

FLORA OF INDIA

VOLUME 13

ASTERACEAE
(Inuleae - Vernoniaceae)

BOTANICAL SURVEY OF INDIA

23993

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ASTERACEAE
(Inuleae - Vernonieae)



Editors

P.K. HAJRA

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and

B.P. UNIYAL

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BOTANICAL SURVEY OF INDIA

CALCUTTA

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ABBREVIATIONS

of

INDIAN LANGUAGES

Abhor	: Abhor	Kum.	: Kumaonese
And.	: Andaman	Lep.	: Lepcha
Asm.	: Assamese	Lus.	: Lushai
Beng.	: Bengali	Mal.	: Malayalam
Bhoj.	: Bhojpuri	Mani.	: Manipuri
Bhut.	: Bhutia	Mar.	: Marathi
Cachar	: Cachar	Mikir	: Mikir
Coorgi	: Coorgi	Miri	: Miri
Eng.	: English	Naga	: Naga
Garo	: Garo	Nep.	: Nepali
Garh.	: Garhwali	Or.	: Oriya
Goa.	: Goanese	Port.	: Portugese
Guj.	: Gujarati	Punj.	: Punjabi
Hindi	: Hindi	Raj.	: Rajasthani
Jain.	: Jaintea	Sans.	: Sanskrit
Jaun.	: Jaunsar	Sant.	: Santal
Kang.	: Kangri	Sind.	: Sindhi
Kan.	: Kannada	Tam.	: Tamil
Kash.	: Kashmiri	Tel.	: Telugu
Kh.	: Khasi	Tipp.	: Tippera (Tripura)
Kon.	: Konkani	Urdu	: Urdu

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Anaphalis busua (Buch.-Ham. ex D. Don) DC. (BSI, S.H.C., Gangtok)



Anaphalis contorta (D. Don) Hook.f. (BSI, S.H.C., Gangtok)



Anaphalis margaritacea (L.) Benth. (BSI, N.C., Dehra Dun)



Blumea laciniata (Roxb.) DC. (BSI, N.C., Dehra Dun)



Anaphalis triplinervis (Sims.) C.B. Clarke var. *intermedia* (DC.) Airy-Shaw
(PSL, N.C., Duke Univ.)



Anaphalis royleana DC. (BSI, S.H.C., Gangtok)



Catamixis baccharoides Thomson (BSI, N.C., Dehra Dun)



Cremanthodium arnicoides (Wallich) R. Good (BSI, S.H.C., Gangtok)



Cremanthodium ellisii (Hook.f.) Kitam. (BSI, N.C., Dehra Dun)



Gerbera gossypina (Royle) P. Beauv. (BSI, N.C., Dehra Dun)



Inula hookeri C.B. Clarke (BSI, S.H.C., Gangtok)



Inula cuspidata (DC.) C.B. Clarke (BSI, S.H.C., Gangtok)



Inula racemosa Hook.f. (BSI, N.C., Dehra Dun)



Inula rhizocephala Schrenk. var. *rhizocephaloides* (C.B. Clarke) Kitam.
(BSI, N.C., Dehra Dun)



Inula royleana DC. (BSI, N.C., Dehra Dun)



Leontopodium brachyactis Gaud. (BSI, N.C., Dehra Dun)



Senecio laetus Edgew. (BSI, N.C., Dehra Dun)



Pentanema indicum (L.) Ling (BSI, N.C., Dehra Dun)



Senecio graciliflorus DC. (BSI, S.H.C., Gangtok)

Tribe 8. I N U L E A E Cass.

(S. Kumar and P.C. Pant)

Herbs, shrubs or undershrubs, mostly arachnoid, white woolly or glandular. Leaves alternate or subopposite, entire or lobed or dentate. Inflorescence mostly paniculate or spiciform. Heads discoid or seldom radiate, homogamous or heterogamous, small, dioecious in some genera. Involucral bracts sometimes coloured, many in several graded series, overlapping, often glistening. Receptacle flat or convex, paleaceous or epaleaceous. Ray florets with slender, filiform or ligulate corolla, minutely toothed. Disc florets usually light yellow or white, with tubular, campanulate corolla, 4-5 lobed. Anthers connate, apically appendaged, tailed at base. Style branches various, apically rounded or truncate, ovaries mostly terete. Achenes flat, terete, angled or elongated, usually very small, often ribbed. Pappus of many fine, strigose bristles or absent.

A cosmopolitan tribe usually abundant in old world regions, particularly Australia and S. Africa; about 300 genera and ca 2000 species, 25 genera and 147 species in India.

Notes. The generic limits in Inuleae are often not very distinct. Morphologically this tribe is similar to Astereae. Some of the most distinguishing characters of Inuleae are : strongly tailed anthers, flattened style, branches with marginal stigmatic lines and mostly capillary pappus. Cytologically this tribe is not well known. The known base numbers of gametic chromosomes are 5, 7, 8, 9, 10, 11.

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KEY TO THE SUBTRIBES

- | | |
|--|----------------|
| 1a. Heads homogamous (except <i>Gnaphalium</i>) | 2 |
| b. Heads heterogamous | 3 |
| 2a. Achenes winged | 1. Angiantheae |
| b. Achenes not winged | 5. Gnaphaleae |
| 3a. Receptacle naked | 4 |
| b. Receptacle palaeaceous | 5 |

- | | |
|-------------------------------|-----------------|
| 4a. Heads radiate | 3. Euinuleae |
| b. Heads discoid or disciform | 6. Plucheineae |
| 5a. Ray florets strap shaped | 2. Bupthalmeeae |
| b. Ray florets filiform | 4. Filagineae |

Subtribe 1. ANGIANTHEAE DC.

(P.C. Pant)

Herbs, glabrous, usually marshy. Leaves entire. Heads homogamous, in sessile, axillary, involucrate clusters. Involucral bracts 2, keeled or winged.

1 genus with 1 species in India.

Caesulia Roxb.

Herbs. Leaves alternate, lanceolate, serrulate. Heads homogamous, not rayed, in sessile, axillary, involucrate clusters. All florets bisexual, fertile. Involucral bracts 2, large, membranous, opposite, keeled or winged at length including the achenes. Receptacle with lanceolate, stramineous paleae; paleae glabrous. Corolla tubular, deeply 5-lobed; lobes linear. Anther base sagittate; tails of a bundle of fine hairs. Style arms short, linear-cuneate, subtruncate. Achenes included in the laterally compressed bracts, obovoid, winged on each side, sparsely hairy. Pappus of 2, ovate scales above the wings.

A monotypic genus of the Indian subcontinent.

Caesulia axillaris Roxb., Pl. Corom. 1: 64. t. 93. 1798; Hook.f., Fl. Brit. India 3