eastern lowlands also.

Species in the Eastern escarpment, Southeastern slope, and Somalian mountain centre of endemism

Most of this area lies between the altitudes of 1500 and 3000 m. A number of non-endemic species are also restricted to this area and of those that are endemic, the most common in this centre is the monotypic endemic family Barbeyaceae (Friis 1986:81). *Senecio* species found in this area include; *S. lyratus* (Fig. 22), *Senecio* sp. A (Fig.



Fig. 21. Map of Ethiopia showing distribution of *Senecio hadiensis* (Δ), *S. schultzii* var. *lanatus* ($\bullet$) and *S. schultzii* var. *schultzii* ($\blacksquare$).

26), and *S. steudellii* (Fig. 25). *S. lyratus* is distributed in the eastern and northeastern highlands but it also extends to the lowlands in the north and the plateaus in the central Ethiopia. *Senecio* sp. A is a taxon whose distribution is still very much unknown. Presently its localities are only known in the southeastern highlands and the highland zone between the Southwestern centre of endemism and the Central plateau centre of endemism. *S. hadiensis* (Fig. 21) is a species found in parts of the plateau and highland areas in north, central, eastern and southern Ethiopia, but has also been recorded from the southwestern highlands.

Species in the Southwestern centre of endemism

The Southwestern centre of endemism is a highland region characterized mainly by forest species and many non-endemic species (Friss 1986). *S. platypleurus* (Fig. 23) has its distribution restricted to this area only.

Widespread species

These are species which are known to have their distribution in more than one centre of endemism. *S. myriocephalus* (Fig. 22) is known to occur in three of the centres of endemism and is mainly concentrated in the highlands lying between c. 36 and 41 E and 5 and 10 N. *S. hochstetteri* (Fig. 20), another widespread species, occurs in the northern, southern and southwestern highlands, with its distribution covering three centres of endemism.

The highlands of Ethiopia are known (Mesfin 1984:41) to be an important centre of endemism. Seven endemic *Bidens* species (Mesfin

1984) have been described from this region. Another composite also known to be endemic to this region is *Dimorpha megenensis* F. G. Davies (1979). Thirteen out of the 28 *Senecio* species studied are so far only known from the highlands of Ethiopia with a few, however, also occurring in the lowlands. Ellis et al. (1982:28) calculated the degree of endemism in the 'upland vegetation' to vary between 5 and 10%. However when individual genera are looked at, the degree of endemism is seen to be higher e.g. c. 32% in *Bidens* (Mesfin 1984:39). In *Senecio* it could possibly be about 50%, if the species so far known only from Ethiopia are considered.

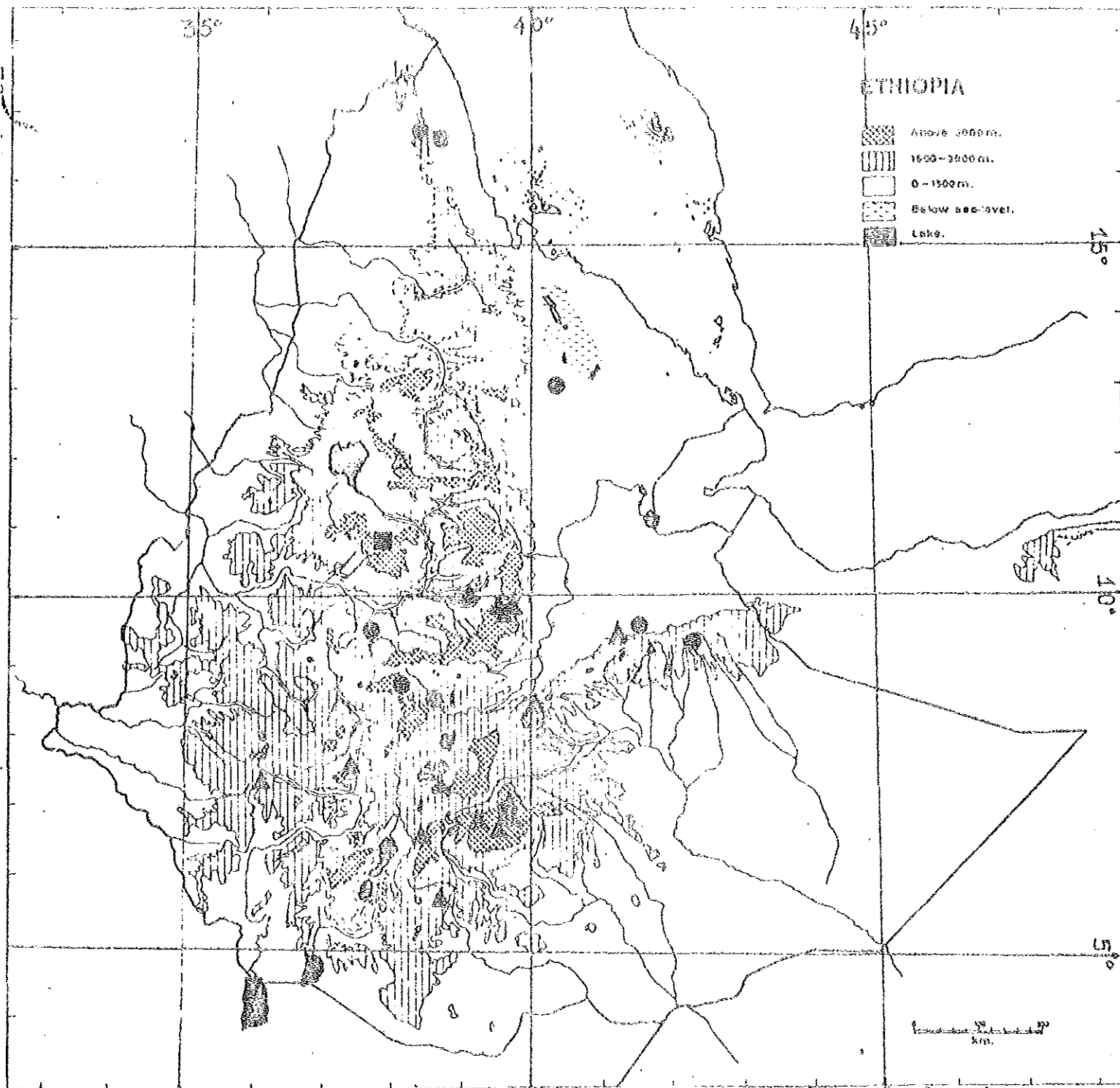


Fig. 22. Map of Ethiopia showing distribution of *Senecio myriocephalus* (▲), *S. lyratus* (●) and *S. nanus* (■).

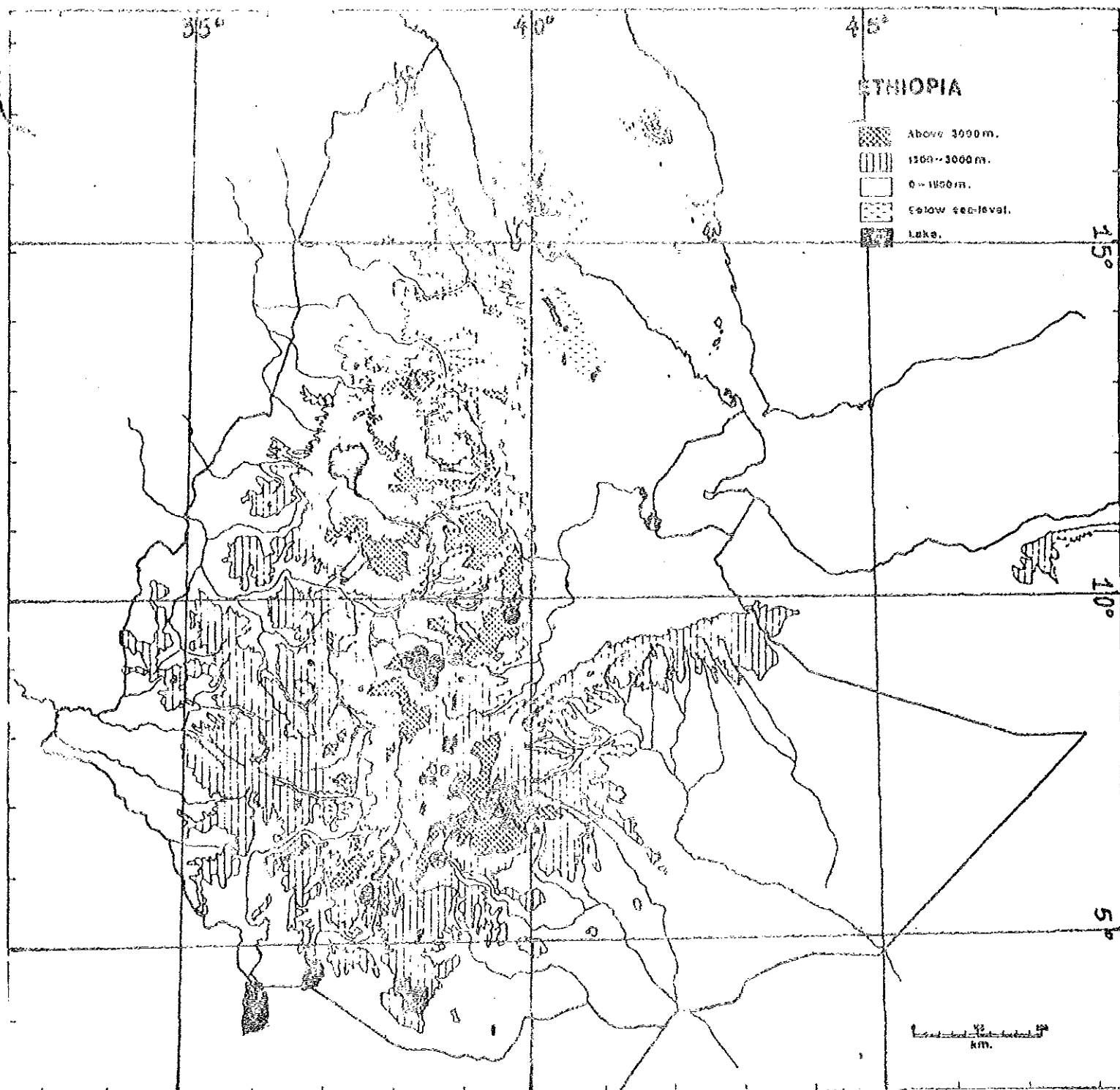


Fig. 23. Map of Ethiopia showing distribution of *Senecio ochrocarpus* (●), *S. unionis* (▲) and *S. platypleurus* (■).

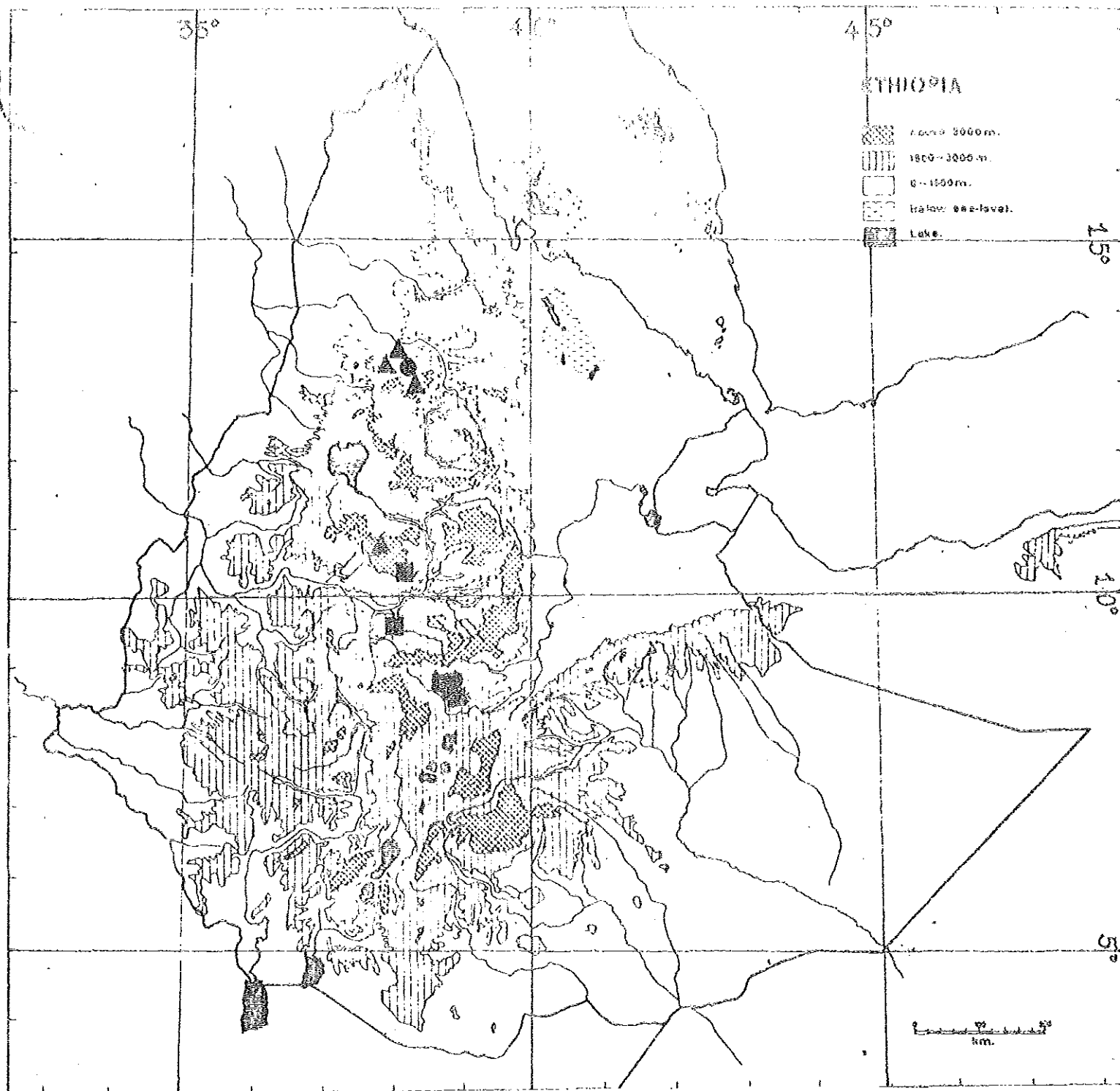


Fig. 24. Map of Ethiopia showing distribution of *Senecio farinaceus* (▲), *S. pinnatipartitus* (■) and *S. mesogrammoides* (●)

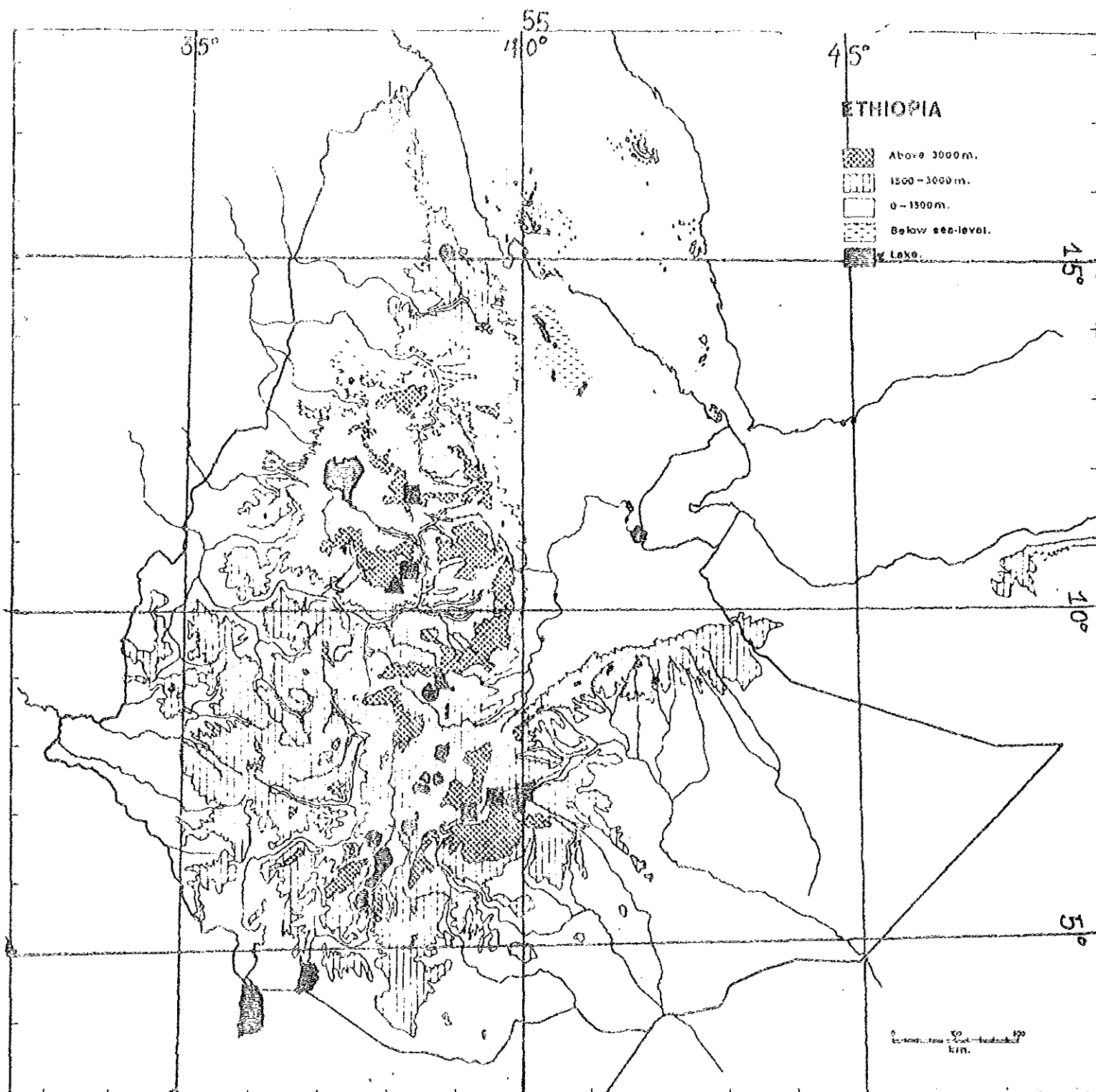


Fig. 25. Map of Ethiopia showing distribution of *Senecio steudelii* (▲), *S. aegyptius* var. *discoideus* (■) and *S. tamoides* (●)

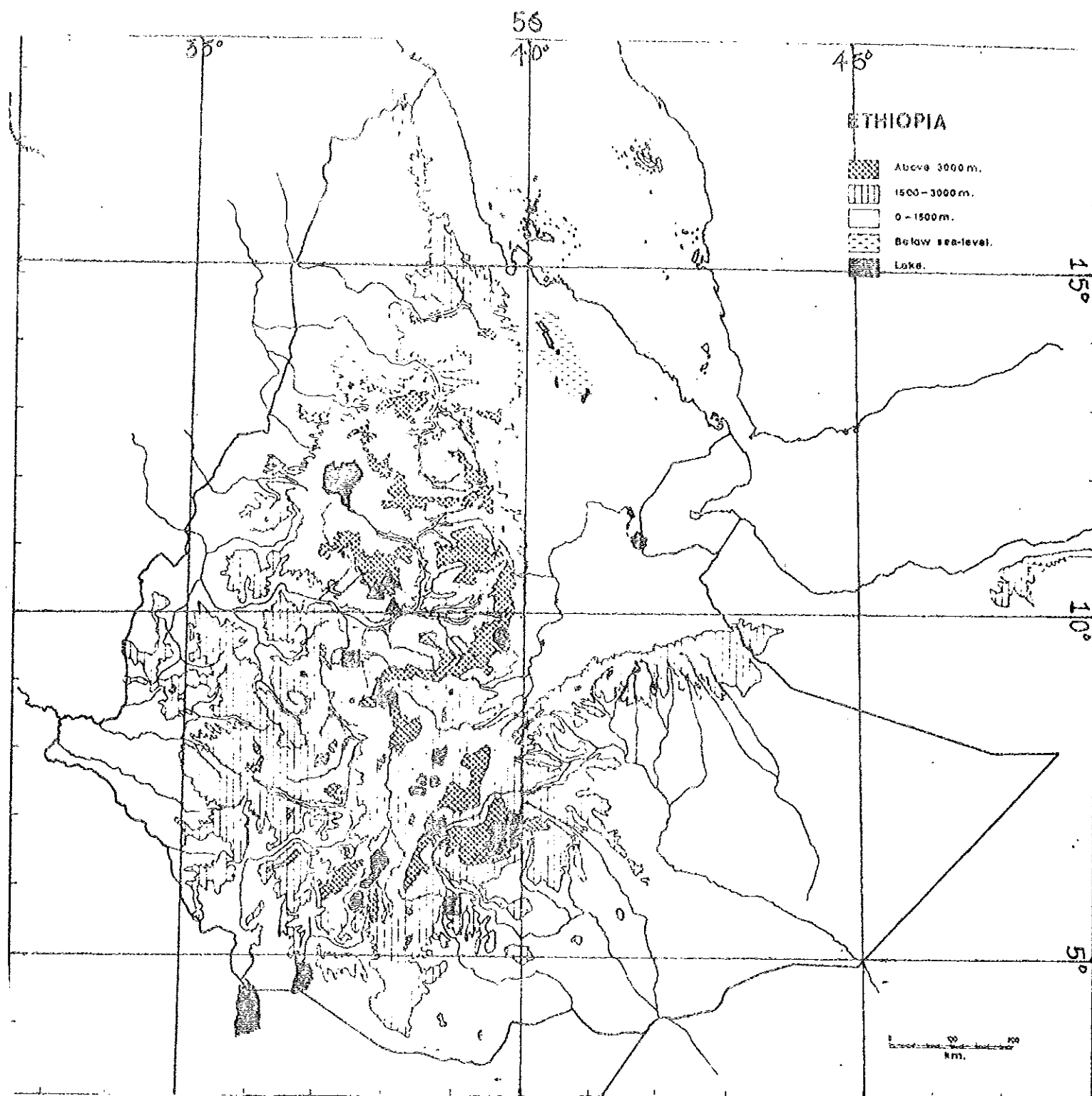


Fig. 26. Map of Ethiopia showing distribution of *Senecio ragazzii* (●), *Senecio* sp. A (▣) and *senecio* sp. B (▲).

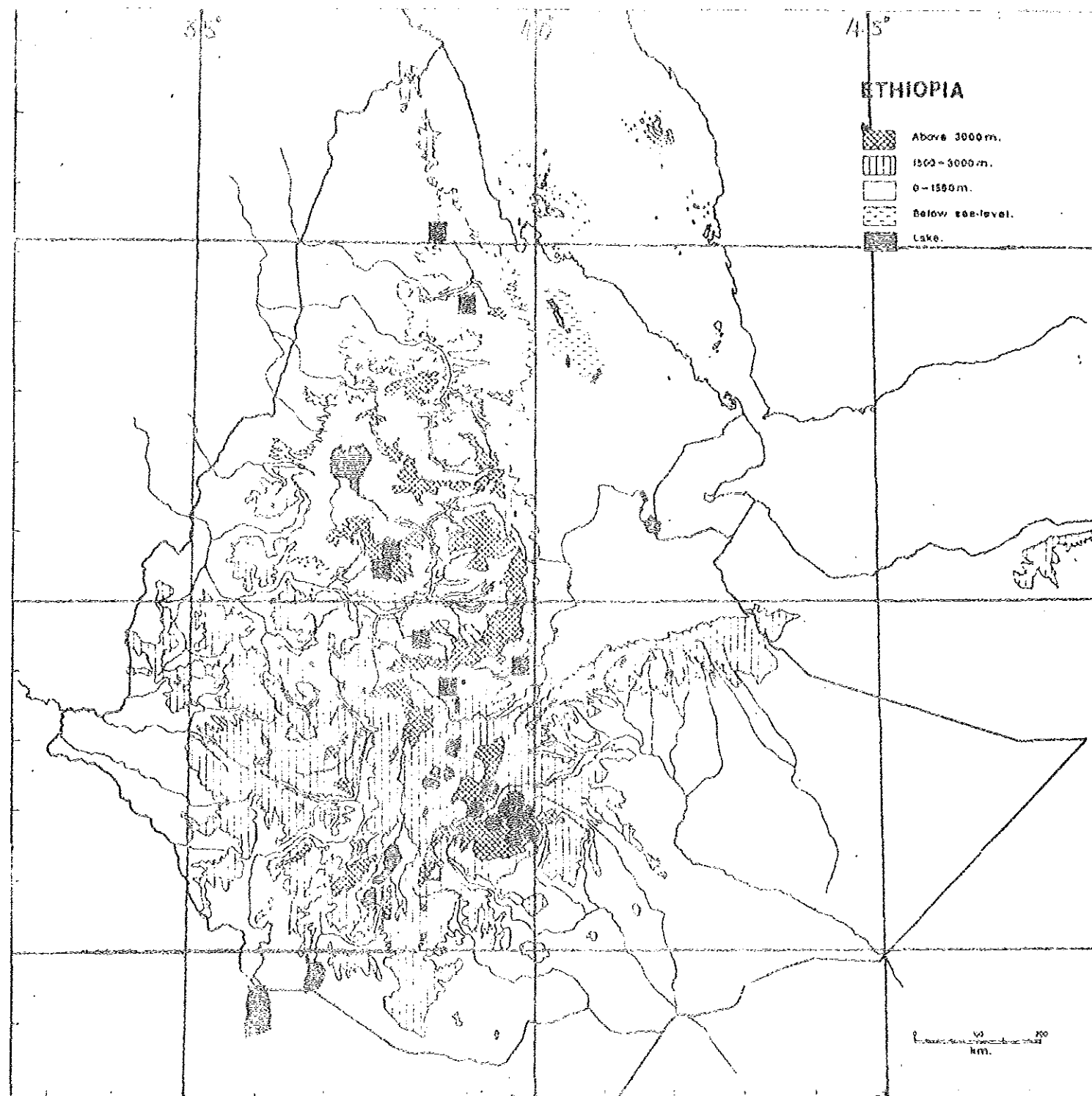


Fig. 27. Map of Ethiopia showing distribution of *Senecio schimperi* (■) and *S. fresenii* (⊙).

TAXICOMY

Senecio L.

Linnaeus 1753:866; Bentham & Hooker 1873:446; Oliver & Hiern 1877:408.

Type: *S. vulgaris* L. .

Erect, scandent, annual or perennial herbs, undershrubs or shrubs. Stem terete, simple or variously branched. Leaves alternate or distichous, sessile to petiolate; lamina linear to cordate, shallowly to deeply or sometimes irregularly pinnatipartite; margins entire, serrulate to doubly serrate, indistinctly denticulate to compound dentate or pinnatifid, sometimes revolute; lobes oblong to ovate. Capitula erect at anthesis, solitary and terminal or axillary and arranged in lax or compact corymbose cymes; peduncle terete or striate-sulcate. Calyculi linear to triangular, glabrous to tomentose; margins entire, smooth or variously pubescent, sometimes scarious and lacerate. Phyllaries green, uniseriate, connate, linear to ovate, herbaceous, rarely coriaceous; margins entire, scarious or rarely pubescent. Ray florets pistillate, rarely neuter; ligules light or deep yellow to orange or yellowish-orange, elliptic to obovate, sometimes absent. Disc florets yellow to brownish-yellow, hermaphrodite. Corolla (4-) 5-lobed, narrowly cylindric below, expanded and cylindric to campanulate or turbinate above. Anthers yellow to brown; base truncate or sagittate; apex lanceolate or ovate triangular; pollen grains echinate, 3- colporate. Style ± uniform or semi-bulbous to conical at base, bi- or rarely trifurcate at apex with truncate or somewhat pectinate tips. Achenes terete, rarely 3-4

angled, sometimes narrowed at apex and base, elliptic to oblanceolate, smooth striate to costate, glabrous or pilose; margins entire or setulose; apex with annular rim having pappus; pappus with antrose barbs; base truncate or open and encircled by a narrow cartilaginous rim.

Key to the species.

1. Plants with climbing stems or stems growing through and over bushes 2
 - Plants erect or at most basally decumbent or ascending, not climbing 5
2. Leaves elliptic, sometimes ovate or oval; stem semi-succulent or succulent 9. *S. hadiensis*
 - Leaves triangular or somewhat so, if not, then lyrate-pinnatifid; stem not succulent 3
3. Leaves reticulately veined; capitula 4-15 mm wide 1. *S. lyratus*
 - Leaves palmately veined; capitula 24-45 mm wide 4
4. Leaves 3-nerved; capitula solitary; bracts of calyculus 9; involucre diam. c. 15 mm; apex of ray florets obtuse 21. *S. macroglossus*
 - Leaves 5-7 nerved; capitula in lax but crowded corymbose cymes; bracts of calyculus 2-4; involucre diam. (2-)3-7 mm; apex of ray florets 3-fid 24. *S. tamoides*

5. Plant annual 6
 - Plant perennial 8
6. Capitula discoid 2. *S. schimperi*
 - Capitula radiate 7
7. Basal leaves petiolate, only upper sessile; corolla tube glabrous; style branches with reddish-brown lines from tip to base; achenes 3-4 angled, shiny black ... 23. *S. pinnatipartitus*
 - Basal and upper leaves sessile; corolla tube pilose; style branches lacking such lines; achenes terete, brown 15. *S. mesogrammoides*
8. Capitula discoid 9
 - Capitula radiate 12
9. Leaves (or at least some of them) decurrent on to the stem, elliptic or ovate-elliptic; achenes striate, glabrous 10
 - Leaves not decurrent on to the stem, pinnatipartite or somewhat so, spatulate in outline; achenes densely pubescent with hairs in longitudinal rows or appearing as if so 11
10. Lower leaves rosulate; capitula few; phyllaries (6.8-)7-10 (10-8) mm long 12. *S. inornatus*
 - Lower leaves absent; capitula many; phyllaries 5-5.5 mm long 18. *S. sp. A*
11. Plant glandular, viscid; inflorescence in lax corymbose cymes; involucre diam. 4-7 mm; phyllaries 6.2-9.8 mm long; achenes (2.4-)2.8-3.9 x 0.4-0.8 mm 7. *S. hochstetteri*

- Plant not glandular, not viscid; inflorescence in compact corymbose cymes; involucre diam. 2-3 mm; phyllaries 3.9-4.5 mm long; achenes 1.7-2 x 0.3-0.4 mm 16. *S. aegyptius* var. *discodeus*
- 12. Plant low; sometimes caespitose 13
- Plant not low; never caespitose 15
- 13. Calyculi 2.2-5 mm long; leaves always alternate; involucre diam. 4-8 mm 10. *S. unionis*
- Calyculi 5.5-14.3(-20) mm long; leaves rosulate or only alternate on evident stems; involucre diam (8-)9-24 mm 14
- 14. Capitula 15-48 mm wide; anther bases truncate; achenes 2.5-4 mm long, costate, glabrous or sparsely pubescent between ribs 20. *S. schultzei*
- Capitula 13-15 mm wide; anther bases sagittate; achenes 1.9-2 mm long, striate-sulcate, glabrous 13. *S. nanus*
- 15. Leaves succulent, glaucous and glabrous 22. *S. ruwenzoriensis*
- Leaves not as above 16
- 16. Peduncles remotely to densely pubescent 17
- Peduncles thinly to densely white tomentose 20
- 17. Leaves petiolate or if not so, only a few sessile, cordate 14. *S. ragazzii*
- Leaves not petiolate, sessile, not cordate 18

18. Phyllaries c. 8, achenes striate, copiously hairy
 19. *S. confertus*
- Phyllaries 11-21, achenes striate or costate, glabrous 19
19. Ray florets c. 8.4-9.5 mm long; leaf margins sharply
 denticulate 25. *S. subsessilis*
- Ray florets c. 15-20.6 mm long; leaf margins dentate
 3. *S. sp. B.*
20. Leaf margins irregularly dentate, parted or pinnatifid 21
- Leaf margins not as above 22
21. Involucre diam. 5-7 mm; phyllaries 4.3-5.3 mm long; (10-)13
 ray florets, (7-)8-9.2 mm long 6. *S. platypleurus*
- Involucre diam. 7-13 mm; phyllaries 7.5-9 mm long; (4-)5 ray
 florets, 9.5-20 mm long 17. *S. farinaceus*
22. Basal leaves in young plants petiolate; disc floret funnel-
 shaped 4. *S. ochrocarpus*
- Basal leaves in young plants sessile; disc floret tubular 23
23. Achenes striate ± hairs along striations 11. *S. myriocephalus*
- Achenes not as above 24
24. Leaves thinly to thickly white tomentose; capitula urceolate
 6. *S. fresenii*
- Leaves glabrescent, rarely tomentose; capitula campanulat
 5. *S. steudelii*

1. *Senecio lyracous* Forssk., Fl. Egypt Arab., 246 (1775). Type: Yemen,
Forsskål (C, Syntype, n.v. fide A. F. B. Petersen, unpublished
manuscript on composition of *Cineraria*).

Syn. 5. *lyratipartitus* Sch. Bip. ex A. Rich., Tent. Fl. Abyss.
1:439 (1848). Type: Ethiopia, Schimper 184, n.v. fide Jeffrey
(1986).

Cineraria schimperi Sch. Bip. ex Oliv. Hiern., Fl. Trop. Afr.
3:404 (1877) nom. Illegit. Super fl. Type as for *S.*
lyratipartitus Sch. Bip. ex A. Rich., n.v. fide Jeffrey
(1986).

C. lyratipartita (Sch. Bip. ex A. Rich.) Cuf. In Bull. Jard. Bot.
Nat. Belg. 37, suppl. 1752 (1967). Type: M. Scholada near
Adua, Schimper 1843, n.v. fide Cufodontis (1967).

Erect many branched rambling, diffuse or pendulous, climbing,
rather fragile herb or shrub. 0.3-3.5 m tall or more. Stem terete
green, sparsely pubescent, striate-sulcate, above; light brown to
purplish - brown, glabrous, below. Leaves sessile, auriculate; young
ones small, ovate; mature ones large, lyrate - pinnatifid or
triangular and lobed at base; lobes with dentate margins, terminal one
lanceolate or oblanceolate, acute, largest; (2.2-)3.5-10.5 x 1.3-5.5
cm; upper surface green, sparsely pubescent; lower surface light or
pale green, densely pubescent; pubescence mainly along veins and
margins; rarely both surfaces glabrous; margins doubly serrate or
dentate; apex acuminate or acute. Capitula urceolate radiate, small,
4-15 x 4-10 mm at anthesis; in loose corymbs or corymbose cymes;
peduncles 0.3 - 2.7 cm long, slightly pubescent, green, striate -

sulcate, bracteate, calyculi (3-)5 or 5(-8), linear-lanceolate or lanceolate, brownish-green to green, (1-)1.2 - 2.8(-3.5) x 0.2-0.5(-0.9) mm; apex acute, light brown, hairy; surface glabrous; margins hairy. *Involucre* 5-7 mm in diameter; phyllaries 12-14, light brown, yellowish-brown or light green, 3-5.4 x 0.5-1.3 mm, glabrous, lanceolate or oblong, tapered or attenuate at apex; apex acute brown, puberulous; margins entire or scarious; striae (1-)3-5. *Ray florets* bright to deep yellow, (4-)6-9, pistillate; rays elliptic or obovate; 3.2-7.8 x 1.3-4.8 mm; tube glabrous; (2-)3-5(-8)-striated; apex 3(-4)-fid. *Disc floret* 3.8-6 x 0.8-1.2 mm, tubular; corolla yellow, 5-lobed; lobe apices papillose; limb glabrous. *Anthers* 1.4-2 mm long, light-brown, sagittate at base. *Style* 2.5-6.9 mm long, glabrous, terete, bulbous at base; stigmatic branches brown, 2(-3). Achenes faintly striate, glabrous or hispidulous; hairs caducous, arranged in widely spaced longitudinal rows; yellow or brown; apex with white spongy rim; oblong or oblong-elliptic, terete, 1.6-2.6 x (0.1)0.4-1 mm; base truncate. Pappus of achenes (2.5-)3-3.2 mm long white, antrosely barbed.

Distribution. Common particularly in the Eastern, Northern and North-eastern parts of Ethiopia. Also found in Shewa and Sidamo regions. Outside Ethiopia in Kenya, Tanzania, Sudan, Somalia and Yemen.

Habitat. Among bushes in open *Juniper* forests on clay, in *Olea-Acacia-Rhus* -*Carissa* scrub, in stony valley bottoms. Also grows on very steep wooded slopes with *Schrebera*, *Alata*, *Pavetta* spp; mountain slopes with mixed *Podocarpus-Celtis* forests; limestone slopes with *Euphorbia*

aby. It grows in forest on the edge of the forest by roadsides and in shrubs alongside paths; etc. (Mooney 8264).

Notes on variation and similarities. *S. lyratus* is a distinct species that is fairly homogeneous in most morphological features. It, however, shows variation in its achenes which can either be hairy or glabrous. Both these features sometimes occur in one collection, e.g. Mooney 8264. The presence of glabrous achenes can be attributed to the fact that the hairs are caducous. This is attested to by the observation of traces of hair at the basal area of those achenes that are glabrous.

The degree to which the bases of the leaves are parted or divided also shows some variation. In some collections, e.g. Ensermu et al. 550, most of the leaves are intact with no divisions or partitions at the base, but if present then only two lobes are seen. In others e.g. Mesfin & Tewelde 2627, only a single lobe occurs at the base of each leaf while in Mesfin et al. 1179 up to 6 lobes are seen in some of the leaves. In the later case the leaves are somewhat pinnatipartite.

S. lyratus resembles *S. macroglossus* in habit and *S. tamoides* in both leaf shape and habit. From *S. macroglossus* it differs in having leaves that are lyrate - pinnatipartite or triangular and lobed at the base and capitula that are urceolate. From *S. tamoides* it can be distinguished by its capitulum which is urceolate, the achenes which are glabrous or faintly striate and pubescent with hairs arranged in widely spaced longitudinal rows or by its leaf margins which are doubly - serrate or dentate or obtusely dentate and also by the lobes at the base of the leaves.

Specimens examined.

Eritrea: Bad. Area, 1.IX.1962, *Mooney* 9424 (ETH); Faghena,
13.V.1967, *Mooney* 1100 (ETH)

Tigray: Forest beyond Besa just below Agoro, 19.IX.1972, *Tewolde*
1135 (ETH).

Wollo: Koram, 19.IX.1980, *Mercier* v 200 (ETH).

Hararghe: Errer Valley, c. 22 km SE of Harrar on highway to
Jiggiga, 20 km downstream, 25.XI.1961, *Burger* 13409 (ETH);
Near Chelanko, 27.XI.1959, *Mooney* 8264 (ETH).

Shewa: c. 10 km N. of Arsi Negelle, 4.VI.1982, *Ensermu et al.* 550
(ETH); Bole Valley below Mullu farm c. 60 km NNE of Addis
Ababa, 23.X.1971, *Gilbert* 2220 (ETH). c. 26 km S.W. of Addis
Ababa on the Butajira road, 14.IX.1980, *Mesfin et al.* 1179
(ETH)

Sidamo: c. 14 km N. of Wadera, area called Harte Sekora,
22.XII.1981, *Mesfin & Tewolde* 2676 (ETH).

2. *Senecio schimperii* Sch. Bip., Tent. Fl. Abyss. 1:425 (1878)

Type : Ethiopia, Tigray, near Adwa 25 May 1837. Schimper 144 (? P, syn.; K, isosyn.), Schimper 1880 (? P, syn.; K, isosyn.),
Quartin-Dillon s.n. (P, syn) (n.v. fide Mesfin Yadesse,
unpublished manuscript on compositae of Ethiopia) (Isosyn. EAL
UPS!)

An erect annual or somewhat woody perennial herb, often much branched basally with branches ascending, 10-70 cm tall. Stem pale-green, often also purplish green near base, upper parts sometimes streaked purple, terete, striate-sulcate; internodes 8.26(-53) mm long. Leaves simple, alternate, numerous, narrowly-elliptic or linear, often narrowing towards apex and base; young ones lanceolate; brown (after drying) brownish-green or pale green to green above, lighter below, glabrous, sessile, amplexicaule, 12.7-106 x 2-5 mm; apex callous tipped, obtuse; margins entire, remotely denticulate to dentate, sometimes with one or two large lobe-like teeth towards base, revolute. Capitula discoid, 0.5-0.9 x 0.5-0.8 cm at anthesis, in corymbose cymes; peduncles 0.3-5 cm long glabrous, terete, striate-sulcate, some bracteate, light green to purplish-green. Calyculi 6-12, lanceolate ovate-lanceolate, rarely triangular, (1.1-)2-3(-4) x 0.5-1 mm, light green to brownish-green, mostly brown towards apex, sometimes with a purplish tinge at point below the apex; apex sharp, acuminate, acute, attenuate or blunt, hairy; margins hairy, sometimes membranous, lacerate and hairy; surface glabrous with solitary median striation; occasionally swollen at base. Involucre 3.5-7 mm in diameter; phyllaries (17-)21(-23), brownish-green to light green (4.2-)4.6-6.1 x 0.5-1(-1.4) mm glabrous or sparsely hairy, linear-

lanceolate, lanceolate or oblanceolate; apex sharp, acute or alternate. Light brown to brownish black, sometimes with a slight purple tinge at point below apex; hairs; margins entire or scarious when scarious; sometimes on only one side, white; striac 1 or 2. *Disc floret* somewhat tubular, 3 2-4.7 x 0.4-0.9 mm; corolla yellow or sometimes with a greenish tinge, 5-lobed; lobe apices papillose; limb glabrous. *Anthers* (0.3-)0.6-1.2 mm yellow light brown or brown, truncate at base. *Style* 2.5-4.5 mm long, glabrous, uniformly terete or often also semi-bulbous or conical at base; stigmatic branches yellow, or brown, sometimes reduced. *Achenes* finely striate, densely pubescent; hairs short and thick, arranged along striations; light brown, terete, sometimes 3-4 angled; apex with yellowish-white crown; (1.7-)2-2.3 x 0.3-0.6 mm, oblong-elliptic; base truncate. *Pappus* of *achenes* (2.5-)3 1-4.2 mm long, white, antrosely barbed.

Distribution. Wide, from Eritrea region in the north to Sidamo region in the south

Habitat. Open low scrub, near streams, or in bushes with *Acacia*, *Rhus*, *Ricinus communis*, *Solanum nigrum* etc. Also occurs around cultivated fields, waste fallow areas and on hillsides; alt., 2050-2800m.

Notes on variation and similarities. Many of the floral and foliar features in *S. schimperii* show uniformity. However in some of the specimens studied variation has been noted in calyculi shape and margins, phyllary shape and amount of hairiness and in the dissection of the leaf margins. In Thulin 2 Luado 3940 and Evans 349 from Gojjam, Mooney 7855, Gilbert et al. 7347 and Ensermu 84 from Showa, Mooney 8032 from Eritrea, Telle 64 from Aggrey and Mooney 6378 from Sidamo

the calyculi are lanceolate with margins that are either hairy or membranous and ciliate (Fig. 129). In Tesfaye s.n. and Otieno 14 both from Shewa and Schimper 144 from Digray, they are lanceolate or narrowly triangular with margins that are membranous, lacerate or somewhat so and hairy, especially around the basal region. The collection Mooney 7855 from Shewa has calyculi that are slightly different from those in the rest of the examined material; they are slightly swollen at the base. Sometimes also, as in Evans 349 and Mooney 5378 the surface point below the apex of the calyculi is tinged purple.

The phyllaries are generally linear, lanceolate or oblanceolate, with the only variation being seen at the apical region which can be acute, pointed or attenuate. Sometimes all three types of apices occur in a specimen e.g. in Thulin & Hunde 3940. The presence of pubescence on the phyllary surface is also variable. The collections Mooney 8032, Thulin & Hunde 3940, Takie 64, Evans 349, Gilbert et al. 7347 Ensermu 84 and Otieno 14 have glabrous or remotely pubescent phyllaries while in Schimper 144, Mooney 7855 and Tesfaye s.n. they are sparsely pubescent. Sometimes also, as in the calyculi, a purplish tinge is observed at the point immediately below the apex e.g. in Evans 349. The variations mentioned occurring in the calyculi and phyllaries of *S. schimperi* do not appear to show any discontinuities in regional distribution or any distribution correlating with altitude or habitat and are thus regarded as being of common occurrence within the species in Ethiopia.

Oliver and Hiern (1877:412) described the leaves of *S. schimperi* as being "... numerous, linear, narrowed to a callous tip, fleshy,

entire or obscurely ciliate on culms, smaller serrulate, $1/2$ to $1/2$, serrulate. Adams (1963) also stated that they are linear with subentire margins and 2-3 cm long. In the present study the leaves have been observed to be linear or narrowly elliptic and 1.5-10.6 cm long. The only deviation noted from Oliver and Hierns (1877) as well as Adams (1963) description in the present study is in the margins which can be entire as in Thulin & Hunde 3940; this conforming with Oliver and Hierns (1877) and Adams (1963) descriptions of the leaf margins in *S. schimperi*, denticulate e.g. in Ensermu 84, Otieno 14 and Mooney 6378 or remotely so as in Schimper 144 and Tesfaye s.n. Other collections e.g. Mooney 8032, Tekle 64 and Evans 349 have narrowly to widely dentate leaf margins. In Gilbert et al 7347 collected in Shewa the leaf margins are remotely denticulate but sometimes are also provided with 1 or 2 large lobe-like teeth especially towards the base. From the above discussion it appears that the leaf margins of *S. schimperi* generally tend to change from dentate to remotely denticulate from the north to the south of the country. However populations with entire to dentate margins are also to be found occurring in both regions.

S. schimperi is similar to *S. aegyptius* var. *discoideus* in capitular and achenial features but can be distinguished from it by its glabrous stem, simple leaves, wider involucral diameter and truncate anther bases.

Specimens examined.

Eritrea: 16 miles N.W. of Asmara on Keren road, 25.VIII.1959,

Mooney 8632 (ETH).

74
Gejjam: 23 km on track from Debre Markos towards Mela, 25.V.1980,
The Tin & Humie 3940 (ETH); upper most part of Godel gorge,
4.IX.57, *Evans* 349 (ETH).

Snawa: Wofasha near Debre Sina, 27.IV.1959, *Mooney* 7655 (ETH);
A.A. University (Arat Kilo campus) at back of Saha Hall,
30.VI.80, *Tesfaye* s.n. (ETH); slopes of Sodoble river valley
near Wegedi below Muggher Cement factory; 1.V.1983, *Gilbert*
et al. 7347 (ETH); 21.IV.78, *Ensermu* 84 (ETH); c. 17 km from
Guder, along steep climbing road. 17.X.1989, *Otieno* 14 (ETH);
JemJem forest, 22.X.1.1954, *Mooney* 6378 (ETH)

Tigray: Agudey, 6.I.1963, *Tekle* 64 (ETH). Near Adwa, 25.V.1837,
Schimper 144 (EA, UPS).

3. *Senecio* Sp. b.

Erect herb, subshrub, up to 3 m tall. Stem brownish-green or pale-green, terete, striate, sparsely pubescent, often simple, sometimes decumbent. Leaves simple, alternate or distichous, narrowly to widely ovate, sessile, 8.7-19.7 x 4.5-8.5 mm; upper surface glabrous or subglabrous, dark green; lower subglabrous to obsoletely white tomentose, light green; margins dentate; apex acute. *Capitula* radiate, campanulate, 19-34 x 7-13 mm at anthesis, in corymbose cyme; peduncle 1-4.5 cm long, remotely pubescent, brown, brownish-green or green, terete, striate, with leafy bracts. *Calyculi* 7-15 lanceolate, narrowly to widely triangular or ovate, sometimes attenuate at apical region, brownish-green, yellowish green or light green, 3-5 x 1-1.5 mm; apex acute or obtuse, brown, hairy, sometimes hairs form tufts; surface glabrous or remotely pubescent; margins hairy; striation one. *Involucre* 7-13 mm in diameter; *phyllaries* 13-21, brown, brownish-green to pale-green, (5-)5.5-7 x 0.9-2.3 mm, glabrous to remotely pubescent, lanceolate, oblong-elliptic to ovate, sometimes attenuate at apical region; apex acute or obtuse, with soft or hairs or bristly; margins entire or scarious; striae 1(-2) or not apparent. *Ray florets* yellow, 11-13, pistillate; rays narrowly ovate to obovate or lanceolate to ovate-elliptic; 15-26.6 x 2.14 mm tube glabrous; striae 4-11; apex 2-3 fid, sometimes narrowed attenuately. *Disc floret* 7-9.6 x 1-2 mm, tubular; corolla yellow, 5-lobed; lobe apices papillose; limb glabrous. *Anthems* 1.8-2.5 light brown, greyish-brown to greenish, truncate at base. *Style* 6.5-8.8 mm long, glabrous, terete, bulbous at base; arms papillose towards apex, apex hairy. *Achenes* (immature) glabrous, striate, light to dark brown, 1.1-1.5 x 0.2-0.4 mm; apex with

yellowish-white crown; oblong, somewhat flattened and twisted; base with narrow cartilaginous rim. Pappus 6-7.7 mm long, white, antrosely barbed.

Distribution. Known only from Gojjam and Shewa in Ethiopia.

Habitat. Dry hillsides or slopy grounds by river valleys or gorges, along stream banks or on meadows; alt. 2200-2440 m.

Taxonomic remarks. Based on the specimens examined, *Senecio* sp. B. does not show much variation in its morphological features. The only distinct variation observed was in the number of phyllaries. In the collection Otieno 15, from Shewa, the number of phyllaries is 13 while in the rest of the examined specimens; the phyllary number is between 15 and 21.

Senecio sp. B. has similarities with *S. ochrocarpus* in several morphological features (see table 2). However this entity differs from the later species in having stems that are glabrous or subglabrous, 11-13 ray florets and phyllaries that are either glabrous or remotely pubescent.

Table 2. Comparison of some morphological features between *Senecio ochrocarpus* and *Senecio* sp B.

Character	<i>Senecio</i> sp. B.	<i>S. ochrocarpus</i>
Habit	Erect herb or under-shrub	Erect herb or under-shrub
Leaf length (mm)	6-21	c. 8.7-19.7
Capitula width (mm)	18-38	19-34
Phyllary texture	Fleshy	Fleshy
Achenes (immature)	faintly striate, brown	faintly striate, brown

Because of the above stated dissimilarities from the closest species and for lack of detailed studies this entity is here given as an imperfectly known taxon. More detailed field as well as laboratory studies will in the future reveal its true identity.

Specimens examined.

Gojjam: c. 5km N. of Dejen, 29.X.1981, *Mesfin & Kagne* 1625 (ETH). N.E. of Debre Markos Abma Tacle Haimanot Farmers association, close to church 3.XI.1981, *Sebsebe* 531 (ETH). Stream S. of Debre Markos airfield, 15.X.1957 *Evans & Flenley* 278 (ETH).

Shewa: Along road to Guder, 17.X.1989, *Otieno* 15 (ETH).

2. *Senecio ochrocarpus* Oliv. & Hiern, Fl. Trop. Afr. 3:466 (1877).

Type: Ethiopia, Gonder, Dschaa-Meda near Caffar, Schimper 1829

(K. Holol., n.v. fide Mesfin Tadesse, unpublished manuscript on Compositae of Ethiopia).

An erect, usually unbranched, sometimes shrub-like perennial herb. 0.75-1.7m tall or more. Stem pallid, terete, thinly to densely lanate especially on upper parts; internodes 10-64 mm long. Leaves simple, alternate; young ones lanceolate; mature ones ovate-elliptic to ovate, some constricted around basal regions, somewhat or scarcely auriculate at the base, sessile, basal ones of young plants petiolate, amplexicaule, 2.5-21 x 1.6-10.2 cm, whitish-green, light to pale green, glabrous to obsolete white tomentose above; thinly pubescent to densely white tomentose below; apex acuminate or acute; margins denticulate or dentate. Capitula radiate, 18-54 x 7-16 mm at anthesis, in thinly lanate corymbose cymes; peduncles 0.63-7.2 cm long, brown to green, lanate or sometimes tomentum wanting. Calyculi 3-5(-8), unequal, lanceolate, 4-7 x 0.5-1.5 mm, brown, brownish-green or green; apex pointed, sometimes attenuate, brown or dark brown; margins hairy; surface sparsely to densely white tomentose, with single median striation. Involucre 6-13 mm in diameter; phyllaries 10-14 oblanceolate, oblong-elliptic or ovate, yellowish-grey, brown brownish-green, pale or light green 5.5-10 x (0.5-)1.4-3 mm, tomentous, with one or occasionally two Striae; apex acute or attenuate, brown, brownish-black or black, hairy or bristly; margins entire or scarious, occasionally slightly hairy especially ground base; fleshy. Ray florets light to deep yellow, (4-)8; rays elliptic oblong-elliptic obovate or ovate; c. 13.4-24.1 x 3-7.9 mm; tube

glabrous or pilose. If pilose, hairs denser at ray-tube joint, rarely split almost down to the base; apex 2-3-fid, rarely acute, obtuse or obcordate. *Disc florets* tubular, 1.9-3 x 1.3-2.2 mm; corolla yellow, 5-lobed; lobe apices papillose; limb glabrous. *Anthers* 2-3 mm long, yellowish, brownish-green, greyish-brown or brown, sagittate at base. *Style* 4.6-9.5 mm long, glabrous, bulbous at base; stigmatic branches yellow with continuous stigmatic areas. *Achenes* costate, glabrous, creamish-brown; apex with yellow or yellowish-white crown, (1.5-)2.5-4.7 x (0.3-)0.5-1 mm; terete, narrowly oblong or oblong-elliptic, base with narrow cartilaginous rim. *Pappus of achenes* 3.2-8.2 mm long, white, antrosely barbed.

Distribution. Widely distributed in the high altitudes of Shewa and Bale regions but also occurs in Sidamo region.

Habitat. Frequent in *Juniper* forests in moist shady or open places; on moist or dry sunny hillsides; sometimes among scattered trees, on river banks, open grasslands and roadsides.

Notes on Variation and Similarities. *S. ochrocarous* displays variation in the density of indumentum on the lower surface of the leaves. This usually ranges from thinly pubescent surfaces as in Roitzsch 7 to a dense white indumentum, as in Mesfin et al. 3160, which usually gives the under surface a flossy appearance. The upper surface of the leaves is usually glabrous or obsolete to thinly white tomentose. The lower stem leaves are usually ovate but sometimes are constricted and variably auricled at the base e.g. in Otieno 36 and Roitzsch 79. The development of auricles at leaf bases shows variation being very evident as in the above cited specimens to scarcely so as in Mesfin

1452 and Rottsch 7. Young plants of *S. ochrocarpus* are recognizable by their broad, ovate, cuneate and petiolate basal leaves, e.g. Knox 681; these leaves however disappear when the plant matures. The sizes of the phyllaries and ray florets also show continuous variation (Fig. 28A and B) the collection Mooney 8519 shows a significant variation by having the lengths c. 9-10 mm and c. 19-24.1 mm for phyllaries and ray florets respectively.

S. ochrocarpus seems to have similarities with *S. subsessilis*, a species widespread in East Tropical Africa (Jeffrey 1986). Oliver and Hiern (1877), however, distinguished the two species on the basis of the characters indicated in the table below

Table 3. Morphological characters distinguishing *S. ochrocarpus* and *S. subsessilis*.

Character	<i>S. ochrocarpus</i>	<i>S. subsessilis</i>	<i>S. ochrocarpus</i> (present study)
Involucral-bracts			
-number	13-15	15-20	10-14
-length (mm)	c. 6.4-8.4	c. 6.4	c. 6-10
-surface	thinly pilose	glabrous	sparsely pilose or obsolete to thinly white tomentose.
stem leaves			
-shape	ovate, lanceo- late, oval	ovate or elliptical	ovate-ellip- tical or narrowly to widely ovate.
base	somewhat - or scarcely- auriculate	not auric- ulate	auriculate or- somewhat co.

There seems to be some agreement on the length of the involucral bracts and shape of the stem leaves between *S. ochrocarpus* and *S.*

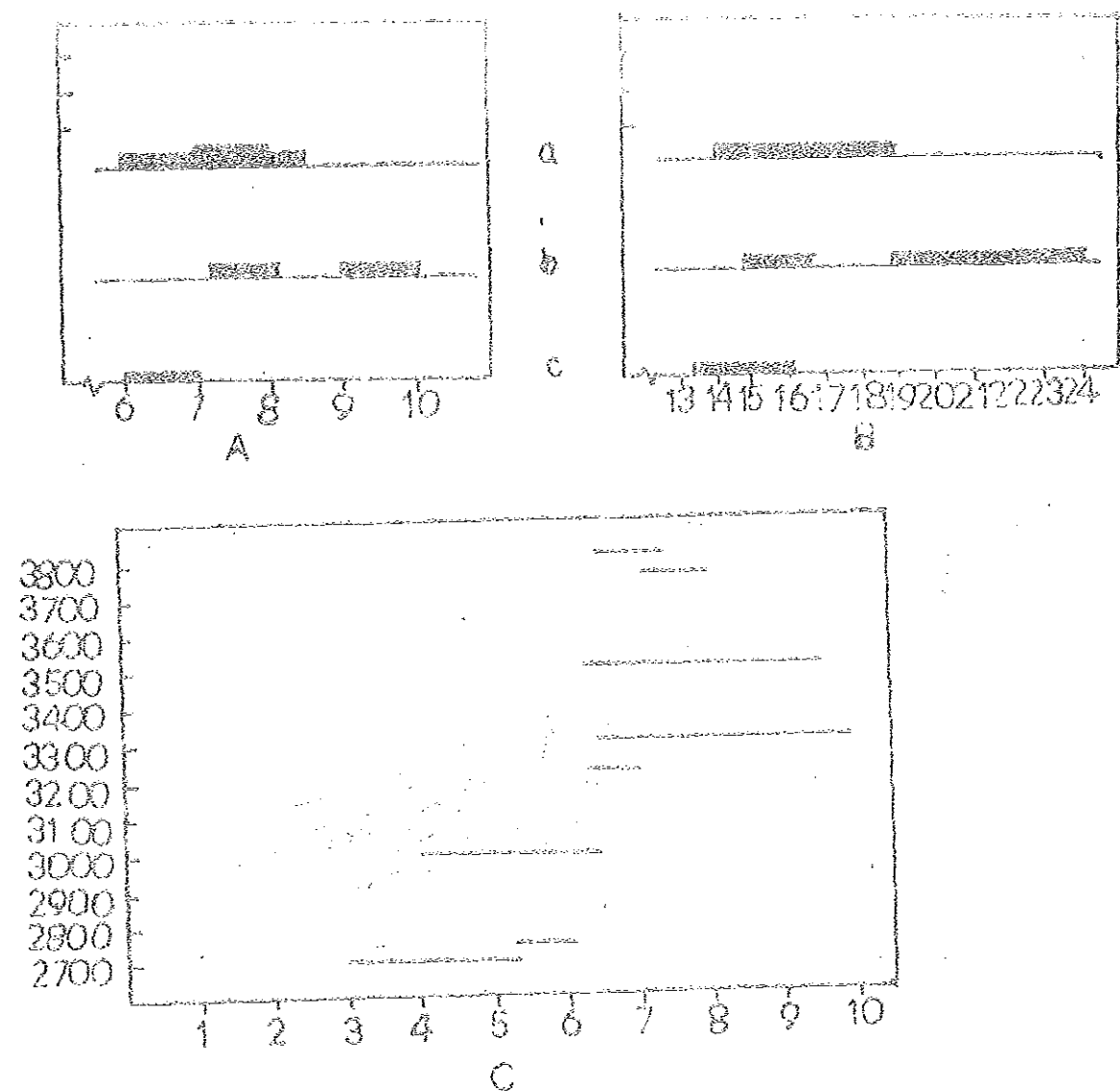


Fig. 28. Variation ranges for length of phyllaries (A), length of ray florets (B) and style length of the disc florets at different altitudes (C). A and B: Material of *Senecio ochrocarpus* from Shewa (a), Bale (b) and Sidamo (c) Regions. The diagrams are based on original values. B: *Senecio ragazzii*. Each short horizontal line represents the variation range of one collection. Lengths in mm, altitude in m.

subsessilis when the studies made by Oliver and Hiern (1877) is compared to the present one, however differences are seen on the nature of oblique serrures and the development of auricles at the leaf bases (see table 3). Hedberg (1957:226) in his key to *Senecio* species noted that *S. subsessilis* has 5 to 15 patent outer bracts while Agnew (1974:480) stated that *S. subsessilis* has "... fewer (up to 15) inner phyllaries." This does not fit in with the work of Oliver and Hiern (1877) which recorded 15 to 20 phyllaries in *S. subsessilis* but however agrees with the numbers recorded for *S. ochrocarpus* in the present study (see table 3).

Nordenstam (1978a:40) established a point of distinction between *S. subsessilis* and *S. ochrocarpus* by stating that "...disc styles of *S. subsessilis* are typically 'senecoid', with discrete stigmatic areas...While...disc styles of *S. ochrocarpus* have continuous stigmatic areas." In the present study the specimens examined had continuous stigmatic areas thus agreeing with Nordenstam's concept of *S. ochrocarpus*. No mention of ray floret number in *S. subsessilis* was made by Oliver and Hiern (1877), Hedberg (1957) or Agnew (1974) but Jeffrey (1986:883) indicated that this species has 5 to 8 ray florets. In this study 6 to 8(-9) have been recorded for *S. ochrocarpus*. From the foregoing, inadvertently, the question of whether *S. ochrocarpus* and *S. subsessilis* are really distinct taxa is reasonably thrown open. However since *S. subsessilis* is insufficiently known in Ethiopia, as evidenced by its absence in the collections within ETH, then this remains a question that can not be answered now but rather requires more investigation. More collections should probably now be made at

The type localities of both *S. rhinocarpus* and *S. subsessilis* i.e. Gonder have been included in the following list of localities.

Specimens examined.

Shewa: Menagesha forest, 7.IX.1989, *Offeno* 10 (ETH). Wofasha forest near Debra Sina, *Roitzsch* 79 (ETH). Menagesha forest, 25.XI.1958, *Roitzsch* 7 (ETH). Gafaresa, c. 18 km W. of Addis Ababa, 13.XI.1964, *Lemma* 459 (ETH). Mt. Wachacha Menagesha forest, 23.XII.1967, *Gilbert* 519 (ETH). Entoto Ca. 5km N. of Addis Abaa on the way to Kidane Miheret Church, 20.X.1981, *Mesfin* 1462 (ETH). Menagesha, 19.XI.1954, *Mooney* 6340 (ETH). W. of Wofasha forest, 29.XII.1988, *Mesfin* et al. 7209 (ETH).

Bale: Tiniso. W. Bale, 4.I.1960, *Mooney* 8519 (ETH). By museum at Park HQ, Dinsho, 27.XI.1988, *Knox* 681 (ETH).

Sidamo: c. 54 km S. of Dilla, 8.X.1985, *Mesfin* et al. 3160 (ETH).

5. *Senecio stendellii* Sch. Bip., Tent. Fl. Abyss 1.440 (1848). Type:

~~Ethiopia, Gondar, R. Saall, Schimper, 9 August 1838, Schimper~~

760 (P. syn., K. isosyn.), 1862, Martin-Billon s.n. (P. syn., K.

isosyn.) n.v. fide Heslin Tadesse unpublished manuscript on

Compositae of Ethiopia). (Isosyn. UPS!)

Erect, woody, branched semi-aquatic perennial herb, 25-150 cm tall. Stem pale brown, brown, yellowish-brown, purplish-green, pale green turning purple towards base or light green, glabrous, naked below, leafy and thinly tomentose above, terete, striate-sulcate; internodes 2-45 mm. Leaves simple, alternate in upper parts, distichous in lower parts or distichous all along stem; young ones lanceolate, sessile, auriculate; mature ones linear-lanceolate narrowly-elliptic, ovate-lanceolate or spatulate, attenuate at base, tapering gradually or not at all towards apex, somewhat auriculate; slightly greyish-green, yellowish-green, whitish-green or green above and below, sometimes white below, glabrescent or sometimes obsolete to thinly tomentose, more so when young; margins closely to widely denticulate or somewhat subentire in mature ones, serrulate in young ones, 30-203 x 3-15 mm; apex acute, occasionally obtuse. Capitula radiate, 19-44 x 5-13 mm at anthesis, in corymbose cymes; peduncle 0.6-9.5 cm long brownish-green, yellowish-green, pale-green or green, thinly white tomentose, terete, striate-sulcate, bracteate. Calyculi (2-)5(-9), lax, lanceolate or linear-lanceolate, attenuate or tapered towards apex (-3) 3.8-8.2 x (0.3-)0.6-1(-1.5) mm, yellowish-brown, brownish-green, pale-green or light-green; apex pointed, acute, obtuse or blunt, brown to brownish-black, hairy, sometimes bristly, occasionally scarious and minutely lacerate; margins with short thick,

brown to dark brown hairs, sometimes denticulate; surface glabrous or hairy. ~~with sparse or dense interspersed dark brown hairs; striae 1(-3).~~ Involucre 6-12 mm in diameter; phyllaries (13-)20-22 yellowish-brown, brownish-green, pale or light green, whitish at margins, 5.8-9 x 1-2 mm, surface with sparse or dense dark brown hairs; oblanceolate or lanceolate, occasionally attenuate at apex; apex pointed, acute or somewhat obtuse, brown to brownish-black, bristly or with scanty to dense hairs; margins entire or scarious and yellowish-white, when scarious, sometimes so on one side only; striae 1 or 2. Ray florets pale, light or deep yellow, (10-)13, pistillate; rays lanceolate to obovate, 9.2-17(-26) x 1.8-4.2 mm; tube glabrous or hairy; 4-5(-6)-striated; apex 2-4-fid, often with deep clefts, rarely acute, obtuse or obcordate. Disc floret campanulate, 4.8-7.3 x 1-2 mm; corolla light to deep yellow or yellowish-brown, 5-lobed; lobe apices papillose; limb glabrous. anthers 1.3-2.4 mm long, yellow, yellowish-brown or brown, shortly sagittate at base. Style 3.5-7 mm long, glabrous, uniformly terete or sometimes semi-bulbous at base, rarely conical; stigmatic branches yellow, yellowish-brown or brown. Achenes faintly costate, glabrous, sometimes scabrid, yellowish- or greyish-brown; apex with white crown; terete, occasionally narrowing slightly towards apex, 3.3-4 x 0.5-0.9 mm, ovate-lanceolate, elliptic or oblong; base with narrow cartilaginous rim. Pappus of achenes 3.8-5 mm long, white antrosely barbed.

Distribution. Occurs in Gonder, Gojjam, Shewa and Bale regions.

Habitat. Open grassy places along creeks or water-logged soils along river banks. Also near or in small streams; alt. 2000-3080 m.

Notes on variation and similarities. *S. steudelii* as circumscribed here shows morphologic homogeneity among its forms. The diagnostic features. Oliver and Wiern (1971:416) cited a variety var. *albido-tomentosa* Rich. that they noted varied from the species proper in being of "...a luxuriant state with upper part of stem and leaves white-cottony and teeth of leaves irregular and obtuse". However none of the specimens inspected during the course of this work could be recognized as this variety. One specimen, Hedberg 4210, on loan from UPS had the determination slip indicating that it was var. *albido-tomentosa* but on examination it was found to have morphological features fitting in with those of *S. fresenii* a species that has some similarities with *S. steudelii*.

The ray florets in *S. steudelii* generally have apices that are 2-4-fid. Sometimes however they show variation in having deep clefts that give the apical region a lobed appearance (Fig. 16D) as observed in Mesfin 630 and Mesfin & Kagneu 2056 from Bale and Shewa Regions respectively. The number of calyculi also varies (see Table.4). The altitudinal ranges within which these variations occur overlap and hence cannot be considered as a factor influencing their occurrence. The habitats from which the cited collections were made are also similar, i.e., along streams or rivers in waterlogged places, thus, in view of this it would be safe to consider these variations as not being totally unexpected for the species.

Table 4. Collection numbers of *S. steudelii*.

Collector and Locality	Number of specimens	Altitude from which collected (m.)
Mesfin 630- Bale	5	2070 m.
Mesfin 5798- Bale	3-5	2080 m.
Mesfin & Kagnaw 2056 Shewa	4-5	2100 m.
Mooney 8529- Bale	7	2600 m.
Mesfin & Kagnaw 1655 Gojjam	2-3	2510 m.
Schimper 750- Gonder	4-5	3000 m.
De Wilde, c.s 8743-Shewa	5	2000 m.
S. Gilbert 90- Bale	5-7	3080 m.
Getachew 2905- Shewa	8	?

S. steudelii closely resembles *S. fresenii* in habit, leaf shape and some capitular features. However it differs from the latter in habitat, leaf and stem anatomy and pollen morphology as discussed below.

Habitat differences. *S. steudelii* is always found growing along streams or rivers in waterlogged places within the altitudinal range of 2000-3080 m. While *S. fresenii* grows along roadsides, in *Erica* bushland or in association with some taxa e.g. *Hypericum* and *Helichrysum* species, within the alpine belt (3250-4200 m) but sometimes it also occurs at altitudes of about 2500 m.

Pollen morphological differences. SEM examination of pollen grains of *S. steudelii* and *S. fresenii* has revealed some differences between them. The shape of the grains in *S. steudelii* is subprolate (Fig. 29). Its P:E ratio i.e. length of the polar axis : equatorial diameter (see Table 5) is close to that given by Erdman (1969:34) for subprolate pollen grains. In *S. fresenii* the pollen grains are spheroidal with a P:E ratio as given in the Table. The spines in *S. steudelii* appear to

be shorter (Fig. 28) and are not perforated at the basal region. Those in *S. fresenii* appear relatively longer (Fig. 29) and are provided with basal perforations.

Table 5. Comparison of pollen sizes and P:E ratios in *S. steudelii* and *S. fresenii*. Sizes of pollen were calculated from pollen micrographs using, scale $\bar{D}=10$ μ m and measured $\bar{D}$ values of 46 mm for *S. steudelii* and 43 mm for *S. fresenii*.

	<i>S. steudelii</i>	<i>S. fresenii</i>
Pollen size (μ m)	c. 24.3 x 21.5	c. 27.4 x 26.7
P:E ratio.	8.1:7	9.1:8.9

Anatomical differences in stems and leaves. Stem and leaf histologies of *S. steudelii* and *S. fresenii* are basically the same but differences are noted in a number of aspects. Young stems of *S. steudelii* have epidermal cells that are approximately longer than they are wide (Fig. 33A), as also indicated by their absolute sizes and length : width ratios (see Table 6). The hypodermis consists of only a single cell layer. In *S. fresenii*, stems comparable in age with those used in *S. steudelii* have epidermal cells that are wider than they are long (see Table 6 and Fig. 33B). The hypodermis in this species is composed of 2 or 3 cell layers (Fig. 33B). Another anatomic difference between *S. steudelii* and *S. fresenii* is the occurrence of chloroplasts in some of the collenchymatous cells bordering the hypodermis in *S. steudelii* (Fig. 33A). The presence of chloroplasts in the cortical tissues makes the stems of *S. steudelii* appear deeply green. Differences are also noted in the grouping of vessels in *S. steudelii* and *S. fresenii*. In the former, vessel grouping is relatively minimal (Fig. 34A) if

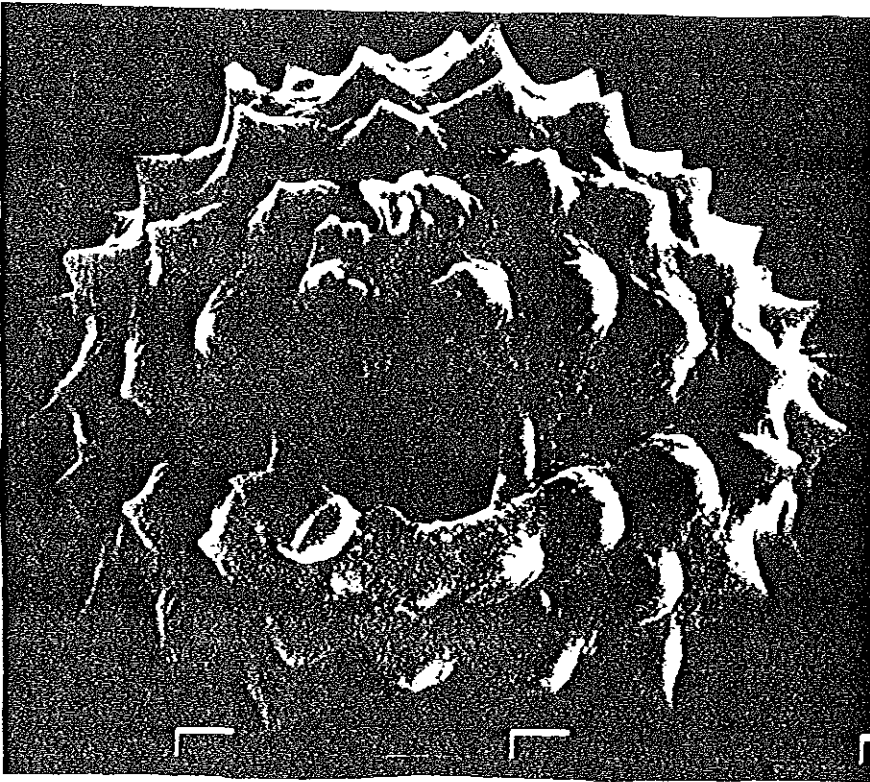


Fig. 29. Scanning electron micrograph of a pollen grain of *S. steudelii* showing colpus with longitudinal ora, short spines without perforations at the base and subprolate pollen shape. Magnification X 3500.

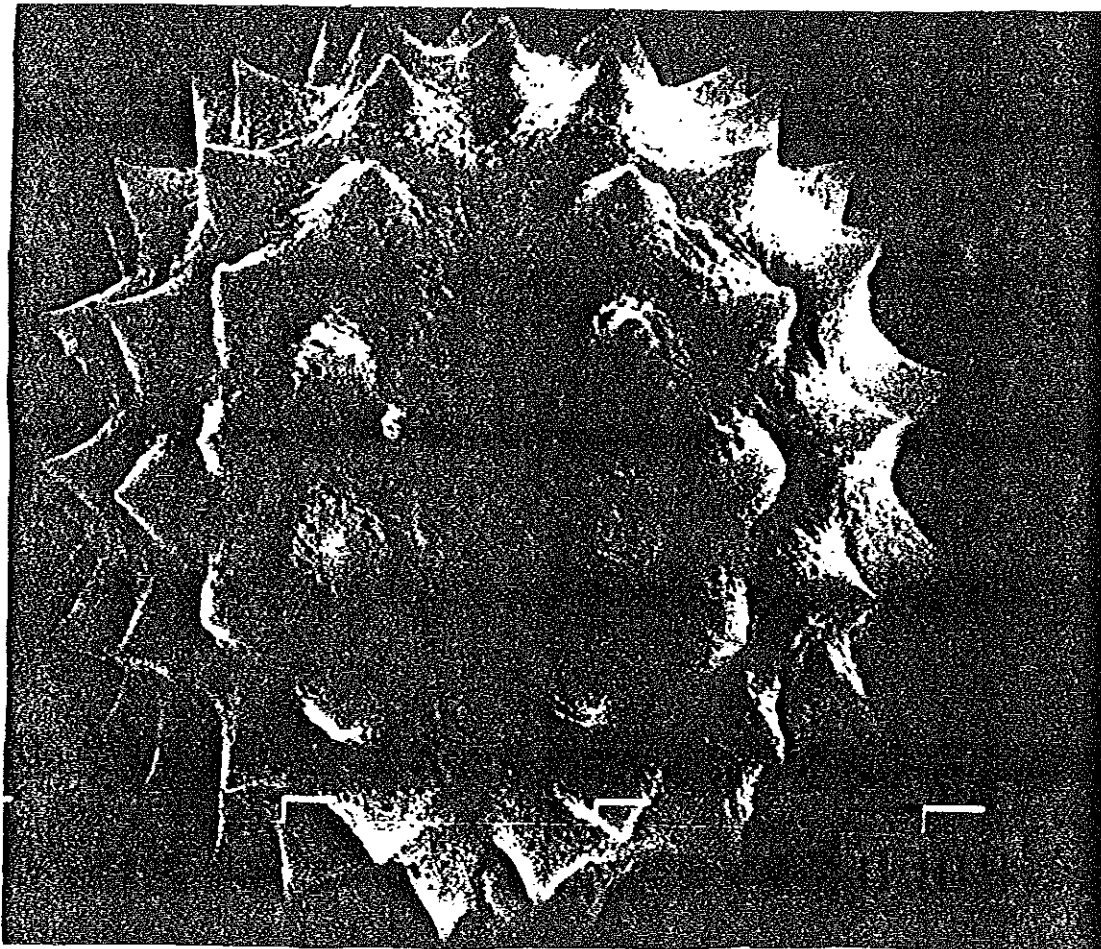


Fig. 30. Scanning electron micrograph of a pollen grain of *S. fresenii* showing equatorial view, colpus with longitudinal ora, perforations at spine bases and spheroidal pollen shape. Magnification X 3500.

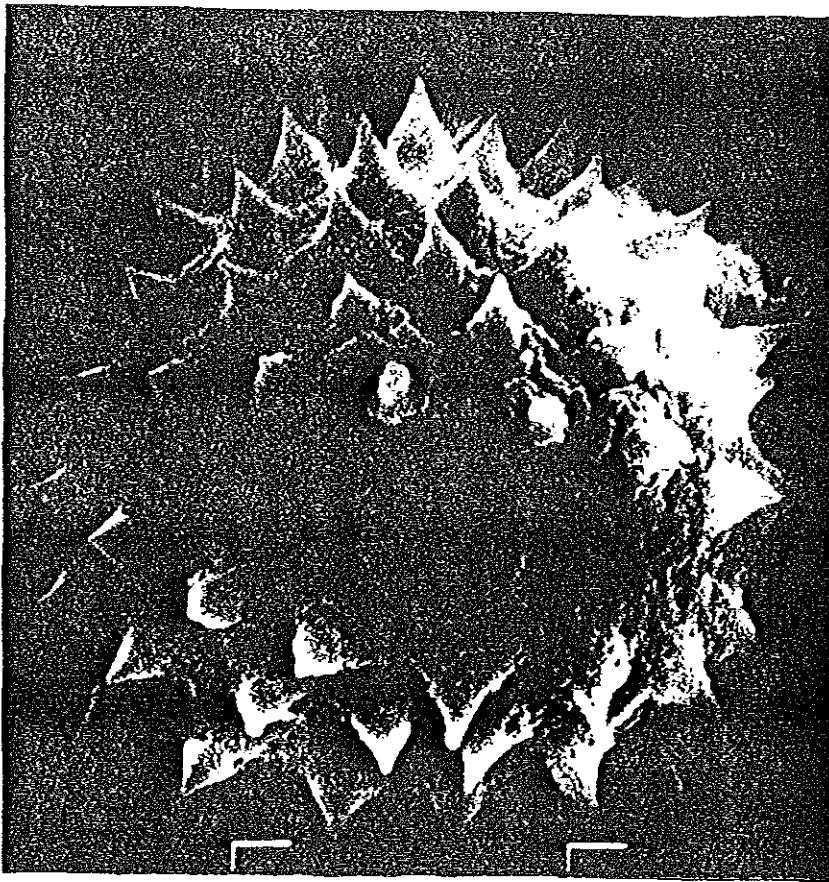
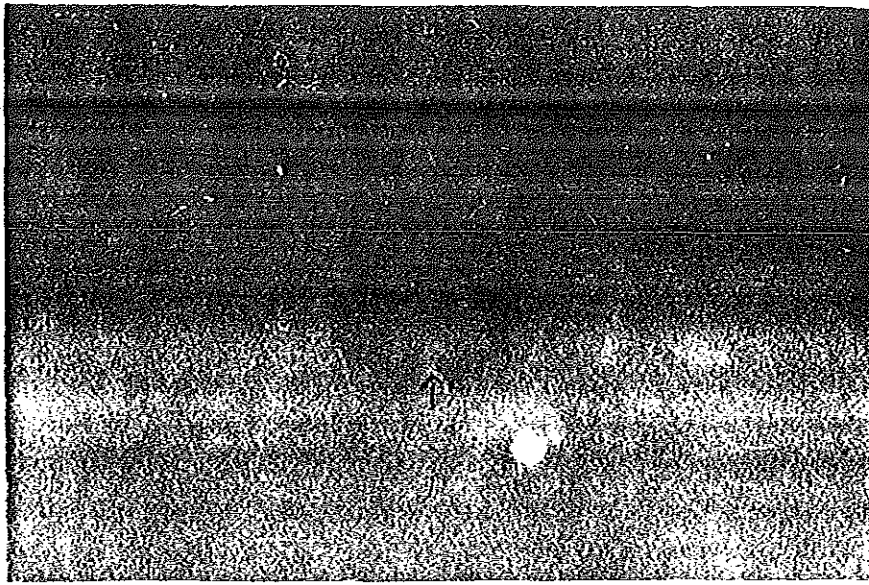
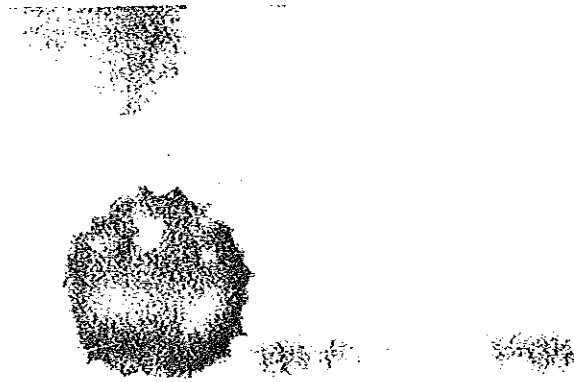


Fig. 31. Scanning electron micrograph of a pollen grain of *S. mesogrammoides* showing colpus with elongate ora, perforate spine bases and spheroidal pollen shape. Magnification X 3500.



A



B

Fig. 32. LM micrographs of acetolyzed pollen of *S. schultzii*. A: var. *lanatus* (Mooney 8332). B: var. *schultzii* (Hedberg 4214). A shows polar view. Note positions of colpi (arrows). B. shows equatorial view. Magnifications X 1000.

compared to the *S. steudelii* (Fig. 34B). This kind of grouping has been reported previously (1951) for *Gynura verrucosa* var. *gracilifolia*, the two are also two similar species, viz. *S. mannii* and *S. potaninii*. Carlquist (1952) observed that this arrangement of vessels occurs in species from relatively moist habitats as is the case in *S. steudelii*. *S. fresenii*, on the other hand, has comparatively larger vessel groupings (Fig. 34B) which as reported by Carlquist (1952) is more pronounced in species occurring in dry-country as is the case in *S. fresenii*.

The leaf anatomy of *S. steudelii* differs from that of *S. fresenii* in a number of features. The palisade and spongy mesophyll cells in *S. steudelii* are densely packed with chloroplasts and the vascular tissues embedded within the spongy mesophyll are bounded by a sheath of parenchyma cells (Fig. 35A). Large air spaces also occur in the mesophyll tissue of *S. steudelii* (Fig. 35B). Esau (1960:357) and Cutler (1978:64) noted that the presence of large airspaces in the leaf tissues of hydromorphic plants is an adaptation to their habitat, assisting them in gas exchange and buoyancy (Cutler 1978). In the case of *S. steudelii*, the large air spaces are apparently for facilitating gas exchange since it normally grows well-rooted and hence does not appear to require buoying up. The leaves of *S. fresenii* differ from those of *S. steudelii* in having cavities that always occur associated with the vascular tissue, spongy mesophyll tissue that has only a few chloroplasts, vascular tissue surrounded by chlorenchymatous cells of the mesophyll (Fig. 36A) and a lower epidermal layer that is beset with long multiseriate hairs (Fig. 36B).

Table 6. Comparison of epidermal cell size and Length Width ratios

between *S. steudelii* and *S. fresenii*. Values of cell size

represent the means of measurements made on ten epidermal cells on the stem.

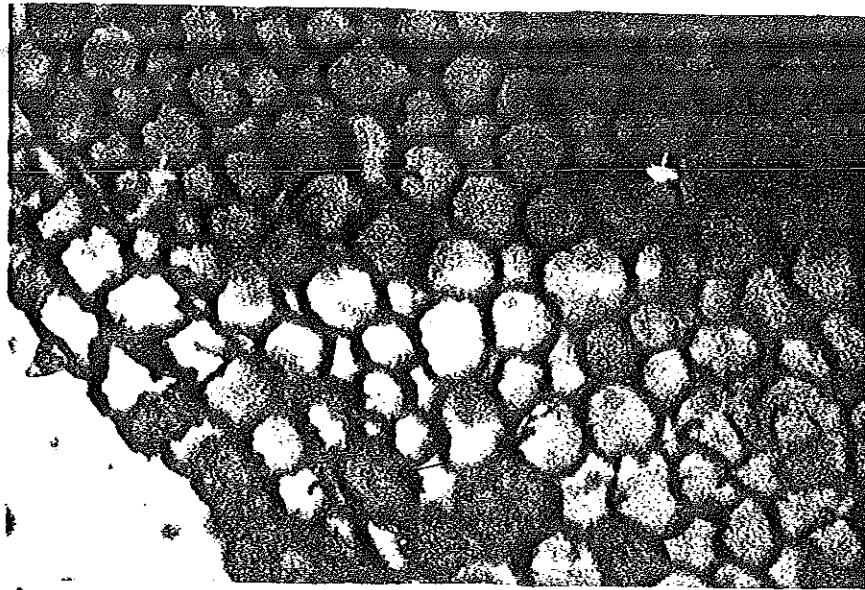
	<i>S. steudelii</i>	<i>S. fresenii</i>
cell size (µm)	10.5 x 8.3	6.5 x 11.5
length:width ratio	1.3:1	1:1.8

Specimens examined.

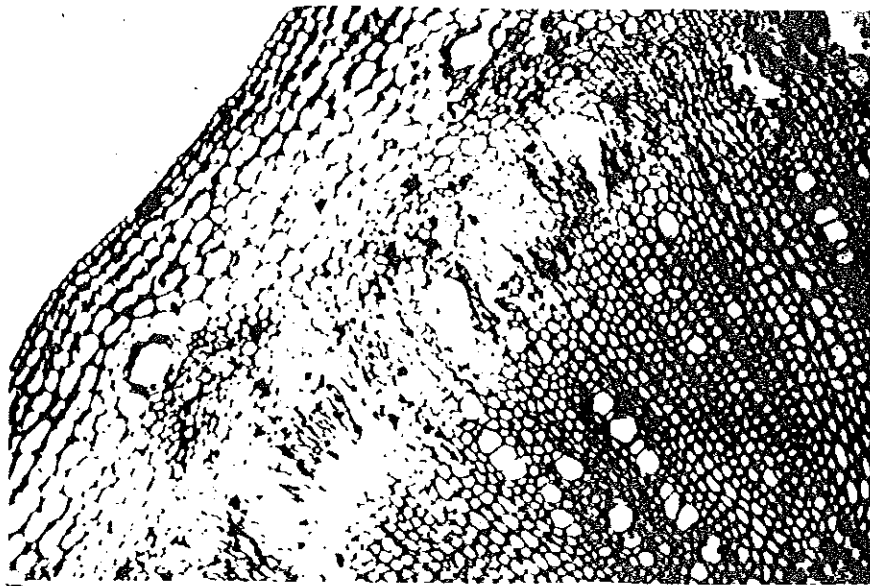
Gonder: Southern slopes of Mt. Buahit along small stream near Demerki, 9.VIII. 1838, *Schimper* 750 (UPS); between Gaech and Ambaras, 19.IX.1969, *De Wilde & Gilbert* 81 (UPS).

Gojjam: Ca. 36km N.W. of Debre Work along Tigidad river, 30.X. 1981, *Mesfin & Kagneu* 2056 (ETH); near Chekie, 30 km before reaching Debre Berhan in small stream, XII.1982, *Erich* 26 (ETH); 30km W. of Ambo near Guder, along creek, 9.XI.1965, *De Wilde* c.s. 5743 (UPS). Sibulu, 40km from Addis junction to Muger cement factory, 4.III.1990, *Getachew* 2905 (ETH)

Bale: Along river Danka, Dinsho, 16.XI.1979, *Mesfin* 630 (ETH); c. 2.6km N. of Goba, along bank of Tegona river, *Mesfin* 5798 (ETH); Bura near Dodola, middle of stream, 5.I.1960, *Mooney* 8529 (ETH); the 'flats' at Dinsho in water-logged soil beside river bed, 10.XI.1971, *S. Gilbert* 90 (UPS).

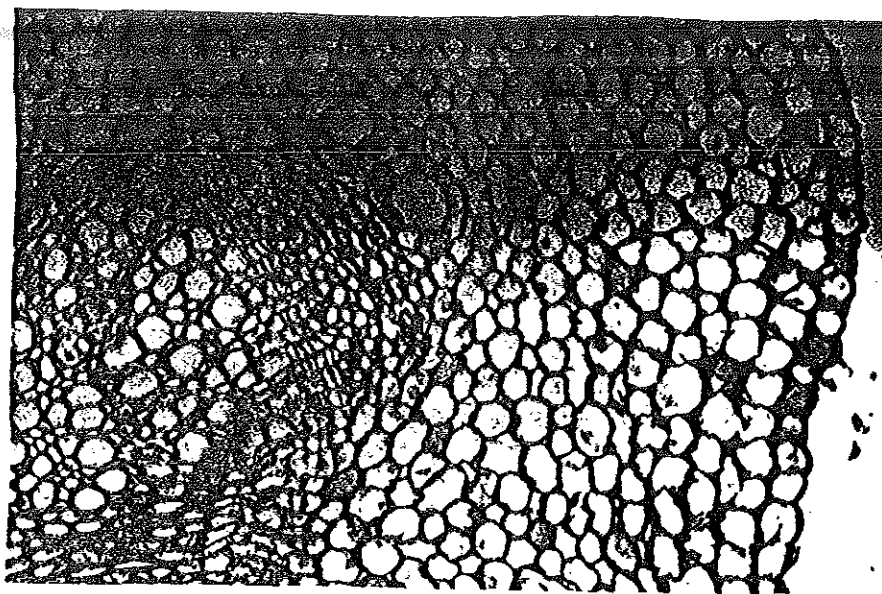


A

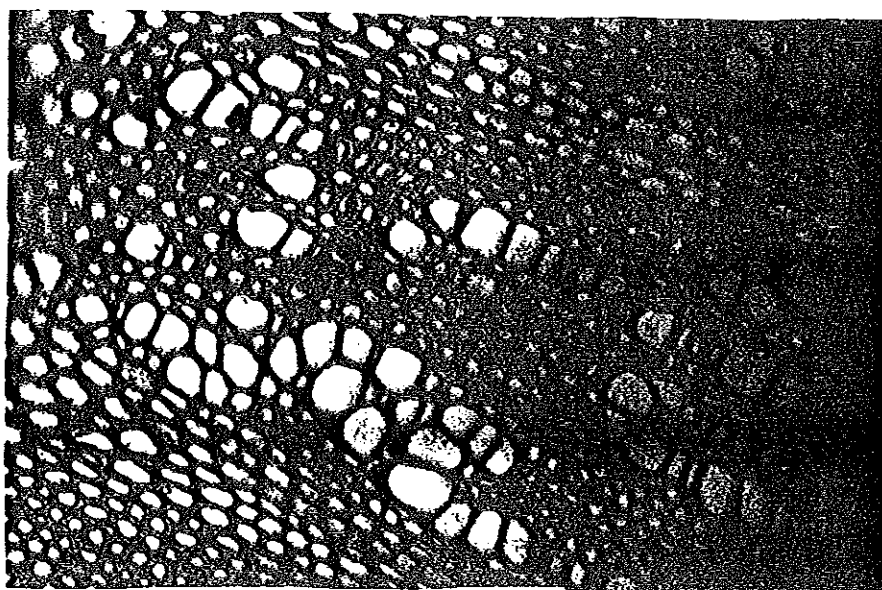


B

Fig. 33. Stem cross-sections in *Senecio*. A: *S. steudelii*. Note long epidermal cells, single hypodermal layer, and chloroplasts in cortex parenchyma cells immediately below the hypodermis (arrow). B: *S. fresenii*. Note wide epidermal cells and 2 or 3 hypodermal layers. A X 400, B X 100. A from Getachew 2905; B from Otieno 40.

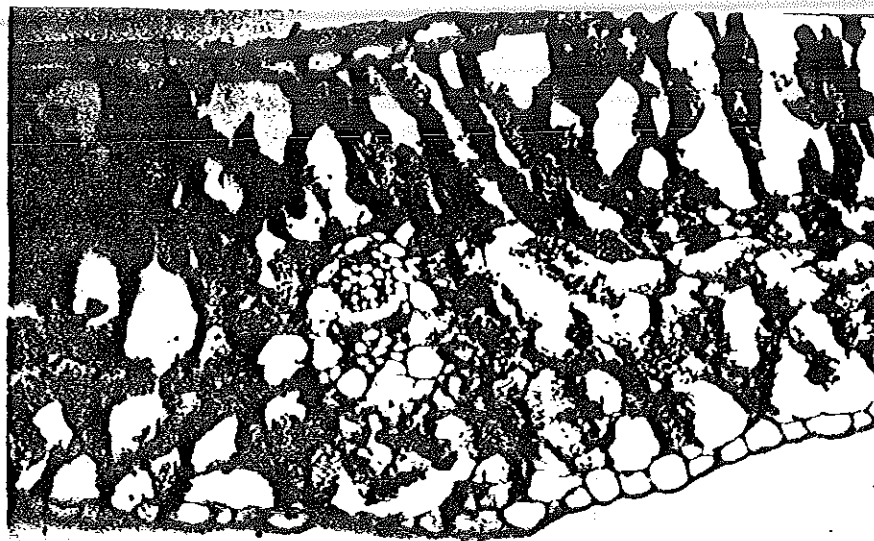


A

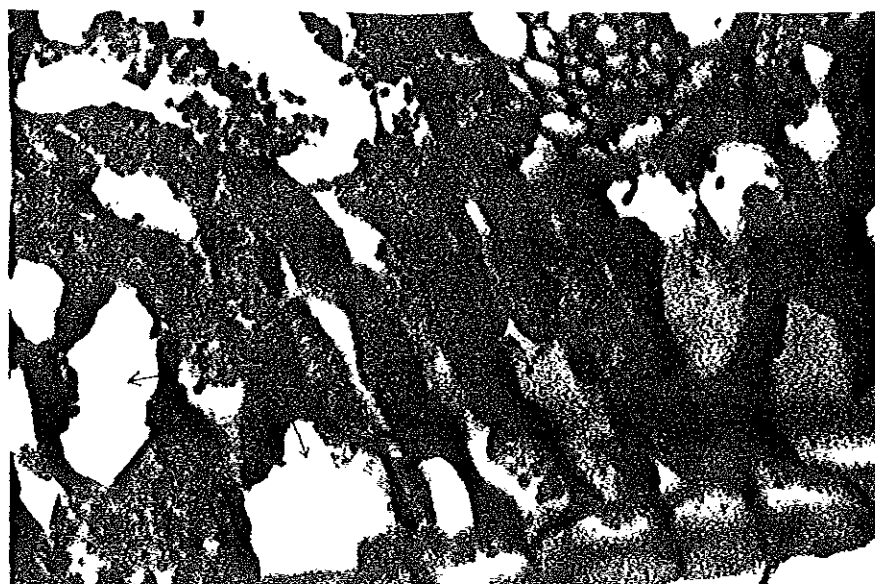


B

Fig. 34. Stem cross-sections in *Senecio*. A: *S. steudelii*. Note minimal grouping of vessels. B: *S. fresenii*. Note larger grouping of vessels. A, B X 200. A from Getachew 2905; B from Otieno 40.

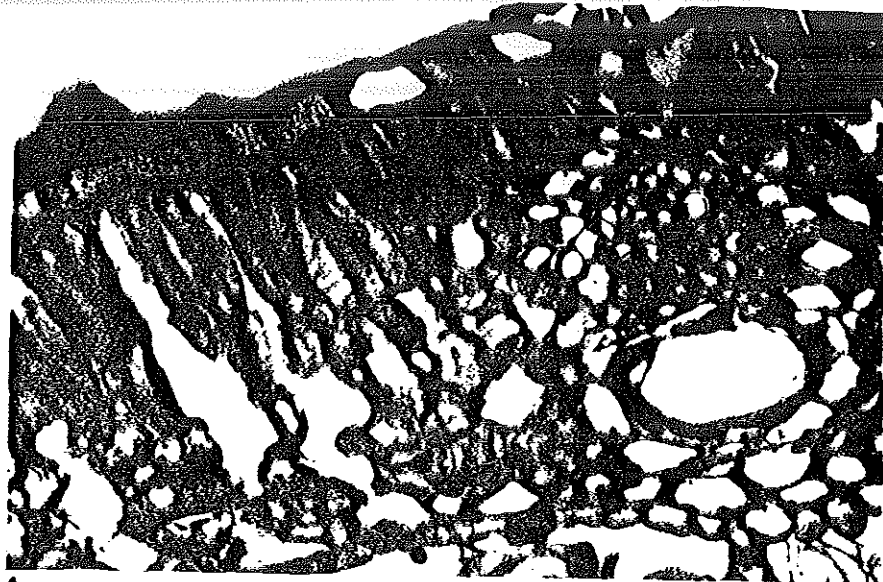


A

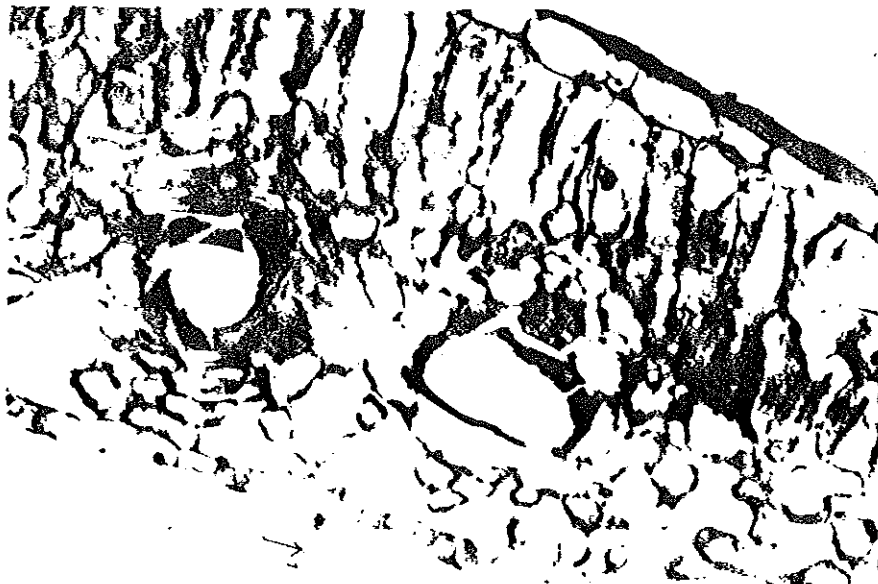


B

Fig. 35. Leaf cross-sections in *S. steudelii*. A: Note palisade and spongy mesophyll cells densely packed with chloroplasts and vascular tissue embedded in spongy mesophyll bounded by parenchyma cells. B: Note large air spaces (arrows). A X 200, B X 400. A, B from Getachew 2905.



A



B

Fig. 36. Leaf cross-sections in *S. fresenii*. A: showing cavity associated with vascular tissue embedded within the mesophyll, spongy mesophyll with few chloroplasts and chlorenchymatous cells of the mesophyll surrounding vascular tissue. B: showing multiseriate hairs on lower epidermis. (arrow). A,B X 400. A,B from Otieno 40.

6. *Senecio* (present) *Senecio* (P. B. & H. B. K. Trop. Afr. 3:417

(1877). Type: Senecio 7, fig. 1. Senecio 7, fig. 1. Senecio 7, fig. 1.

s.n. (1877) (P. B. & H. B. K. Trop. Afr. 3:417) (P. B. & H. B. K. Trop. Afr. 3:417)

on compositae of Ethiopia.

Shrubby perennial herb, often gregarious, 30-150 cm tall. Stem greyish-white, whitish-green or green, basally branched, terete, striate-sulcate especially on upper parts, thinly to densely white tomentose; internodes 10-40mm long. Leaves simple, alternate on main stem, often distichous on branch tops; young ones lanceolate or linear-lanceolate, sessile, somewhat auriculate; mature ones narrowly ovate to ovate-lanceolate, often narrowing from middle to base; greyish, greyish-white, whitish-green or green, glabrescent to thinly white tomentose above; white, densely white tomentose below; margins closely to widely serrulate, 17-105 x 2.5-12mm; apex acute or cuspidate. Capitula urceolate, radiate, few to many, 18-40 x 7-13mm at anthesis, in crowded corymbs; peduncle 0.5-9.5cm long, thinly to densely white tomentose, terete, striate-sulcate, bracteate, whitish-green. Calyculi 5-8(-11), lanceolate, 3-8.1 x 0.4-1 (-1.3) mm, upper quarter or sometimes upper half brown, dark brown or brownish-black; margins hairy, occasionally hairs short and thick; surface glabrous or thinly white tomentose interspersed with sparse or dense dark-brown pubescence; striae single. Involucre (4-)6-11 mm in diameter; phyllaries (13-)21(-22) pale to light brown, brownish-green, yellowish-green or green, occasionally upper quarter brown or dark brown, 6.5-11 x 1-2.2 mm; surface glabrous or thinly to densely white tomentose with sparse or dense interspersed dark brown hairs; linear-lanceolate, lanceolate or oblanceolate, sometimes attenuate towards

apex; apex acute, rarely obtuse, brownish, brownish margins entire or scarious, when scarious, sometimes brownish only. Phyllaries 1 or 2. Ray Florets light to deep yellow (Fig. 37, 38). Rays oblong-elliptic to ovate, oblanceolate, ovate-lanceolate or ovate; 10.5-22.5(-32) x 2.2-5.6 mm; tube glabrous or sparsely pilose, (3-) 4(-5)-striated; apex 2-3-fid, rarely obtuse. Disc floret somewhat tubular, 5.7-9.6 x 1-2 mm; corolla light to deep yellow, 5-lobed; lobe apices papillose; limb glabrous. Anthers 2-3 mm long, light yellow, yellowish-brown or brown, sagittate at base, at times shortly so. Style 4-8 mm long, glabrous, uniformly terete or sometimes semi-bulbous at base, rarely conical; stigmatic branches light brown, dark brown, yellow or pale yellow, occasionally assymetric. Achenes striate-sulcate, glabrous, light to dark brown; apex with yellow or yellowish-white crown oblong, oblong-elliptic or ovate-elliptic, terete, some narrowing towards both ends, 2.2-3 x 0.4-0.8 mm, base with narrow cartilaginous rim. Pappus of Achenes 4-8.3 mm long, white, antrosely barbed.

Distribution. Common in the highlands of Tigray/Gonder, Arssi and Bale provinces.

Habitat. Alpine moorland with *Festuca scheffleri*, *Helichrysum* spp, *Euryops prostrata* etc. *Erica arborea* bushland, rough mountain pastures with *Erica*, *Hypericum* spp, *Mucroneria* and grasses. Also frequent by roadsides and on protected hillsides; alt. 2500-4200m.

Notes on Variation. *S. fresenii* does not show much variation in its morphological features except only in calyculi and phyllary numbers. The number of calyculi and phyllaries varies continuously between 4 and 11, and 13 and 22 respectively (see Table 7) and (Fig.37). With

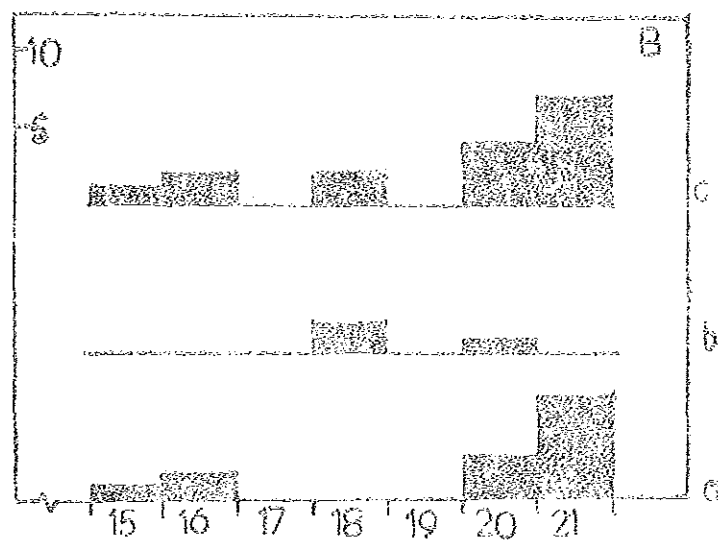
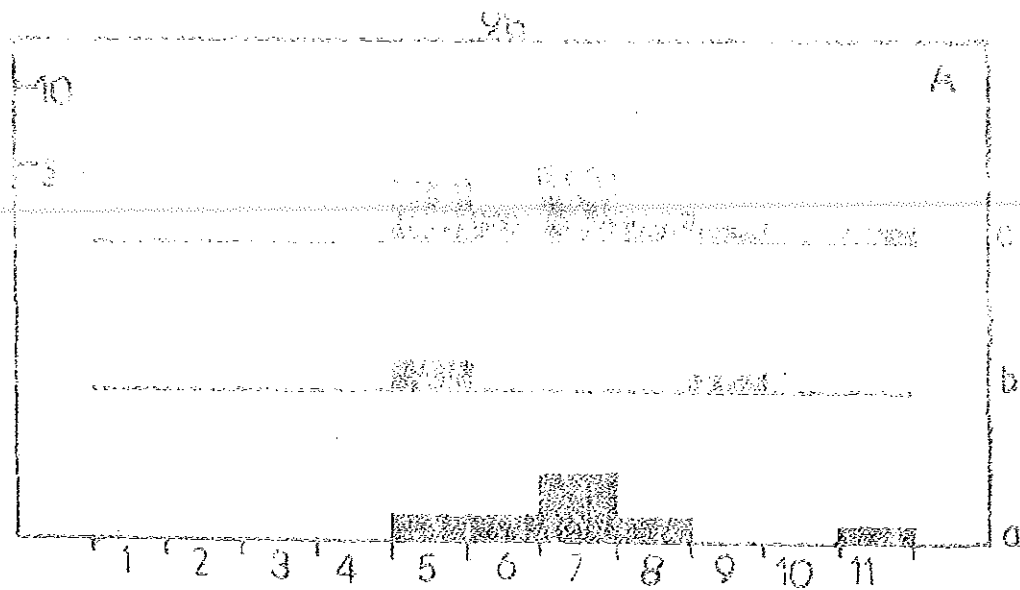


Fig. 37. *Senecia fresenii* Sch. Bip. ex A. Rich. Variation ranges for number of calyculi (A) and number of phyllaries (B) in material from Bale Region (a), Arssi Region (b) and in the total material (c). The diagrams are based on the average values for each collection.

the lack of any marked discontinuities in the altitudinal and other additional overlapping of the altitudinal ranges within which the variations occur, they cannot be considered as being unexpected for the species. This however can only be confirmed or dispelled by an examination of more material from around the type locality.

S. fresenii bears similarities and distinctions with *S. steudellii* as discussed under the latter species.

Table 7. Variation in calyculi and phyllary numbers in *S. fresenii*.

The altitudes or altitudinal ranges within which the variations occur are also indicated.

collection	calyculi number	phyllary number	Altitude (m)
Andeberg 1705 (ETH, UPS)	4-7	16-18	c. 4000-4200
Mesfin 5447 (ETH)	7	21 or 22	3330
Mesfin 4803 (ETH)	5	21	c. 3320-3360
Mooney 7231 (ETH)	7	21 or 22	3240
Mesfin 5636 (ETH)	5 or 6	13-17	3250
Ash 1665 (ETH, UPS)	14-6	18 or 19	c. 2500-3500
Ash 2328 (ETH)	3 or 9	20 or 21	3275
Hedberg 5610 (ETH, UPS)	5-7	21	4150
Mesfin 5461 (ETH)	7 or 8	21	c. 3850-3900
Mesfin 5540 (ETH)	7 or 8	21 or 22	3500
Otieno 23 (ETH)	11	21 or 22	3500
Otieno 26 (ETH)	5 or 6	20	3365
Otieno 37 (ETH)	7 or 8	19-21	3980

Specimens examined.

Arssi: Ca. 35km South of Mt. Chilalo, 32 km on track to Ticcio via Robie, 12.1.1974, *Ash* 2328 (ETH).

Bale: Along road just below summit of Mt. Batu, 8.XI.1982, *Andeberg* 1705 (ETH, UPS); c. 5 km N. of Rira Village, 15.VIII. 1956, *Mesfin* 5447 (ETH); Above Barenna forest, c.

50 km. on Dello-Mena road, 1000 m. alt. 1973, *Mesfin* 4903 (ETH).
 20 miles S.W. of Goba, 11.V.1973, *Strey* 1231 (ETH); c. 5 km
 W. of Dira, 10.VI.1973, *Strey* 1593 (ETH); 30 miles East of
 Shashamane on main Shashamane to Goba road, 28.V.1972, *Ash*
 1665 (ETH, UPS); Sanneti plateau between Garba Goracha &
 Tullu Deemtu, 1.XI.1973, *Hedberg* 5610 (ETH, UPS); c. 5 km N.
 of Rira on Goba-Dello-Mena road, 16.VIII.1986, *Mesfin* 5540
 (ETH); 17.XII.1986, *Mesfin* 5778 (ETH); c. 5.8 km from Goba
 along Dodola-Goba road, 19.XII.1989, *Otieno* 23 (ETH); c.
 12.4 km from Goba, on the road to Tullu Deemtu 22.XII.1989
Otieno 37 (ETH).

A. Senecio hochstetteri Sch. Bip. ex A. Rich. Tent. Fl. Abyss. 1: 635

(1843). *Syns. Ethiopia, Jigra, near Axum, alt. 4000, 26 June 1837.*

Schimper 258 (P, holo, K, iso. n.v. Pide Mesfin Tadesse).

unpublished manuscript on Compositae of Ethiopia (iso. EA!)

Erect, viscid herb, 33-76 cm tall. Stem light to dark brown, subscabrid, densely pubescent, terete, striate-sulcate; internodes 20-90 mm. Leaves simple, numerous at base, alternate on upper stem; lower ones oval-spathulate in outline, narrowed at base into a petiole which is dilated and amplexicaule; upper ones lanceolate, sessile, amplexicaule-auriculate; densely pubescent with hairs concentrated around margins and veins, brownish-green to light green; margins irregularly toothed or compound dentate; 3.5-33 x 0.4-7.3 cm; apex acute or obtuse. *Capitula* discoid, campanulate, 6-12 x 5-13 mm at anthesis, in rather lax corymbs; peduncles 0.3-7.6 cm long, densely pubescent, yellowish-brown to light-brown, terete, striate-sulcate. *Calyculi* (2-)4(-5), lanceolate; apex pointed, acute or blunt, brown, slightly hairy; surface slightly pubescent; hairs glandular; margins hairy; striation one. *Involucre* 4-7 mm in diameter; phyllaries 13(-14) light brown yellowish-brown, yellowish-green or light green, lighter towards margins; 6.2-9.8 x 1-2 mm, glandular-puberulous, linear-lanceolate or oblanceolate; apex pointed, acute or obtuse, light to dark brown, with very short hairs; margins entire or scarious; striae 1 or 2. *Disc floret* funnel-shaped, 6-9 x 1-2 mm; corolla light yellow to yellowish-brown, 5-lobed; lobe apices papillose; limb glabrous. *Anthers* c. 2(-2.6) mm long, yellowish-brown, purplish-brown or light brown, sagittate at base. *Style* 4-9(-10) mm long, glabrous, uniformly terete or conical at base; stigmatic branches yellow or yellowish-

brown. Achenes pubescent; hairs arranged in longitudinal rows; apex with yellowish-white crown; ligule to dark brown. Lvs. (2.4-)2.8-3.2 x 0.4-0.8 mm, elliptic or oblong-elliptic; base encircled by a narrow cartilaginous rim. Pappus of achenes c. 4-6.1 mm, white, antrorsely barbed.

Distribution. In low mountains and low lands of Tigray, Sidamo and Gamo Gofa Regions.

Habitat. Grasslands with scattered *Protea gaguedi* etc, low mountain tops, open bushland and between borders of fine swept tree grasslands and forests; alt. 1500-2400m.

Notes on Variation and similarities. *S. hochstetteri* is variable in the degree to which the lamina of the middle and basal leaves appear to be parted or divided. The basal leaves in the collection Mooney 7383 (ETH, UPS) representing a 'grassland' population at an altitude of 1500 m in Sidamo shows variation in being coarsely and irregularly toothed or somewhat parted and lobed, especially around the middle. In Gillet 14526 (location not indicated but probably also from Sidamo), collected from grassland-forest border, at an altitude of 2040, the mid-stem leaves are moderately to deeply divided from the middle to the base with oblong lobes beset with 2-5 irregularly placed triangular teeth. The leaves are usually oval-spathulate in outline with the margins exhibiting the features already indicated.

S. hochstetteri closely resembles *S. farinaceus* and *S. platypleurus* in achenial features, *S. schimperii* in achenial and capitular features and *S. acgyptius* var *discoideus* in achenial and some foliar features. From *S. farinaceus* and *S. platypleurus* it can be

distinguished by its discoid capitula while from both *S. schimperii* and *S. aegyptius* var *discoideus* it differs in having glandular hairs on the involucre bracts, leaves and stems.

Specimens examined.

Tigray: Near the top of Mount Kubbi, 26.VI.1937, *Schimper* 268 (EA).

Sidamo: Zimbaba near Adola, 13.VIII.1958, *Mooney* 7383 (EA, ETH).
1.XII.1952, *Gillet* 14526 (EA).

Gamo Gofa: Eastern slopes of Gughe highlands above Arba Minch,
3.IX.1975, *Gilbert, Thulin & Getachew* 445 (ETH).

8. *Senecio platypleurus*. Type: Ethiopia, Sidamo, Mega. 13 September 1939, Corradi 20719 s. (Fl. Folor, n.v. Hied Melfin Tadesse, unpublished manuscript on Compositae of Ethiopia).

Erect, bushy and woody perennial herb or undershrub. 30-50 cm tall. Stem whitish-brown, brown, brownish-green or green; branches greyish-white; terete, striate-sulcate, obsoletely white tomentose; internodes 8-30 mm. Leaves simple, alternate, sessile, amplexicaule-auriculate, spathulate or pinnatifid, lanceolate when young, 20-80 x 2-26 mm; upper surface thinly to densely white tomentose, lower surface densely white tomentose; margins dentate or pinnatifid, revolute; apex acute. Capitula radiate, 13-18 x 5-6 mm at anthesis, in lax corymbose cymes; peduncle 0.7-4.9 cm long, thinly to densely white tomentose, brownish-green, striate-sulcate, bracteate with 1 or 2 bracts. Calyculi 10-17, lanceolate, brown, brownish-green or light green, 2.5-4 x 0.5-1 mm; apex pointed, acute or blunt, light to dark brown, hairy; surface thinly white tomentose; margins hairy; striation 1. Involucre 5-7 mm in diameter; phyllaries (19-)21(-22), brown, brownish-green or light green, 4.3-5.3(-5.6) x 0.7-1.4 mm, thinly white tomentose interspersed with sparse or dense short thick hairs, lanceolate or oblanceolate, attenuate or tapered at apex; apex pointed or acute, yellowish-brown or brown, ciliolate or bristly; margins entire or scarious; striae 1 or 2. Ray florets light to deep yellow, (10-)13, pistillate; rays narrowly elliptic, oblong-elliptic or obovate, (7-)8-9.2(-10) x (1.5)2-2.9 mm; tube pilose, striate; 4(-5) striated apex 3-fid. Disc floret funnel-shaped, 3-5.2 x 0.7-1.2 mm; corolla light to deep yellow, 5-lobed; lobe apices papillose, limb glabrous. Anthers 1-1.9 mm long, yellowish-brown to brown, sagittate

at base, style (3-4) mm long, slender, white, terete or semi-bulbous at base, staminate branches yellow or yellowish-brown, hairy at apex. Achenes densely pubescent; hairs arranged in longitudinal rows; light brown, brownish-black or black; apex with white crown; terete, 1.6-2.2 x (0.2-)0.4-0.6 mm, elliptic; base with narrow cartilaginous rim. Pappus of achene 3-4 mm long, white, antrosely barbed.

Distribution. Confined to low altitude regions of Sidamo.

Habitat. Hilly grasslands, grasslands on open mountain tops and roadside margins; alt. 1800-2200 m.

Notes on Variations and Similarities. *S. platypleurus*, a species only known from Sidamo region is fairly homogeneous in its morphological features. However it shows variation in the dissection of the lower leaf margins. Within the same plant the lower leaf margins can be dentate or deeply pinnatifid. (Figs 7A and B) as seen in the collections Ensermu 1189 and Mesfin et al. 3349 and 3385. It closely resembles *S. farinaceus* in habit and achenial features but can be distinguished by its smaller involucre diameter, fewer ray florets and shorter involucre bracts, ray and disc florets and achenes.

Specimens examined.

Sidamo: c. 4.8 km N. of Mega, 10.X.1985, Mesfin et al. 3385 (ETH).

c. 4.8 km N. of Mega, 10.X.1985, Mesfin et al. 3349 (ETH).

Mega, 23.IX.1962, Mooney 9839 (ETH). c. 4 km from Mega on road to Addis Ababa 14.VIII.1985, Ensermu 1189 (ETH).

9. *Senecio hadiensis* Forssk. Fl. Aegypt-Arab. : 149, t. 19 (1775).

Type : Yemen. Forsskal (C, holo, n.v. fide Mesfin Tadesse).

unpublished manuscript on Compositae of Ethiopia).

Syn. *S. petitioides* L. Rich., Tent. Fl. Abyss. 1:442 (1848). Type :

Ethiopia, Shoa, Petit (P, holo, n.v. fide Jeffrey, 1986).

Shrubby liana or Scandent perennial herb, upto 5m high. Stem light brown, yellowish brown, greyish green or pale-green, terete, Striate-Sulcate, glabrous, more or less woody to Succulent; internodes 0.4-3.6 cm long. Leaves simple, sessile, distichous on lower parts of stem, alternate on upper parts, narrowly to widely elliptic, sometimes ovate or oval, abruptly narrowed at the base into a short shaft, 2.5-11.4 x 0.6-6.7 cm, membranous, succulent, glabrous, shiny bright green; margins closely to widely serrulate; apex acute or subacute. *Capitula* radiate, about 20 flowered, narrowly campanulate, 12-13 x 9-13 mm at anthesis, in crowded corymbose cymes; peduncles 0.5-1.7 cm long, glabrous, striate-sulcate, dark-brown, light brown, yellowish or brownish-green, bracteolate; bracts bright-green. *Calyculi* (1-)2-5, lanceolate, yellowish-brown or brownish-green, 1.5-3.1 x 0.3-0.5 mm; apex acute or blunt, hairy; margins entire but occasionally with sparse hairs; surface glabrous; striation 1. *Involucre* diameter 2-4 mm; phyllaries 9-11, brownish-green, pale-green or light green, 3-5.2 x 0.8-2 mm, glabrous, lanceolate to linear lanceolate or oblong, attenuate or tapering at apex, swollen at base; apex acute or obtuse, in some light brown, ciliolate, bristly or sometimes with tuft of hairs; margins entire or scarious, if the latter, sometimes on one side only, yellowish-white; striae 1 or 2. *Ray florets* bright to deep yellow, (3-)5 or 6, pistillate; rays oblong-elliptic, ovate or

obovate; 4.2-8.1 x 1.2-2.4 mm; tube glabrous; 4(-5)-striated; apex 3
 (4-5) lobed. *Pistil*: *Flower*: limb shaped, 5.2-7.5 x 1.1-1.5 mm; corolla
 bright to cream yellow, 5-merous; tube apices papillose; limb glabrous,
 anthers 2-2.4 mm long, yellowish brown or brown, sagittate at base.
Style: (4-)5.1-5.7 mm long, glabrous, uniformly terete or semi-bulbous
 to bulbous at base; stigmatic branches yellowish-brown or brown,
 sometimes assymmetric, hairy at apex. *Achenes* costate, puberulous,
 cream coloured; apex with yellowish-white crown, terete, 1.9-2.2 x
 0.4-0.6 mm, narrowly oblong; base shortly attenuate and truncate.
Pappus of achene 4-6.3 mm, white, antroscely barbed.

Distribution. Low altitudinal ranges of Eritrea, Hararghe, Arssi and
 Sidamo. Also in Uganda, Kenya, Tanzania, Yemen, Saudi Arabia, Somalia,
 Zaire, Rwanda and Madagascar.

Habitat. Mountainous regions with *Commiphora kerepentina*, *Cineraria*
schimperii, *Acacia* spp etc, bushy vegetations and forest borders. Also
 in wet areas or dry thorn scrubs with red soil; alt 1450-2300m.

Notes on Variation and Similarities. *S. hadiensis* in Ethiopia is a
 fairly uniform species. This however is not so else where e.g. Jeffrey
 (1986:898) noted that a variant with white-margined leaves had been
 recorded in cultivation in Nairobi.

It closely resembles *S. ruwenzoriensis* in being succulent and in
 leaf shape. However, it can be distinguished from *S. ruwenzoriensis* by
 its climbing habit, longer ray florets, puberulous achenes and
 reticulate leaf venation.

Specimens examined.

Entrées: voir *Entrées disparues* à Asmara, à la jonction de la

Call us in 24 hours at 051 749 03 00 or 051 749 03 01 (E.H.)

Harrington, A. L., 3 July 1959, *Aquatic Fungi* (1959)

(ETH).

(ETH). Aghare Mariam, 4.1.1954, *Nooney* 5431 (ETH).

subglabrous with pubescence scattered or on the edges of the slightly raised middle portion, linear, lanceolate, ovate-lanceolate, ovate or oblanceolate; apex somewhat attenuate and sharp, acute, obtuse or blunt, brown or brownish-black, hairy; margins entire or scarious, when scarious, sometimes so on one side only; striae 1 or 2. Ray florets pale to bright yellow, (7-)13, pistillate; rays, oblong-elliptic, broadly elliptic, ovate, oblanceolate or obovate; (4.2-)8-15 x (1.5-)2-4.2 mm; tube hairy, sometimes very short; (3-)4(-5)-striated; apex 2-3-fid, rarely acute or obtuse. Disc floret somewhat tubular, 3.5-6.2 x 0.7-1.2 mm; corolla yellow, yellowish-brown or yellowish-white, 5-lobed; lobe apices papillose; limb glabrous. Anthers 1.1-2 mm long, light yellow, yellowish-brown or brown, sagittate at base. Style 2.4-5 mm long, glabrous, uniformly terete, sometimes conical or semi-bulbous at base; stigmatic branches light yellow, yellowish brown or brown, hairy at apex. Achenes costate with short white hairs, black; apex with white or yellowish-white crown; terete, 1.8-2.5 x 0.4-0.7 mm, ovate-elliptic or oblong-elliptic; base truncate. Pappus of achene 3.5-5.4 mm long, white, antrosely barbed.

Distribution. Common in the high altitudinal ranges of Gonder, Arssi and Bale.

Habitat. Afro-alpine moorland with *Helichrysum* species, rocky crevices in afro-alpine moorland, ericaceous scrub, along roadsides and in *Alchemilla johnstonii* bush grassland; alt. 3170-4050m.

Notes on Variation and Similarities. Variation is observed in the leaf types within *S. unionis*. In some specimens, e.g. Hedberg 5703, Thulin 1667, Hillman 70 and 71, the leaves are pinnatpartite while in others,

eg. Mesfin 5492, Hedberg & Getachew 5352 and Ash 3535 the leaves are simple with ~~widely serrate margins~~. Both simple and compound leaves sometimes occur on the same specimen eg. Mesfin 3070, Hillman 72, and Mesfin 7076. The number of calyculi also varies, but rather continuously (Fig. 38), being 7-10 as in Ash 3535 from Bale, 9-12 in Hedberg & Getachew 5362 from Gonder and 10-21 in Mesfin 3070 from Bale. The same kind of variation is seen in the peduncle length.

S. unionis has similarities with *S. mesogrammoides* in having both simple and compound leaves and with *S. pinnatipartitus* in achenial and some foliar features. From the first it can be distinguished by its costate and black achenes and from *S. pinnatipartitus* by its wider capitula and hairy peduncles. From both it also differs in being perennial, having a dwarf and often caespitose habit and leaves that are tinged purple at the base.

Specimens examined.

Gonder: Simien, 16.X.1973, Hedberg and Getachew 5362 (ETH). Mt. Buahit, 19.VIII.1838, Schimper 1272 (UPS).

Bale: c. 45 km N. of Goba, 17.VIII.1986, Mesfin 5492 (ETH); At 370km on Addis - Goba road, c. 30 km N. of Dinsho, 28.1.1985, Mesfin 3070 (ETH); Between Little Batu Camp HQ, 4.XI.1973, Hedberg 5703 (ETH); Dinsho HQ, 17.VIII.1984, Hillman 71 (Bale Natl. Park Flora); Sanetti Plateau, Quarry hill camp, IX.1984, Hillman 70 (Bale Natl. Park Flora); Sanetti Plateau on new road to Masslo, 22.VI.1976, Ash 3535 (UPS); c. 45 km N. of Goba, 17.VIII.1986, Mesfin 5548 (ETH).

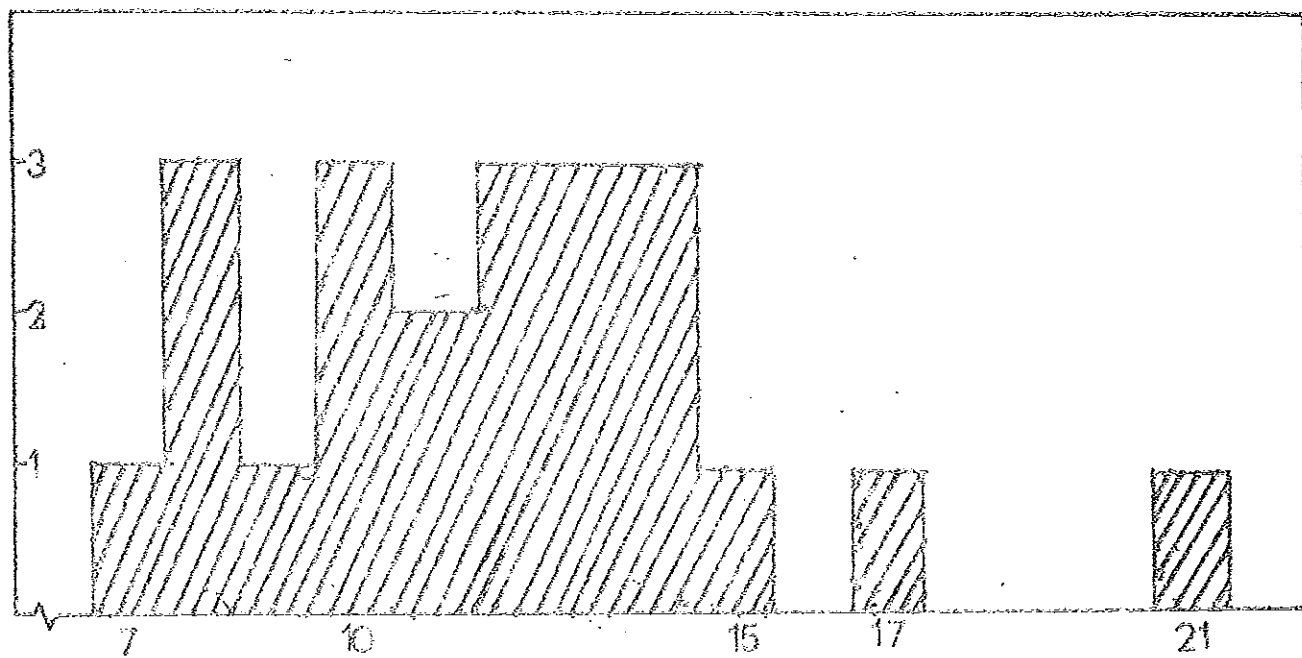


Fig. 38. *Senecio unionis* Sch. Bip. ex A. Rich. Variation ranges for number of calyculi. The diagram is based on the original values of calyculi counted.

11. *Senecio myriocephalus* Sch. Bip. ex A. Rich, Tent. Fl. Abyss.

(1441 (1842). Type : Ethiopia, Gonder, Mt. Aber. 1 Jan. 1840.

Schimper 837 (? P. Syn. K. (Isosyn.) n.v. Flde Mesfin Tadesse, unpublished manuscript on Compositae of Ethiopia). (Isosyn. UPS!).

Erect, robust, leafy perennial herb or shrub, 0.8-3m tall. Stem brown, brownish-green, pale-green or purplish-green, terete, glabrate below, densely pubescent or somewhat cottony above, branches at base and towards top; internode 4-37 mm. Leaves simple, alternate or opposite especially on upper stem, linear-oval, narrowed towards both ends, sessile, auriculate, 2.5-19 x 0.4-4.5 cm, glabrous or subglabrous, dark green above, obsolete to thinly white tomentose below; margins serrulate, serrate, denticulate or doubly serrate; apex acuminate or acute. Capitula radiate, numerous, 6-20 x 6-12 mm at anthesis, in dense much-branched corymbose cymes held high; peduncles 0.5-3.5 mm long, lanate, light brown or green, striate-sulcate, with 1-10 small bracts along its length. Calyculi (2-)5, lanceolate, brownish-green to light green, sometimes upper 3/4 dark brown and the rest light green, 2-4 x 0.1-0.6 mm; apex acuminate or acute, light brown or slightly dark brown, puberulose and so on margins; surface glabrous with single striation. Involucre 4-8 mm in diameter; phyllaries (11-)13(-14), brown (after drying), brownish-green, pale-green or light green, (5-)6-7 (-7.8) x (0.5-)0.6-1.8 mm, glabrous, lanceolate or oblanceolate, rarely ovate; apex pointed or acute, light brown to black, hairy; margins entire or scarious, when scarious occasionally so on one side only; striae 1 to 3. Ray florets light to deep yellow, (5-)7 or 8(-9), pistillate, rarely neuter rays elliptic or oval, sometimes obovate or oblanceolate, rarely sinuate; (4.3-)7.2-

12(-13.5) x 1-3 mm; tube glabrous; (2-)3-4(-6) striated; apex 2-3-fid or obtuse, rarely acute. *Disc floret* tubular, (5.2-)6-8(-9) x 1-2 mm; corolla yellow, 5-lobed; lobe apices papillose; limb glabrous. Anther 1.9-2.4 mm long, yellow to light brown, sagittate at base. Style 3.5-8.3 mm long, glabrous, terete, semi-bulbous at base; stigmatic branches 2(-3), yellow or brown, hairy at apex. Achenes striate, pilose with hairs arranged in longitudinal rows, sometimes striate and glabrous light to dark brown; apex with white crown; terete, 1.7-3 x 0.2-0.7 mm, elliptic or oblong-elliptic; base with narrow cartilaginous rim. Pappus of achenes (3-)5-5.6 mm, white, antrosely barbed.

Distribution. *S. myriocephalus* is found distributed especially in the highland areas of Southern and Eastern Ethiopia i.e. in Shewa, Keffa, Sidamo, Hararghe, Arssi and Bale regions. It also occurs in the highlands in Gonder.

Habitat. Open rocky places, steep hillsides and escarpments with *Eucalyptus* and *Juniper*; often frequent in alpine meadows with *Juniper* and *Hagenia*. Also occurs in Montane forests, grassy mountain slopes, *Erica* bushland and in waste ground among planted *Eucalyptus* or in thickets forming hedges; alt 2250-3200m.

Notes on Variation. *S. myriocephalus* is an easily recognizable and fairly homogeneous species. In the field it can be distinguished from the other perennial Ethiopian species of *Senecio* by its habit, i.e. being an up to 3m high shrub and its leaves which are very dark green and smooth above, white below and narrow, both towards apex and base.

The shrubby habit makes it a common hedge plant in the areas where it is prevalent (Fig. 3C).

The only and perhaps not too common variation occurs in the hairiness of the achenes and the number of style arms. The achenes can be both glabrous and striate or pilose and striate with the pubescence being arranged in longitudinal rows (Figs. 18A and B). In most cases the number of style branches is two but three (Fig. 17N) occasionally also occur e.g. in Ash 1657.

Specimens examined.

Gonder: Lima Lino, 24.XI.1982, *Mesfin & Zerihun* 2843-2849 (ETH);
Mt. Aber, 1.1.1840, *Schimper* 837 (UPS).

Hararghe: Northern slopes below new road to Gara Ades, 23.II.1963,
Burger 2585 (ETH).

Keffa: ca. 22 km from Benga on road to Felege Salam, 25.1.1984;
Ensermu et al. 720 (ETH); Mt Maigudo, Ca. 37 km from Jimma-
Addis road, on Omo-Nadda track, 3.XII.1972. *Friis et al.* 1507
(ETH).

Shewa: Chilimo forest, 15.XII.1979, *Mesfin* 809 (ETH); Below
Gushmeda, 22.III.1955, *Nooney* 6439 (ETH). Wofasha forest near
Debrasina, 22.XII.1958, *Roitzsch* 75 (ETH); Mussolini Pass,
between Debre Birhan & Debre Sina c. 200 km NNE of Addis
Ababa, 23.VIII.1965, *De Wilde & De Wilde-Duyfjes* 7367 (ETH);
Ca. 25 km W. of Addis Ababa. upper Mt. slopes of Menagesha
State forest, 24.IV.1965, *De Wilde & De Wilde-Duyfjes* 6411
(ETH); Gorebela (Ankober) escarpment, between town and

Amur St., B. 51. 1962, L. 400005 & Class 65 (ETH).

Arsef: XI.1978, Merga 825 (ETH).

Bale: Bale Mts. Natl. Park, near HQ, 17.XI.1979, *Mesfin* 723 (ETH);
c. 50 km on Dello-Mena - Goba road, 13.VI.1986, *Mesfin* 4798
(ETH); Dinchu or Curfecca, 25.V.1972, *Ash* 1557 (ETH). Fatcha,
2.1.1960, *Mooney* 8493

Sidamo: Jem Jem forest, 23.XI.1954, *Mooney* 6384 (ETH). Agere
salam, 29.1.1954, *Mooney* 5555 (ETH).

12. *Senecio incornatus* DC in Fl. Swaz. Suppl. Vol. II:685 (1976). Type :

South Africa: Cape Province: Orange-Fish R. DC. holotype, fide

Heald in *Adansia*. Unpublished manuscript on Compositae of Ethiopia).

Erect rhizomatous perennial herb, sometimes with trailing stems, 53-100 cm tall. Stem pale-brown, pale or dark green, terete, striate-sulcate, glabrous; internode 4.5-16 mm. Leaves simple, rosulate, alternate or distichous on upper stem; upper ones lanceolate or cordiform, sometimes narrowing attenuately towards apex; sessile, some narrowly decurrent on stem; lower ones elliptic, narrowing at base into a petiole; 5-30.5 x 1-3 cm; upper surface glabrous or obsoletely white tomentose; lower surface sparsely to finely pubescent; pubescence concentrated around veins; pale or light green; margins denticulate or dentate; apex pointed or acute; petiole 3.5-10.4 cm long, flattened and blade-like, pericladial, glabrous, striate-sulcate beneath, yellowish-green, purplish at base. Capitula discoid, 5-10 x 8-12 mm at anthesis, few, in corymbose cymes; peduncles 5-34 mm long, finely pubescent to thinly white tomentose, yellowish-brown, pale green or light green, terete, bracteate. Calyculi (1-)4(-6), lanceolate, brownish-green or light green, 4-8(-9) x 0.5-1 mm; apex blunt or acute, light to dark brown, bristly; surface glabrous; margins hairy, sometimes more or less bristly; margins entire or scarious, yellowish-white when scarious; striae 1 to 4. Disc floret turbinate, 5.4-8 x 2-3.5 mm; corolla light yellow, 5-lobed; lobe apices papillose; limb glabrous. Anthers 1.8-2.2 mm long brown, shortly sagitate at base. Style 4.5-7 mm long, glabrous, terete, bulbous or somewhat conical at base; stigmatic branches 2(-3), yellow or brown, hairy at apex. Achenes glabrous, striate, creamish-brown; apex with yellowish-white

crowns; Lvs. 3.1-5.7; x 0.9-1.2 mm. elliptic or oblong-elliptic; base with narrow cartilaginous rim. ~~Pappus or achenes 3.5-7.7 mm, white, antrosely barbed.~~

Distribution. Frequent in the highlands of Bale and Sidamo regions. Also in Tanzania, Malawi, Zambia, Zimbabwe, Angola, Zaire, South Africa (Transvaal, Natal, Cape Province).

Habitat. Damp areas at base of rock outcrops, grasslands and in ericaceous scrub. Also in forests and along rivers.

Notes. *S. inornatus* is a uniform species that shows close similarities with *Senecio* Sp. A. (see discussion under the latter species.)

Specimens examined.

Bale: Between little Batu Camp and HQ, 4.XI.1973, *Hedberg* 5687 (ETH,UPS); Angasu, 15.XII.1959, *Mooney* 8311 (ETH); c. 3 km S. of Rira on road to Dolo Mena, 10.VIII.1986, *Mesfin* 5113 (ETH); c. 50 km N. of Dolo Mena (Masslo) on road to Goba, *Friss et al.* 3799 (ETH).

Sidamo: Zimbaba near Adola, 13.VII.1958, *Mooney* 7388 (ETH).

13. *Senecio nanus* Sch Bip. ex A. Rich., Tent. Fl. Abyss. 1:443

(1848). Type: Ethiopia, Gambia, H. Brahm, Schimper 1865 (det.)

syn.). Tigray, Mt. Selki, Schimper 1897 (? P. syn.) n.v. fide Mesfin

Tadesse, Unpublished manuscript on Compositae of Ethiopia).

Rhizomatus, caespitose, low perennial herb, 5-26 cm high. Stem semi-subterranean, covered below by imbricated bases of leaves. Leaves simple, rosulate, linear or spatulate, elongated sessile, dilating at the base, subamplexicaule, 25-85 x 1-7 mm, glabrous, sometimes thinly white tomentose below; margins entire or indistinctly denticulate; apex acute or obtuse. Capitula radiate, terminal, subhemispherical, 13-35 x 6-15 mm at anthesis, solitary; peduncles 0.3-10 cm long, glabrous or sparsely hairy; purplish-brown, yellowish, brownish-green or purplish-green, terete, striate-sulcate, bracteate. Calyculi (0-)6-15, lanceolate or oblanceolate, brown, purplish-brown, purplish-green or light green, 7-11.5 x 1-1.8 mm; apex acute, blunt or obtuse, brown, purplish-brown or brownish-black with purplish tinge, hairy; surface glabrous, or hairy; margins entire and scarious or sparsely hairy especially around basal region; striae 1(-3). Involucre 9-18 mm in diameter; phyllaries 13-21, purplish-brown, yellowish-brown or light green, 5.5-12 x 1.1-2.8 mm, glabrous or sparsely hairy, lanceolate, elliptic or oblanceolate; apex acute, hairy, light to dark brown, sometimes with purplish tinge at point immediately below it; margins entire and scarious; striae 1(-4). Ray florets light yellow or yellowish-brown, 14-21, pistillate; rays elliptic, ovate, oblong-elliptic or obovate; 6.3-19 x 2.2-4 mm; tube glabrous or sparsely hairy; 4- striated; apex 2-3-fid, dentate, acute or obtuse. Disc floret campanulate, (3.1-)6-7 x 1-1.7 mm; corolla light yellow, 5-

lobed; lobe apices papillose; lim. glabrous. Siliques (1.1'-)1.6-2.1 mm long, yellow or brown, capitate at base, 2/3 (1.5-1.6 mm long, glabrous, terete, conical or somewhat bulbous at base, hairy at apex. Achenes glabrous, striate-sulcate, light brown; apex with yellowish crown; terete, 1.9-2 x 0.4-0.5 mm, elliptic or oblong-elliptic, narrow towards base; base with narrow cartilaginous rim. Pappus of achenes 4.2-6 mm long, white, antrosely barbed.

Distribution. Highlands in Gojjam, Arssi and Bale Regions.

Habitat. Along shallow inlets to lakes, wet rock platforms or in ericaceous belts on areas with flat rocks and impeded drainage. Also in exposed grasslands with volcanic boulders and close cropped turf; alt. 3250-4100m.

Notes on Variation and Similarities. *S. nanus* is homogeneous in most of its morphological characters. However the collection Ash 1702 from Bale representing a population growing in "open grassland in full sun" at an altitude of 3250 m shows variation from the rest of the material examined from Bale and Arssi which generally grows in wet areas e.g. soils with impeded drainage or along shallow lakelets (see Table 8). The variations noted in Ash 1702 could probably be a result of habitat influence but this can only be ascertained by more studies of plants from around the same collection site.

S. nanus closely resembles *S. schultzei*. For similarities and distinctions between these two species see discussion under *S. schultzei*.

Table 3. Variations in some morphological features between two populations of *S. nana* from different habitats.

	Population from open grassland	Population from wet area
Calyculi number	Absent	4-16
Phyllaries:		
- shape	ovate	lanceolate, elliptic or oblanceolate.
- texture	coriaceous	herbaceous
Disc floret length (mm)	c. 3.1-3.5	c. 5.9-7.6
Style length (mm)	c. 1.5-2.1	3.3-6.2
Anther length (mm)	c. 1.1-1.2	1.6-2.1

Specimens examined.

Gojjam: Upper Godeb Valley below Mt. Birhan, 28.VIII.1957, *Evans & Hiller* 332 (ETH).

Arssi: Mt. Kaka, E. slope, VI.1980 *Hedberg & Mesfin* 7062 (UPS).

Bale: Crest of Garba Goracha Camp Site, 2.XI.1973 *Hedberg* 5639 (ETH, UPS); Top of escarpment leading to Bale plateau, 17 miles West of Dinchu, 27.V.1972, *Ash* 1702 (UPS).

14. *Senecio ragazzii* Chiov. In Bull. Jard. Bot. Nat. Belg. 37, Suppl:

1137 (1957). Type : Ethiopia, Shewa, Entoto, 1896, Ragazzii s.n.

col. 1910, n.v. (see Meslin-Jacques, unpublished manuscript on

Compositae of Ethiopia).

Erect rhizomatous, perennial herb, 0.25-2 m tall. Stem light to deep purple at base, yellowish-green, purplish-green or green on upper parts, terete, striate-sulcate densely pubescent at base, finely so on upper parts, internode 2-13.8 cm long. Leaves simple, alternate; young ones ovate, auriculiform, or cordiform, amplexicaule-auriculate; mature ones cordate; 2.2-15.3 x 1.3-12.7 cm; sessile or petiolate; petioles pericladial, terete, some flattened and margins continuous with that of leaf, striate, brownish-green or green, purplish green at base, slightly to densely pubescent, 3.5-22.5 cm long; surfaces finely to densely pubescent with hairs concentrated around margins and veins, greyish-brown, brownish-green, pale green or light green; margins denticulate to doubly dentate; apex apiculate, acute or obtuse. *Capitula* radiate, subhemispherical, 20-58 x 9-15 mm at anthesis, in lax corymbose cymes; peduncles 0.7-1.2 cm long, slightly to densely pubescent, brownish-green, purplish-green, pale-green or light-green, terete, striate-sulcate, with 1 or 2 leaf like bracts. *Calyculi* 8-22 mm long, almost equalling involucre in length, linear-lanceolate to oblanceolate, brown, yellowish-brown, brownish-green, yellowish-green or light green, upper 1/4 or 1/2 brownish-black, 6.3-10 (-12) x 0.5-1(-1.4) mm; apex acute, blunt or obtuse, brownish-black or black, papillose, ciliolate or scarious; surface glabrous or sparsely to densely pubescent with long hairs; marginal hairs long; striation one. *Involucre* 9-15 mm in diameter; phyllaries 21(-24) yellowish-brown,

brownish-green, yellowish-green or light green 7-12 x 1-2.9 mm, sparsely to densely pubescent, mostly so on absp. parts, lanceolate to broadly oblanceolate; apex acute or obtuse, dark brown, brownish-black or black, in some with a purplish tinge at surface point immediately below, papillose, ciliolate or hairy; margins entire or scarious, when scarious, sometimes so on one side only; striae 1(-2). *Ray florets* light to deep yellow, 13, pistillate; rays ovate, narrowly to broadly elliptic or oblong-elliptic; 15-30 x 4-6 mm; tube glabrous; 4-8-striated; apex 2-4-fid, once or twice cleft or dentate. *Disc floret* funnel-shaped, 6-9.3 x 1-2.5 mm 5-lobed; lobe apices papillose; limb glabrous. *Anthers* (1.5-)1.7-2.3(-2.5) mm, yellowish-brown or brown, sagittate at base. *Style* (3-)4-8.2(-9.9) mm long, glabrous, uniformly terete or somewhat bulbous at base; stigmatic branches 2(-3) brown, yellowish-brown or yellow, with short thick hairs at apex. *Achenes* striate, slightly hairy with hairs aligned along striations, purplish-brown; apex with white crown; terete, narrow towards base, 4.3-4.8 x 0.9-1 mm, narrowly oblong or oblong-elliptic; base with narrow cartilaginous rim. *Pappus of achene* 4.4-8.3 mm long, white, antrosely barbed.

Distribution. Highlands in Shewa, Arssi and Bale.

Habitat. Moderate mountain slopes with *Erica arborea* or slopes of hilly grasslands. Also in fens or along road margins; alt. 2700-3800m.

Notes on Variation and Similarities. Populations of *S. ragazzii* in Shewa, Arssi and Bale Regions occuring between altitudes of 2700 and 3000 m e.g. Edwards & class 44, Thulin 1483 and Friis et al. 3801 have a higher number of calyculi (13-22) than those populations occuring at

higher altitudes (3220-3880 m) e.g. Hedberg 5665, which have between 7 and 9 cilyculi. The latter population is represented by specimens from Arssi and Bale Regions only. No marked differences are evident between the two populations in all other phenetic features except in style length of the disc floret which tends to be shorter in the lower altitude population than in the higher altitude one (Fig. 28C).

The young leaves of *S. ragazzii* which are sometimes both petiolate and cordate have some resemblance with those that occur at the base of young plants in *S. ochrocarpus*. However they are distinguished by their sharply denticulate margins and absence of the dense white tomentum on the lower surface. Besides this, *S. ragazzii* does not show many similarities with other *Senecio* species.

Specimens examined.

Shewa: c. 5km before Gorebela (Ankober), 3.VI.1982, *Edwards & Class* (UPS).

Arssi: Gobe Livestock farm, c. 50 km N. of Koffale, 12.X.1971, *Thulin* 1483 (ETH, UPS); c. 3 km E. of Boraluco, 8.IX.1967, *Hedberg* 4217 (ETH).

Bale: Between Garba Goracha and Little Batu camps, 3.I.1973, *Hedberg* 5665 (UPS); c. 5 km N. of Rira village, 15.VII.1986, *Mesfin* 5406 (ETH); c. 50 km N. of Dolo-Mena (Massilo) on road to Goba, 5.XI.1984, *Friis et al.* 3802 (ETH); c. 50 km from Goba along road to Rira, 22.XII.1988, *Ozieno* 42 (ETH). Angasu, 15.XII.1959 *Mooney* 8315 (ETH).

15. *Senecio mesogamoides* G. Hoffm. in *Arch. Bot.*, Vol. 41(4), 899

(1986) (1. vol. 2: 1113, 1150-1157, 17-18, syn.); Volkers 553 (28, 29, 30) n. sp. fide W. G. F. Veldman, unpublished manuscript on Compositae of Ethiopia).

Erect, annual herb, 10-50 cm tall. *Stem* often much-branched, yellowish-green, pale green or green with purplish streaks towards top, purple at base, terete, striate-sulcate, glabrous or slightly pubescent; internode 0.7-6.5 cm long. *Leaves* simple, linear-lanceolate or lanceolate, pinnatifid, alternate, sessile, amplexicaule, somewhat auriculate, 17-50 x 4-14 mm; young ones glabrous to thinly tomentose; green; margins entire or widely dentate in young ones, pinnatifid or only so towards base in mature ones; apex acute or obtuse. *Capitula* radiate, campanulate, 9-13 x 5-7 mm at anthesis, in lax corymbose cymes; peduncles 0.7-3.5 cm long, glabrous or slightly hairy, brownish-green, yellowish-green, pale or light green, striate-sulcate, bracteate. *Calyculi* 3-4, linear-lanceolate and tapered at apex, lanceolate, ovate-lanceolate or ovate, pale green, light green or upper 1/2 to 3/4 brownish-black, the rest light or yellowish-green, 2-3 x 0.8-1 mm; apex acute, dark brown to brownish-black, hairy; surface glabrous; margins scantily hairy; striation one. *Involucre* 3-7 mm in diameter; phyllaries 10-13, yellowish-green, pale or light green 4.3-5.7 x 1-2.2 mm, glabrous or subglabrous; hairs short, thick and mostly along margins; linear oblong or oblanceolate, attenuate or tapered towards apex; acute, light to dark brown or brownish-black, hairy; margins entire or scarious, when scarious, sometimes so on one side only; striae 1 to 3. *Ray florets* light to deep yellow, 5-8, pistillate; rays elliptic, oblong-elliptic or oblong; 3.4-6.1 x 1-2

mm; tube hairy; 3-4-ribbed; apex 2-3-fid or dentate. *Disc florets* funnel-shaped, 3-14 x 0.6-1.2 mm; corolla yellowish-brown to yellow; 5 lobes; lobes apical papillose; tube hairy; limb glabrous. *Anthers* 0.7-1 mm long, brown, yellowish-brown or yellow, sagittate at base. *Style* 2-3 mm long, glabrous, uniformly terete or semi-bulbous at base; stigmatic branches yellowish-brown or yellow. *Achenes* densely pubescent, brown; apex with yellowish-white crown; terete, 2.5-3.1 x 0.5-1 mm, elliptic, oblong-elliptic or oblong, narrow towards base; base truncate. *Pappus of achenes* 3-4 mm long, white, antrosely barbed.

Distribution. Highland areas in Gonder and Shewa. Also in Kenya and Tanzania.

Habitat. Open areas of grasslands, wet ditches by roadsides or in ericaceous scrubland, mostly on dry or moist clayey soil; alt. 2500-3250m.

Notes on Variation and Similarities. *S. mesogrammoides* is a fairly homogeneous species exhibiting the only variation in the amount of pubescence on the tube of the disc florets, which can be sparse to moderate as in Mooney 7941 or absent as in Hedberg & Getachew 5425.

This species closely resembles *S. unionis* as discussed under the latter species and also bears similarities with *S. pinnatipartitus* in being annual, having stems that are glabrous or glabrescent and often much-branched and leaves that are simple or compound. However its smaller number of phyllaries and calyculi that are dark brown to brownish-black on about half or three-quarters of the upper portion (Fig. 11W) are distinctive.

Specimens examined.

~~Gonder: Chennek, Simien, 17.X.1973, Hedberg & Getachew 5425 (UPS).~~

Shawa: Blue Nile road, 15 miles N. of Addis Ababa, 9.VI.1959,

Nooney 7941 (ETH).

16. *Senecio aegyptiacus* L. var. *Discoideus* Boiss. In Stud. Fl. Egypt

2: 38. type: Egypt, Audier-Eloy 3421 (n.v.), Karkh (n.v.).

(n.v. fide Mesfin (adesso, unpublished manuscript on Compositae of Ethiopia).

Erect leafy, basally branched, subglabrous perennial herb, 9-46 cm tall. Stem yellowish-brown, pale green to light-green, striate-sulcate, pubescent to obsoletely white tomentose; internodes 13-43 mm long. Leaves cauline, simple or compound, alternate, upper pinnatipartite, sessile, amplexicaule or subpetiolate, base auriculate, lobes toothed; lower pinnatipartite, oblong-spathulate or spathulate in outline, petiolate; petioles slightly dilated at base, sub-amplexicaule; surface obsoletely white tomentose, sparsely or densely pubescent; margins subentire, dentate, parted or pinnatifid; lobes oblanceolate or oblong, dentate or again pinnatifid; 16-67 x 7-26 mm; apex acute. Capitula discoid, narrowly campanulate, 3-5 x 4-5 mm at anthesis in small compact corymbose cymes; peduncles 1-2 mm long, glabrous, sparsely pubescent or obsoletely white tomentose, light green to brown, bracteate terete, striate-sulcate. Calyculi 2-4, whitish or yellowish-brown, appressed to involucre, lanceolate, 1.1-1 x 0.3-1 mm; apex acute, light brown, puberulous; surface glabrous; margins hairy or membranous with wing-like extensions that are minutely lacerate and hairy; striation one. Involucre 2-3 mm in diameter; phyllaries 8-13, yellowish-brown, whitish or yellowish-green or pale green, 3.9-4.5 x 0.5-1 mm, glabrous or subglabrous with scattered brown-tipped short, thick hairs, lanceolate or oblanceolate; apex pointed acute or obtuse, hairy or sparsely so; margins entire or scarious; striae 1(-2). Ray florets light yellow, pistillate, rays

ovate or oblong; 3-3.5 x 0.8-1 mm, tube glabrous, (2-)3-4 striated; apex 2-3-toothed. Disc floret tubular; ~~4.2-2.8 x 0.3-0.7 mm~~; corolla yellow, 4-5 lobed; lobe apices capillare; limb glabrous. Anthers 0.5-0.8 mm long, brown, sagittate at base. Style 1.5-2 mm long glabrous, terete, conical or somewhat so at base; stigmatic branches brown, hairy at apex. Achenes faintly striate, densely pubescent; hairs arranged in inconspicuous longitudinal rows; brown; apex with white crown; terete, 1.7-2 x 0.3-0.4 mm, lanceolate or oblong elliptic; base with narrow cartilaginous rim. Pappus of achenes 2-2.4 mm long, white, antrosely barbed.

Distribution. Known from highlands in Gojjam and Shewa. Also in Egypt.

Habitat. River banks, dry river beds or meadows along streams; alt. 2400-2500m.

Notes on Variation. *S. aegyptius* var. *discoideus* does not show much variation in its morphological features. However the calyculi margins are variable in either being hairy e.g. as in Thulin & Hunde 3898 from Gojjam Region or membranous with wing-like extensions that are minutely lacerate or hairy (Figs. 11E and F) as occurs in De Wilde c.s. 6107 collected in Shewa Region. There is also variation in the number of corolla lobes; these can be either 4 or 5 within the same plant as observed in De Wilde c.s. 6107.

This variety can be distinguished from the species proper by the absence of ray florets in its capitula (Täckholm 1974: 583).

Specimens examined.

Gajjam: c. 15 km on the Dejen-Debre Markos road, 28.V.1980. Inulin
& Glucose 3893 (UPS).

Shewa: c. 20 km N.W. of Addis Ababa along Blue Nile road,
2.IX.1965, De Wilde 6107 (E.H.).

17. *Senecio farinaceus* Sch. Bip. ex A. Rich., Tent. Fl. Abyss., 1:443

(848) . Type : Ethiopia Goodei, Mt Buhit, 19 August 1835,

Schimper 751 (P, holot; K iso. n.v. fide Mesfin Tadesse,

unpublished manuscript on Compositae of Ethiopia). (Iso. UPS!).

Erect or ascending, woody, perennial herb or shrub, 30-75 cm tall. Stem purplish-brown, light-brown or pale-green, terete, striate, thinly to densely white tomentose; Internode 5-22 mm long. Leaves compound, alternate, lobed to pinnatipartite, oblong or obovate in outline, petiolate or the uppermost ones auriculate and sessile, 18-76 x 5-23 mm, obsolete to thinly white tomentose above, densely white tomentose beneath, greyish-green; margins parted or deeply pinnatifid; lobes oval, ovate or oblong, mostly toothed or again pinnatifid; apex acute. Capitula radiate, broadly campanulate, slightly turbinate, 10-30 x 10-18 mm at anthesis, solitary or subcymose; peduncles 0.8-5 cm long, thinly to densely white tomentose, light green, striate-sulcate. Calyculi 7-13, linear or lanceolate, yellowish-brown, brownish-green or yellowish-green, (3.9-)6-9(-13) x 0.5-1 mm; apex acute, light brown, hairy or some scarious; surface densely white tomentose interspersed with long dark brown hairs; margins hairy; striation 1. Involucre 7-13 mm in diameter; phyllaries 15-21(-22), yellowish-brown or brownish-green, 7.5-9 x 1-2.6 mm, thinly white tomentose interspersed with sparse or dense light to dark brown hairs, lanceolate or oblanceolate; apex acute, light to dark brown, hairy; margins entire or scarious, when scarious sometimes so on one side only; striae 1(-2). Ray florets light yellow to yellowish-brown, 13-22, pistillate; rays elliptic, oblong-elliptic or obovate, 9.5-20 x 2-3.6 mm; tube slightly pilose; 4(-5) striated; apex 2-3-fid. Disc

Floral funnel-shaped, 5.4-6.2 x 2-2 mm; corolla light yellow to yellowish-brown, 5-lobed; tube apices corollae light glabrous. *Anthers* 1.4-2.2 mm long, eglandular at base, (3-4) 4-5.2 (5.8) mm long, glabrous, uniformly terete or bulbous at base; stigmatic branches brown, hairy at apex. *Achenes* striate-sulcate, pubescent; hairs aligned along sulcations; brown or brownish-black, terete; apex with yellowish-white crown, 2.4-3 x 0.4-0.9 mm, narrowly oblong or elliptic; base with narrow cartilaginous rim. *Pappus* of achenes 4.7-6-8 mm, white, antrosely barbed.

Distribution. Presently only known from the northern regions of Gonder and Gojjam.

Habitat. *Erica arborea* scrub or in shade of rocks or rock outcrops on mountains; alt. 3600-3800 m.

Notes on Variation. The only noteworthy variation occurring in *S. farinaceus* is in the degree of dissection of the leaf lamina. In the same plant the lamina can either be irregularly parted (Fig. 7I), e.g. as in the collection Evans & Hiller 324 or deeply pinnatifid with lobes toothed or again pinnatifid (Fig. 7J) as in De Wilde & Gilbert 72.

S. farinaceus has close similarities but can also be distinguished from *S. platypleurus* as discussed under the latter species.

Specimens examined.

Gonder: Mount Ruahit, Simien, 19.VII.1838, Schimper 751 (UPS).

Met Gogo, Geech, Simien, 27.III.1965, Lamma 6187 (ETH); c. 3

km N. from Geech, 13.IX.1969, De Wilde & Gilbert 72 (UPS).

Gojjam: Upper Sodeb valley below Mt. Sirhan, 28 VIII.1959, *Evans &*

Hiller 374 (Eth)

111. *Senecio* sp. A.

Herb. gregarious, rarely 0.6-1.7 m tall. Stem brownish-green, yellowish-green or green, hairy or tomentose above, terete, striate-sulcate, obsolete to thinly white tomentose above, glabrous below. Leaves simple, distichous; young ones lanceolate; mature ones elliptic or ovate-elliptic; sessile, auriculate or decurrent on stem, 5-15.8 x 1-6 cm; young ones thinly tomentose on both surfaces; mature ones glabrous on upper surface, obsolete to thinly tomentose on lower surface; dark olive green, a little pale and bluer below; margins denticulate; apex acute. Capitula discoid, slightly turbinate, 4-9 x 5-10 mm at anthesis, in crowded corymbose cymes; peduncle 0.7-2.4 cm long, yellowish-green, terete, striate-sulcate, bracteate. *Calyculi* 5 or 6, lanceolate, brownish-green or yellowish-green, (1.8-)2-3.4 x 0.3-0.7 mm; apex pointed or acute, dark brown or black, hairy or scarious; surface glabrous or sometimes thinly white tomentose; margins hairy; striation one. *Involucre* 3-5 mm in diameter; phyllaries 9-12, yellowish-green, 5-5.5 x 1-2 mm, glabrous or subglabrous, lanceolate, elliptic or oblanceolate; apex acute or obtuse, light to dark brown or black, hairy; margins scarious, white; striation 1. *Disc floret* campanulate, 6.2-7.8 x 1.8-2.2 mm; corolla yellowish-white or yellow, 5-lobed; lobe apices papillose; limb glabrous. *Anthers* 1.9-2.1 mm long, yellowish-brown or brown, sagittate at base. *Style* 5-7.2 mm long, glabrous, terete, semi-bulbous or bulbous at base; stigmatic branches yellow or brown, hairy at apex. *Achenes* striate, glabrous, creamish-brown; apex with white crown; terete, (2.9)3.0(-3.2) x (0.3-)1.0(-1.1) mm, elliptic, some considerably narrowed at base; base

with narrow cartilaginous rim. Pappus of achenes 4.2-5.5 mm long, white, antrorsely barbed.

Distribution. Highlands in Wellega and Sidamo regions

Habitat. Mountain grasslands near roadsides or streams.

Taxonomic remarks. *Senecio* sp. A is a taxon which at the moment is only known from two regions in Ethiopia i.e. Wellega in the West and Sidamo in the South. This taxon is found more or less in the same habitat and within the same altitudinal range as *S. inornatus*. It resembles *S. inornatus* in having unbranched stems, discoid capitula and achenes that are striated and glabrous. However, it can be distinguished by its lack of petiolate basal leaves, possession of mature leaves that are obsoletely to thinly tomentose beneath and decurrent on the stem. and smaller, crowded capitula with shorter calyculi and phyllaries.

Specimens examined.

Wellega: c. 81 km N. of Ghedo, on new road to Finchaa,
12.XII.1971, Ash 1401 (ETH).

Sidamo: c. 45 km N. of Kebre Mengist, 28.XII.1989, Otieno 48
(ETH).

19. *Senecio confertus* Sch. Bip. ex A. Rich., Tent. Fl. Abyss. 1:441

(1848). Type : Ethiopia, Gonder, Descenza, Mt. Aber 2. January

1840, Schimper 884 (P. Holst K. iso. n.v. fide Kasfin Tadesse,

unpublished manuscript on Compositae of Ethiopia)

Erect, robust, perennial herb, 0.6-2 m tall. Stem light to pale brown or pale green, terete, striate-sulcate, sparsely pubescent, simple below, leafy. Leaves simple, alternate or distichous, sessile, auriculate at base, oval or lanceolate, 2.5-21.5 x 0.6-7.8 cm; upper surface glabrous; lower surface slightly pubescent with hairs concentrated around veins and margins; brownish-green to dark green; margins twice sharply dentate; apex acute in young ones, apiculate in mature ones. Capitula radiate, narrowly campanulate, 11-15 x 6-14 mm at anthesis, in a dense much-branched corymbose or rounded cyme; peduncle 0.6-7.1 cm long, sparsely to densely pubescent, pale-brown, terete, striate-sulcate, bracteate. Calyculi 3-5, linear-lanceolate or oblanceolate, brown or yellowish-brown, 2.1-4 x 0.3-0.8 mm; apex acute, blunt or obtuse, light to dark brown, scarious or hairy; surface sparsely pubescent; margins hairy; striation one. Involucre 4-5 mm in diameter; phyllaries 8, yellowish-brown, pale green or light green, becoming lighter at margins, 5.1-9.5 x 1.4-2(-2.2) mm, sparsely to densely pubescent, broadly linear, oblong-elliptic or oblanceolate; apex acute or obtuse, light to dark brown or purplish, with tuft of hairs; margins entire or scarious; striae 1 or 2. Ray florets 5, deep yellow, pistillate; rays oblong or widely elliptic, 5-13 x 4-5 mm; tube glabrous; 6 or 7-striated; apex 2-fid. Disc floret funnel-shaped, 7.9-8.1 x 1.5-2 mm; Corolla yellow, 5-lobed; lobe apices papillose; limb glabrous. Anthers 2.3-2.6 mm long, brown, shortly sagittate at

base. Style 7-7.2 mm long, glabrous, somewhat bulbous at base; stigmatic branches yellowish-brown, papillose at apex. Achenes minute, densely pubescent, linear; apex with yellowish-white crown; terete, 2.2-3 x 0.4-0.5 mm, narrowly oblong or oblanceolate; base with narrow cartilaginous rim. Pappus of achene 5.1-6.6 mm long, white, antrosely barbed.

Distribution. Common in the highlands of Gojjam and Shewa. In Gonder also - known from Type.

Habitat. Wet areas or scrub in forests and along river banks; alt. c. 2600m.

Notes on Variation. Despite the paucity of material examined, *S. confertus*, decidedly, exhibits variation in the amount of pubescence lining the margins of the calyculi, some, e.g. in De Wilde c.s. 8520, have margins that are sparsely pubescent (Fig. 11V) while others within the same collection have margins that are densely pubescent (Fig. 11U). The latter type also shows no distinctive apical region since the marginal hairs extend all the way to the apex.

Specimens examined.

Gojjam: 40 km N.W. of Debre Werk. Forest along Tigidad river, 30.X.1981, Mesfin & Kagne 1686 (ETH).

Showa: Mt. Uociacia, c. 15 km W. of Addis Ababa, 27.X.1965. De Wilde c.s. 8520 (ETH).

20. *Senedio schultzei* Hochst. ex A. Rich. 1848. Fl. Abyss. 1:444
(1848). Type: Ethiopia: Gondar. W. 24018. 19 August 1938,
Schimper 179 (1938). (A. Rich. 1848. Fl. Abyss. 1:444).
Unpublished manuscript on description of *S. schultzei*.

Low perennial herb often with prostrate branches, sometimes erect,
0.2-1.2 m tall. Stem brown, brownish-green or light green with streaks
of purple, terete, sulcate, pubescent, simple or branched from base;
internodes (when present) 7-52 mm long. Leaves simple, alternate on
evident stems or rosulate, linear-oblong, lanceolate (when young),
oblong-spathulate or spathulate, sessile, subsessile or petiolate,
amplexicaule; upper ones dilated and somewhat auricled at the base,
basal ones gradually narrowed downward to near the base, 2.5-17.5 x
(0.5-)0.8-2.5 cm, grayish-white, yellowish-green, glabrous,
subglabrous or densely pubescent above; green, densely pubescent
below; apex acute or obtuse; margins minutely or obtusely dentate,
widely serrate or cleft, sometimes upper leaves serrate at base and
widely so toward apex. Capitula radiate, campanulate, 15-48 x 9-14 mm
at anthesis, solitary or arranged in corymbose cymes; peduncles 10-58
mm long, densely pubescent, yellowish-green to light-green, terete,
striate-sulcate, bracteate. Calyculi 4-13(-20), linear, lanceolate or
oblanceolate, sometimes upper half attenuate, brown, brownish-green or
green, 5.5-14.3(-20) x 0.6-2.6 mm, some nearly equalling involucre;
apex acute, rounded or somewhat dilated, brown, brownish-black or
purplish-black, often tinged purple below the tip, ciliate; margins
hairy or occasionally membrane-like and erose, hairs sometimes long
and swollen at tip; surface densely pubescent; striation one.
Involucre (8-)11-24 mm in diameter; phyllaries (19-)21(-28), brown,

brownish-green to green. $1.1-1.6 \times 1.3$ mm, densely pubescent with long, ~~light to dark brown hairs~~ sometimes swollen at tip. Linear, lanceolate or oblanceolate, apex lanceolate- acuminate, attenuate, acute, rounded or rarely 2-fid, hairy; hairs sometimes forming tufts; brown, purplish-brown to brownish-black, often tinged purple at point below tip; margins entire or scarious, when scarious, sometimes so on one side only, white or yellowish; striae 1 or 2. *Ray florets* yellow, lemon-yellow to yellowish-orange, (9-)18-33, pistillate; rays linear, elliptic, oblong-elliptic, narrowly to widely ovate, oblanceolate or obovate; $12.7-22 \times 2.3-5$ mm; tube glabrous or pilose; (3-)4(-6) striated; apex 2-3(-4)-fid obcordate or obtuse. *Disc floret* tubular, $5.5-8.4 \times 0.9-1.9$ mm; corolla light yellow or yellowish-brown, 5-lobed; lobe apices glabrous; limb glabrous. *Anthers* 1.3-2.4 mm long, yellowish or brown, truncate at base. *Style* 4.1-7.1 mm long, glabrous, uniformly terete, bulbous or conical at base; stigmatic branches brownish-yellow, sometimes reduced, sparsely hairy at apex. *Achenes* glabrous, costate, brownish-black or black; apex with yellowish crown; terete, somewhat flattened or more or less 3-angled, $2.5-4 \times 0.5-1$ mm, oblong, oblong-elliptic or oblanceolate; base with narrow cartilaginous rim. Pappus of achenes 4.9-8.5 mm long, white, antrosely barbed.

Notes on Variation and Similarities. *S. schultzei* is a species that exhibits considerable variation in a number of its morphological characters. The most outstanding variation is observed in the amount of indumentum present on the stems, leaves and involucral bracts. Populations with moderate to dense pubescence e.g. Mesfin 4364 occur in Gonder, Wallo, Gollan, Shewa and Bale Regions, mostly along edges

or banks of small streams and rivers. In the upper reaches (3900-4375 m) of the afro-alpine zone in the highlands of Bale region occurs a population represented by e.g. Mesfin 4406 that shows variation in having a thin to dense white tomentum on the stems, leaves and involucral bracts. (Fig. 39) This population is mostly found growing associated with or on areas having *Helichrysum* spp, *Lobelia rhynchopetalum* and other afro-alpine plants and is here recognized as a variety of *S. schultzii*. Most capitular features of this variety show conformity with those of *S. schultzii* (see Table 10). The leaf margins of *S. schultzii* are sub entire to widely serrate as observed in most of the specimens examined. However variation is noted in the collections Hillman 78 and Mesfin 4406 both from Bale but collected at different altitudes; the latter being of the variety now recognized, which have cleft margins. Specimens examined from Gonder eg. Lemma 631 and Hedberg and Getachew 5348 were seen to vary from the rest of the examined material in having 4 or 5 calyculi (see Table 9). The rest, representing collections from Bale and Gojjam have between 6 to 20 calyculi. The calyculi margins are hairy but variation is noted in those within the collection Evans & Hiller 556 from Gojjam which have brown, membranous and erose margins (Fig. 11D).

Table 9. Variation in Calyculi number in *S. schultzii*.

Collection	Region of origin	Calyculi number.
Lemma 631	Gonder	4,5,5
Hedberg & Getachew 5348	Gonder	5,4,4
Evans & Hiller	Gojjam	20
Hedberg 5534b	Bale	5,13
Mesfin 4364	Bale	11,11
Hillmann 78	Bale	13,19
Hillmann 79	Bale	10,11
Mesfin 4406	Bale	6
Andeberg 1695	Bale	9,12

Mosfin 5533	Bale	9.13
Ellis et al. 3412	Bale	1.7

S. schultzii closely resembles *S. nanus* in habit, leaf shape and leaf arrangement and is often having solitary flower heads. It can however be clearly distinguished by its wider leaves that are moderately to densely pubescent or thinly to densely white tomentose, wider capitula (c. 22-48 mm), tubular disc florets, truncate anther bases and larger (2.1-3.2 x 0.4-0.8 mm) achenes.

Table 10. A summary of capitular features in *S. schultzii* and its variety.

Character	<i>S. schultzii</i>	var. <i>lanatus</i>
Calyculi; number	4-13 (-20)	6-13
Phyllaries:		
-number	19-25 (-28)	19-22
-length (mm)	c. 7.1-14.2	c. 9.5-16
Ray florets:		
-number	9-27	18-33
-length (mm)	14-22	c. 13-18.6
Achenes:		
-size (mm)	3-4 x 0.6-1.0	3.0-3.5 x 0.8-1.0

Key to the varieties of *Senecio schultzii*

Leaves, stems (when evident) and involucral bracts sparsely to densely pubescent, achenes costate and glabrous
..... var. *schultzii*

Leaves, stems (when evident) and involucral bracts thinly to densely white tomentose, achenes costate with sparse pubescence between the ribs var. *lanatus*

Fig. 2A.

Distribution. In the afro-alpine zones of Bale, Gonder, Wollo, Shewa and Gojjam.

Habitat. Common along streams and river banks in *Erica arborea* scrub or places with *Alchemilla johnstonii*. Also in disturbed rocky areas by roadside; alt. 3270-4050 m.

Specimens examined.

Gonder: Genbar, between Geech and Ambaras, 3.II.1966, *Lemma* 631 (ETH); Geech 15.X.1973, *Hedberg & Getachew* 5348 (ETH); Simien, 19.X.1973, *Hedberg & Getachew* 5488 (ETH).

Wollo: Dase Zurya c. 35 km S. of Dase, 26.XII.1984, *Mercier* 1995 (ETH).

Gojjam: S. slopes Mt. Birhan, 21.VIII.1957, *Evans & Hiller* 556 (ETH).

Shewa: Ankober, c. 162 km N.W. of Addis, 26.VI.1971, *Ash* 1017 (ETH).

Bale: Garba Gcrach camp, 29.X.1973, *Hedberg* 5534 b (ETH); Foothills of Tullu Dimtu, 8.VI.1986, *Mesfin* 4364 (ETH); 2nd rain gauge, Sanetti plateau, VI.1984, *Hillmann* 78 (Bale Mts. Natl. Park collections). Near Tullu Dimtu, Sanetti plateau, VI.1984, *Hillmann* 79 (Bale Mts. Natl. Park collections).

S. schultzei Hochst. ex A. Rich. var. *lanatus* Mesfin & Otieno var. nov.

Foliis, caules et phyllaris cum sparsim ad densus albus tomentum,

achardia costatus var. *achardia* (This lower taxon)

Fig. 20.

Distribution. Confined in the upper limits of the afro-alpine zone in Bale Region.

Habitat. Afro-alpine communities much dominated by *Helichrysum* spp., *Lobelia rhynchopetalum* and other afro-alpine species; alt. 3900-4375 m.

Specimens examined.

Bale: c. 31 km from Goba on the road to Dollo Mena, 24.X.1984, *Frits* et al. 3412 (ETH); Top of Tullu Dimtu, 17.VIII.1986, *Mesfin* 5533 (ETH); Mt Batu, 8.XI.1982, *Andeberg* 1695 (ETH); Foothills of Tullu (Mt) Dimtu, 8.VI.1986, *Mesfin* 4406 (ETH).

21. *Senecio macroglossus* DC. in Fl. Swaz. Supp. Vol. 1: 655 (1976).

Type: South Africa (not localized, fide Prof. J. T. Howell, unpublished manuscript on Compositae of Ethiopia)

Climbing herb or shrub. Stem pale-green, twining, terete, glabrous with faint striations; internode 0.9-3.8 cm long. Leaves simple, alternate, somewhat triangular, palmately veined, often 3-nerved from base, 12-4.3 x 10-50 mm, succulent, glabrous petiolate; margins entire; apex acute; petioles 7-27 mm long, glabrous. Capitula radiate, 43-45 x 9-10 mm at anthesis, solitary, held on long peduncles; peduncles 42-54 cm long, terete, striate-sulcate, densely pubescent near apex with 1 or 2 bracts. Calyculi ca. 9, lanceolate or ovate-lanceolate, yellowish-brown or yellowish-green, (6-)6.3-9.6 x 2.3(-3.8) mm; apex acute, light-brown, scarious or with short hairs; margins subentire with widely spaced very short, hair-like protrusions; surface glabrous; striae 2-4. Involucre ca. 15 mm in diameter; phyllaries ca. 15, yellowish-brown, 8-9 x 1.5-2.7 mm, glabrous, lanceolate; apex attenuately pointed or acute, papillose; margins entire, sparsely hairy or scarious; striae 3 or 4. Ray florets pale yellow, ca. 7, pistillate; rays elliptic, obovate; 18.4-23.5 x 3.1-4.5 mm; tube glabrous; 6-8-striated; apex obtuse. Disc floret tubular, 7.5-8 x 1-1.5 mm; corolla yellowish-brown, 5-lobed; lobe apices light brown; limb long and glabrous. Anthers, 2.2-2.6 mm long, yellowish, sagittate at base. Style 5.4-7 mm long, glabrous terete, bulbous at base; stigmatic branches brown, hairy at apex. Achenes costate, sparsely setulose, ca. 3.5 mm long. Pappus of achenes 5.8-7 mm long, white, antrorsely barbed.

Distribution. Presently not known in Ethiopia. Also in Swaziland.

Parlat 848 on specimen collected from India and Tanzania, this species grows on cultivated areas eg. gardens.

22. *Senecio ruwenzoriensis* S. Moore. In *Upl. Kenya Wild Fl.* : 472

(1974) Type: Uganda, Toro district, Igungu, Scott Elliot 3043

(BM, hol., K, iso. and slide Maslin 1968a unpublished manuscript on Compositae of Ethiopia).

Erect, succulent herb, 40-90 cm tall. Stem light-brown, terete, smooth and glabrous, striate-sulcate on upper parts. Leaves simple, alternate, sessile, young ones ovate to elliptic; mature ones widely ovate to obovate, 3.3-8.7 x 0.9-4 cm, palmately veined, glaucous and glabrous, silvery green; margins entire; apex acute in young ones, obtuse or mucronulate in mature ones. *Capitula*, radiate, 19-22 x 6-9 mm at anthesis, in lax corymbose cymes, often held clear off foliage; peduncles 0.7-11 cm long, glabrous, terete, striate-sulcate with one or two bracts. *Calyculi* 1-3, ovate or ovate-lanceolate, yellowish-brown or yellowish-green, 1.2-2.6 x 0.3-0.7 mm; apex acute or blunt, brownish with short thick hairs; margins entire; surface glabrous; striation 1. *Involucre* 5-8 mm in diameter; phyllaries 12-14, yellowish-brown, brownish-green, yellowish-green or light green, 7-14 x 1-3(-3.9) mm; surface glabrous; lanceolate, elliptic, ovate or oblanceolate, often tapered or attenuate at apex; apex acute, brown bristly; margins entire or scarious, when scarious sometimes so on one side only; striae 1 to 3. *Ray florets* light yellow or yellowish-brown, (4-)8, pistillate; rays elliptic, oblong, ovate or obovate; 8.2-13.8 x (1.8-)2-4 mm; tube glabrous or occasionally hairy; 4-5-striated; apex 2-3-fid, occasionally with deep clefts. *Disc floret* campanulate, 5.7-12.3 x (1-)1.3-2 mm; corolla light yellow or yellowish-brown, 5-lobed; lobe apices papillose; limb glabrous. *Anthers* 1.6-2.4 mm long, yellowish-green, sagittate at base. *Style* 4-7.8 mm long, glabrous,

uniformly terete or semi-huribous at base, occasionally conical; stigmatic branches dark brown, yellowish-brown or yellowish-green, hairy at apex. Achenes costate, glabrous, light to dark brown; apex with yellowish-white crown; terete, attenuate at apex, 3.5-4.4 x 0.5-1 mm, elliptic; base truncate. *Pappus* of achene 5-7 mm long, antrosely barbed.

Distribution. Presently not known in Ethiopia. Also in Uganda, Kenya, Tanzania, Nigeria, Cameroun, Central African Republic, Sudan, Zaire, Rwanda, Burundi, Mozambique, Malawi, Zambia, Zimbabwe, Lesotho, South Africa.

Habitat. Based on specimens examined from Kenya, Uganda and Tanzania, this species prefers open grasslands, disturbed grounds or moist grounds by riversides. Also in moorland; alt. 1700-2250m.

23. *Sanatio pinnatifida* Sch. Bip. ex Oliv. & Hiern, Fl. Trop. Afr.

~~(21, 22) type: Ethiopia, Scabon 1874 (P. Holo, K. Is. n.v.)~~

(fide Nestor Tadesse, unpublished manuscript on Compositae of Ethiopia).

An erect, little or much branched, weedy annual herb, 23-60 cm tall. Stem green, pale-green, yellowish-brown or brown, glabrous or nearly so; internodes 8-47 mm long. Leaves simple alternate; lower subrotund, oval or pinnatifid, petiolate; upper rather small, sessile, pinnatifid, amplexicaule, somewhat auriculate; pale-green or brown, glabrous, 2.1-9.6 x 1.6-3.9 cm; apex acute; margins parted or pinnatifid with linear or oblong, toothed or entire lobes. Capitula radiate, campanulate, 0.7-1.3 x 0.4-0.8 cm at anthesis, few to many in, rather small lax corymbose cymes; peduncles 1.1-7.3 cm long, terete, striate-sulcate, bracteate, green or yellowish-brown. Calyculi 5-9, lanceolate-acuminate or ovate-lanceolate, 2-6 x 0.5-1.1 mm, green, light green or yellowish-green; apex acute, sharp, hairy; margins hairy, sometimes scantily so. Involucre 7-14 mm in diameter; phyllaries 13-21 brownish-green, yellowish-green, pale-green or light green, 4.5-7.5 x 0.8-1.7 mm, glabrous to sparsely hairy, linear, lanceolate, ovate-elliptic, narrowly ovate or oblanceolate; apex sharp, acuminate or acute, hairy; margins entire or scarious, yellowish; striae (1-)3(-4). Ray florets light-yellow, (4-)10-15, pistillate; rays oblong-elliptic, ovate-elliptic, ovate oblanceolate; 3.9-6.5 x 0.6-1.4 mm; tube hairy, sparsely so on lower parts; striae 1-4; apex 2-3-fid, rarely rounded. Disc floret tubular, 2.8-5.3 x 0.5-0.8 mm; corolla yellow, 5-lobed with 5-reddish-brown lines from tip of each lobe to corolla base; limb glabrous. Anthers 0.5-1.4 mm long,

yellow. style to stigma sometimes shorter. Style 2.5-3 mm long, glabrous, terete, pubescent at base; stigmatic branches with reddish-brown lines from tip to base. Achenes: costae with dense, short and thick white pubescence, brownish or smoky black; apex with yellowish-white crown; 3-4 angled, 2.1-3.2 x 0.4-0.8 mm, elliptic to oblanceolate; base with yellowish-white hairy appendage. Pappus of achenes 2.4-4.3 mm long, white, antrosely barbed.

Distribution. Common in Shewa Region. Also occurs in the Northern Regions of Gojjam and Eritrea.

Habitat. Wastefields or grounds, untended flower beds or roadside ditches. Sites commonly with black loamy soil; alt. 2300-2500 m.

Notes on Variation. *S. pinnatipartitus* is variable in the degree to which the leaf lamina is dissected. Some specimens from Shewa Region have leaves that are parted (Fig. 108) with 2 to 3 dentate lobes towards the base and margins that are compound dentate towards the apex. Other collections from Shewa and Gojjam Region have leaves that are deeply pinnatifid with lanceolate or oblanceolate segments that bear dentate margins or are again inconspicuously pinnatifid (Fig. 109).

S. pinnatipartitus shows resemblances with *S. mesogrammoides* as discussed under the latter species.

Specimens examined.

Gojjam: c. 14 km N. of Dejen, 29.X.1981, Mesfin & Kagne 1617 (ETH); c. 62 km on Debre Markos - Addis road, 7 km before Dejen, 7.XI.1980, Thurn & Hunde 4091 (ETH).

Abaya Wirta Field near University College, 30.III.1965, De Witte
& De Witte DRYIDs 6624 (ETH); 10 km on road to Dohre Bernan,
11.XI.1965, Nesrin 3699 (ETH); near the University motor
pool. 4.III.1966, Nesrin 3698 (ETH); in compound of
University college, 17.VIII.1962, Mcnney 9282 (ETH).

2. Senecio Cameroensis DC. in Fl. Cam. Suppl. vol. 11:658 (1976). Type
 South Africa: Cape Province, Drège 1839 (Z. f. holo., n.v. fide
 Archie Tidmore, unpublished manuscript on Compositae of Ethiopia).

Woody climber. Stem pale-brown to blackish-green, striate-sulcate, glabrous; internode 3-28 mm long. Leaves simple, alternate, triangular in outline, petiolate, 13-55 x 12-55 mm, glabrous, sometimes thinly hairy around veins, more or less succulent, pale green, palmately veined with 5 to 7 nerves; margins widely denticulate or dentate with large teeth but diminishing in size towards apex; apex acute; petiole 6-35 mm, flattened, subglabrous, pale green or green. *Capitula* radiate, narrowly campanulate, 24-22 x 7-8 mm at anthesis, in lax but crowded corymbose cymes; peduncles 6-33 mm long, glabrous, pale to dark brown, striate-sulcate, bracteate, with one or two bracts. *Calyculi* 2 to 3, linear-lanceolate or lanceolate, brown, yellowish-brown or brownish-green, 1-3.4 x 0.1 mm; apex acute, blunt or obtuse, hairy, glabrous; margins entire or sparsely hairy; striation one. *Involucre* 3 - 5 mm in diameter; phyllaries 8, yellowish-brown to brown, becoming lighter towards margins, 7-8.5 x 1.2-2.2 mm, glabrous, lanceolate, elliptic or oblong, attenuate or tapered at apex; apex acute or obtuse, light to dark brown, with short hairs or glabrous; margins entire or scarious, yellowish-white; striae 1(-3). *Ray florets* light to bright yellow (4-)5, pistillate; rays elliptic, oblong-elliptic or obovate; 14.5-18.4 x 3-4.2 mm; tube glabrous; 4(-5)-striated; apex dentate or 3-fid. *Disc floret* tubular, 11-13 x 1-2 mm, sometimes with slight constriction just below limb-tube joint; corolla yellow to yellowish-brown, 5-lobed; lobe apices papillose, limb glabrous. *Anthers* 2-2.5 mm long yellow or brown,

sagittate at base. Style 0.10.-11.2 mm long, glabrous, uniformly terete or bulbous at base. Stigmatic branches yellow or brown hairy at apex. Achenes glabrous, striate-sulcate, light brown; apex with yellowish crown; terete, 3-3.4 x 0.3-0.9 mm, oblong-elliptic; base with narrow cartilaginous rim. Pappus of achenes 3.5-5 mm long, white, antrosely barbed.

Distribution. In Ethiopia, presently known from Eritrea, Shewa and Sidamo. Also in Malawi.

Habitat. Hedges, cultivated areas in compounds and forest edges; alt. 1700-2440 m.

Notes on Variation and similarities. *S. tamoides* generally does not show much morphological variations. In Addis Ababa, it has sometimes been observed not to flower (Mesfin pers. comm.) and has also been described (Compton 1974:658) to occasionally lack ray florets.

S. tamoides resembles *S. macroglossus* in habit, leaf shape, venation and texture. The 5 to 7 nerved leaves that have widely denticulate or dentate margins, shorter capitular width, glabrous peduncles, fewer calyculi, phyllaries and ray florets and achenes that are striate-sulcate and glabrous are distinctive features in this species.

Specimens examined.

Eritrea: Asmera, private garden in Tiravollo, 5.VI.1988, *Ryding* 1255 (ETH).

Sidamo: Awasa Junior College, 23.VI.1979. Herbar 605 (ETH)

Melayita Soddo, in herb. compound, 10.V.1986, Zeffe et al.
4042 (LH).

25. *Senecio subsessilis* Oliv. & Hiern, Fl. Trop. Afr. 3:413 (1877).

Type: Ethiopia, Gonder, Gafat, 1863-8, Schimper 1532 (K, holotype).

n.v. (vide Mesfin Tadesse, unpublished manuscript on Compositae of Ethiopia).

A robust erect perennial herb, 1.2 m tall or more, glabrous in most parts. *Stem* terete, striate, simple below. *Stem leaves* ovate or elliptical, subsessile, amplexicaul, sharply denticulate, c. 2.54-20.3 cm long, width ranging upto c. 5.08 cm. *Capitula* campanulate, c. 9.5-12.7 mm long, on puberulous pedicels ranging upto c. 2.5 cm, in a dense corymbosa cyme. *Calyculus* consisting of several unequal glabrous linear or lanceolate bracts. *Involucral bracts* 15-20, linear, with thick fleshy median portion and thinner, paler margins, about-6.3 mm long, glabrous except the a ciliolate tips. *Ligule* of the ray-florets oval-oblong, yellow, c. 8.4-9.6 mm long. *Achenes* glabrous, costate, short, dark.

Distribution. In Ethiopia presently not known. Also in Uganda, Kenya, Tanzania, Rwanda, Burundi, Zaire and Sudan.

No specimen examined. Description reproduced from Oliver and Hiern (1877).

EXCLUDED TAXA

1. *Senecio abyssinicus* Sch. Bip. ex A. Rich. = *Emilia abyssinicus* (Sch. Bip. ex A. Rich.) C. Jeffrey (1986).
2. *Senecio aequinoctialis* Fries - in Kenya, (fide C. Jeffrey 1986).
3. *Senecio basipinnatus* Bak. = *S. lyratus* (fide C. Jeffrey 1986).
4. *Senecio bellioides* Chiov. = *Emilia bellioides* (Chiov.) C. Jeffrey (1986).
5. *Senecio caranianus* Chiov. = *Solanecio nandensis* (S. Moore) C. Jeffrey (1986).
6. *Senecio discifolius* Oliver = *Emilia discifolia* (Oliv.) C. Jeffrey (1986).
7. *Senecio erubescens* Alton - from Tanzania to S. Africa (fide C. Jeffrey 1986).
8. *Senecio gigas* Vatke = *Solanecio gigas* (Vatke) C. Jeffrey (1986).
9. *Senecio megamontanus* Cuf. = *Emilia somalensis* (S. Moore) C. Jeffrey (1986).
10. *Senecio nandensis* S. Moore = *Solanecio nandensis* (S. Moore) C. Jeffrey (1986).
11. *Senecio nogalensis* Chiov. - in Somalia (fide C. Jeffrey 1986).
12. *Senecio rhamnaphyllus* Mattf. - in Uganda and Kenya (fide C. Jeffrey 1986).

13. *Senecio senegalensis* Flinck = *Senecio p. adochica* (L.) DC. (fide C. Jeffrey 1986).

14. *Senecio stolzii* Mattf. = *Senecio thornatus* DC. (fide C. Jeffrey 1986).

15. *Senecio tanzaniensis* Cuf. = *Senecio deltoides* Less. (occurs in Kenya to the southern part of Africa).

16. *Senecio trichopterygius* Muschl. = *Senecio subsessilis* Oliv. & Hiern (fide C. Jeffrey 1986).

17. *Senecio tuberosus* Sch. Bip. ex A. Rich. = *Solanecio tuberosus* (Sch. Bip. ex A. Rich.) C. Jeffrey 1986.

Insufficiently known taxa not included in this work.

1. *Senecio degiensis* Pic. Serm.

2. *Senecio ellenbecki* G. Hoffm.

3. *Senecio emiliodes* Sch. Bip. = ? *Emilia emilioides* (Sch. Bip.) C. Jeffrey (1986).

4. *S. erlangeri* O. Hoffm.

5. *Senecio gallicus* Chaix ex Villars.

6. *Senecio hochstetteri* Sch. Bip. ex A. Rich. var. *radiatus* Chiov.

7. *Senecio ochrocarpoides* Cuf.

8. *Senecio ochrocarpus* Oliv. & Hiern var. *gossypinus* Chiov.

10. *Senecio stendellii* Sch. Bip. ex A. N. S. W. *stendellii* A. N. S. W.

11. *Senecio stendellii* Sch. Bip. ex A. N. S. W. *stendellii* A. N. S. W.

12. *Senecio stendellii* Sch. Bip.

13. *Senecio vulgaris* L.

14. *Senecio* sp. - Mooney 8299.

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Fig. 7. *Species names*. A & B: *S. platyphorum*. - C: *S. gracillifolium*. - D: *S. minus*. - E: *S. antheranthum*. - F: *S. angustifolium*. - G: *S. flaviflorum*. - H: *S. furcata*. - I: *S. furcata*. - J: *S. furcata*. - K: *S. furcata*. - L: *S. furcata*. - M: *S. furcata*. - N: *S. furcata*.
Magnifications: E & G X 6; C, I X 7; B, J X 8; A, L X 9; H X 12; D, K, M X 20; N X 30. *Voucher specimens*: A & B from Ensermu 1189 (ETH); C from Otieno 39 (ETH); D from Evans & Hiller 332 (ETH); E from Mooney 7283 (ETH); G from Gilbert 14526 (EA); H from De Wilde c.s. 6107 (ETH); I from De Wilde & Gilbert 72 (UPS); J from Evans & Hiller 324 (ETH); K, M from Mooney 5492 (ETH); L from Thulin 1867 (ETH); N from Mooney 7941 (ETH).

Fig. 8. *Species*. A: *Senecio* sp. A. - B: *S. confertus*. - C: *S. ragazzii*. - D & E: *S. inornatus*. - F-H: *S. ochrocarpus*. *Magnifications*: A, D & E X 7, C, F X 9; B X 10; G & H X 35. *Voucher specimens*: A from Otieno 48 (ETH); B from De Wilde c.s. 8320 (ETH); C from Mesfin 5117 (ETH); D & E from Mooney 2311 (ETH); F from Knox 661 (ETH); G from Mesfin 721 (ETH); H from Reitzsch 7 (ETH).

Fig. 9. *Species names*. A-D: *S. tyratus*. - E-G: *S. stuedelii*. - H-J: *S. schulzei*. - K: *S. ruwenzoriensis*. - L: *S. hadiensis*. - M: *S. schimperii*. *Magnifications*: K, L X 6; C & D X 7; A X 9; B, E-G, M X 10; H-J X 14. *Voucher specimens*: A from Amaro F- 44 (ETH); B from Getahun & Zerihun 330 (ETH); C from Mooney 5424 (ETH); D from Mesfin, Gilbert & Edwards 1179 (ETH); E from Mesfin 630 (ETH); F from Erlich 26 (ETH); G from Mooney 2525 (ETH); I from Friis et al. 3412 (ETH); J from Hedberg 55345 (ETH); K from specimen in EA; L from Rydberg & Ermias 1906 (ETH); M from Gilbert & Thulin 542 (ETH).

Fig. 10. *Species names*. A: *Senecio* sp. B, S & D: *S. glaucipartitus*. - C & F: *S. macroglossus*. - E: *S. myriocephalus*. - G: *S. lamoides*.

Magnifications. C & F: A-G; A, E-G & I; K & D: X-10. *Voucher specimens*:

A from Mesfin & Rague 1625 (ETH); B from Alores 52A74 (SIP); C, F from specimen in EA; D from Mesfin 3680 (ETH); E from Edwards & class 65 (ETH); G from Ryding 1255 (ETH).

Fig. 11. *Species names*. A-D: *S. schultzei*. - E-G: *S. aegyptius* var *discoideus*. - H: *S. macroglossus*. - I & J: *S. ruwenzoriensis*. - K & L: *S. lamoides*. - M: *Senecio* sp. A. - N: *S. platypleurus*. - O: *S. hadiensis*. - P: *S. nanus*. - R, S & T: *S. ragazzii*. - U & V: *S. confertus*. - W & X: *S. mesogrammoides*. - Y & Z: *S. myriocephalus*. - Ai - di: *S. unionis*. *Magnifications*: B X 8; D X 11; C X 12; A X 13; H X 16; U & V, Y & Z X 20; Bi-Di X 25; Ai, E-G, K & L, M-T, W & X X 30. *Voucher specimens*: A from Lemma 631 (ETH); B from Mesfin 4364 (ETH); C from Hillman 79 (Bale Mts. Natl. Park Flora Coll.); D from Evans & Hiller 556 (ETH); E & F from De Wilde 6107 (ETH); G from Thulin & Hilde 3898 (UPS); H from specimen in EA; I & J from specimen in EA; K from Mesfin 605 (ETH); L from Mesfin et al. 4042 (ETH); M from Ash 1401 (ETH); N from Mesfin et al. 3385 (ETH); O from Ryding & Erndas 1006 (ETH); P from Hedberg 5639 (UPS); R from Mesfin 5406 (ETH); U & V from De Wilde 8520 (ETH); W from Mooney 7941 (ETH); X from Roitzsch 75 (ETH); Y from Friis et al. 150 (ETH); Z from Guiteta 525 (ETH); Ai from Mesfin 5492 (ETH); Bi from Mesfin 3070 (ETH); Ci from Hillman 71 (Bale Mts. Natl. Park flora Coll.); Di from Thulin 1667 (ETH).

Fig. 12. *Species names*. A & B: *S. inornatus*. - C-E: *S. fresenii*. - F: *S. tyratus*. - G, H & I: *S. schimperii*. - J & K: *S. hochstetteri*. - L-N: *S. steudelii*. - O & P: *S. parinaceus*. - Q & R: *Senecio* sp. B. - S: *S.*

collected from the following localities: Bagn. Fr. 4250 (EA); A & B 18; D & E, L, O & P, S, T & W, X & Y, Z, A' & B' 40. *Voucher specimens*:

A from Mooney 317 (ETH); B from Mooney 317 (ETH); C from Mooney 3442 (ETH); D & E from Kagn. 1985 (ETH); F from And. 1328 (ETH); G from Burger 1349a (ETH); H & I from Mooney 6372 (ETH); J & K from Mooney 7383 (ETH); L from Mesfin 5758 (ETH); M from Mesfin and Kagn. 2056 (ETH); N from Schimper 750 (UPS); O from Evans & Miller 324 (ETH); P from Lemna 687 (ETH); Q from Evans & Flenley 278 (ETH); R from Otieno 15 (ETH); S from Roitzsch 7 (ETH); T from De Wilde & De Wilde 6029 (ETH).

g. 13. *Species names*. A-C: *S. pinnatipartitus*. - D-G: *S. ochrocarpus*; H & I: *Senecio* sp. B. - J & K: *S. farinaceus*. - L-O: *S. steudelii*. - P-S: *S. froenii*. - T-W: *S. ruwenzoriensis*. - X & Y: *S. macroglossus*. - Z-B': *S. schulzii*. *Magnifications*: A, C' & D' X 10; D & E, L, O & P, S, A' X 15; T-Y X 16; Q & R, B' X 20; F, Z X 25; H & I, M X 30. *Voucher specimens*: A & B from De Wilde & De Wilde 6024 (ETH); C from Mesfin & Kagn. 1617 (ETH); D & E from Roitzsch 7 (ETH); F from Roitzsch 79 (ETH); G from Mesfin 1462 (ETH); H & I from Otieno 15 (ETH); J & K from Evans & Miller 324 (ETH); L from Mesfin 5798 (ETH); M from Mooney 8529 (ETH); N from Mesfin & Kagn. 1655 (ETH); O from De Wilde 8743 (UPS); P & Q from Andenberg 1705 (ETH); R from Mesfin 5636 (ETH); S from Mooney 7231 (ETH); T-W from specimen in EA; X & Y from specimen in EA; Z from Lemna 631 (ETH); A' from Hadberg & Getachew 5348 (ETH); B' from Hillman 78 (Gala Mts. Natl. Park flora coll.); C' from Friis et al. 3412 (ETH); D' from Mesfin 6764 (ETH).

ig. 14. *Species names*. A: *S. natus*. - B-L: *S. hadionsis*. - P-N: *S. confertus*. - J & K: *S. platypleurus*. - R-M: *S. mesogrammoides*. - N-Q:

S. myriocephalus. - R & S: *S. tyratus*. Magnifications: P & Q X 15; N & O X 20; E, I & G X 25; A-D, F-K, R & S X 30. Voucher specimens: A from Hedberg 5639 (UPS); C & D from Ryding & Emilio 1668 (ETH); E from De Wilde c.s. 6996 (ETH); F from Hosino & Kagnaw 1936 (ETH); G & H from De Wilde 8525 (ETH); I & J from Mesfin et al. 3305 (ETH); K from Mooney 7941 (ETH); L & M from Hedberg & Getachew 5425 (UPS); N & O from Merga 525 (ETH); P & Q from Mooney 5656 (ETH); R & S from Burger 1340a (ETH).

fig. 15. Species names. A-B: *S. unionis*. - E-G: *S. ragazzii*. - H-K: *S. schimperii*. - L & M: *S. lamoides*. - N-P: *S. aegyptius* var. *discoideus*. - Q & R: *Senecio* sp. A. - S-U: *S. inornatus*. - V & W: *S. hochstetteri*. Magnifications: V & W X 16; E-G X 20; C & D X 25; A & B, H & I, K- 4 X 30. voucher specimens: A & B from Mesfin 5492 (ETH); C from Mesfin 3070 (ETH); D from Hedberg 5703 (ETH); E & F from Edwards & class 44 (UPS); G from Thulin 1483 (UPS); H & I, K from Thulin & Hunde 3940 (ETH); J from Schimper 144 (EA); L & M from Ryding 1255 (ETH); N from Thulin & Hunde 3898 (UPS); O & P from De Wilde c.s. 6107 (ETH); Q & R from Ash 1401 (ETH); S-U from Hedberg 5687 (UPS); V & W from Gillet 14525 (EA).

fig. 16. Species names. A: *S. myriocephalus*. - B: *S. tyratus*. - C-F: *S. steudellii*. - G: *S. fresenii*. - H & I: *S. schultzei*. - J: *Senecio* sp. B. - K: *S. platypleurus*. - L: *S. hadiensis*. - M & N: *S. unionis*. - O & P: *S. nanus*. - Q: *S. mesogrammoides*. - R: *S. ragazzii*. - S: *S. farinaceus*. - T: *S. confertus*. - U: *S. macroglossus*. - V: *S. rumenzoriensis*. - W: *S. pinnatipartitus*. - X: *S. lamoides*. - Y: *S. ochrocarpus*. Magnifications: A, I, Y X 10; C-F X 15; J, U, V X 16; L, O, R X 20; H X 22; B, K, M, Q, S & T, W & X X 30. Voucher specimens: A

(ETH); D' from Andeberg 1895 (ETH); E from Brehme s.n. (ETH); F from Hillman 73 (Bale Mts. Natl. Park Flora Coll.).

Fig. 10. *Species names*. A & B: *S. myriocephalus*. - C & D: *S. lyratus*. - E: *S. stoudelii*. - F: *S. fresenii*. - G: *S. ochrocarpus*. - H: *S. farinaceus*. - I: *S. hochstetteri*. - J: *S. confertus*. - K: *Senecio* sp. B. - L: *S. ragazzii*. - M: *S. nanus*. - N: *S. schultzii* var. *schultzii*. - O: *S. schultzii* var. *lanatus*. - P: *S. inornatus*. - Q: *Senecio* sp. B. - R: *S. aegyptius* var. *discoideus*. - S: *S. tamoides*. - T: *S. schimperii*. - U: *S. unionis*. - V: *S. mesogrammoides*. - W: *S. platypleurus*. - X: *S. hadiensis*. - Y: *S. rumenzoriensis*. - Z: *S. pinnatipartitus*.

Magnifications: N X 20; F, T X 25; A-E, G-M, O-S, T-X, Y X 30; Z X 40.

Voucher specimens: A & B from Roitzsch 75 (ETH); C from Mooney 8264 (ETH); D from Nastasi 1300 (ETH); E from Mesfin 630 (ETH); F from Mesfin 5636 (ETH); G from Brehme s.n. (ETH); H from De Wilde & Gilbert 72 (UPS); I from Gilbert et al. 445 (ETH); J from Mesfin & Kagnaw 1685 (ETH); K from Otieno 15 (ETH); L from Friis et al. 3518 (ETH); M from Hedberg & Mesfin 7082 (UPS); N from Mercier 1995 (ETH); O from Otieno 31 (ETH); P from Mooney 7388 (ETH); Q from Otieno 48 (ETH); R from De Wilde et al. 6107 (ETH); S from Mesfin et al. 4042 (ETH); T from Gilbert et al. 7347 (ETH); U from Mesfin 5492 (ETH); V from Hedberg & Getachew 5425 (UPS); W from Mesfin et al. 3385 (ETH); X from Mooney 5431 (ETH); Y from specimen in EA; Z from De Wilde & De Wilde 6024 (ETH).

Corrections

Fig. 11 Q. represents phyllary of *S. nanus*. Magnification X 30, from Evans & Hiller 332 (ETH).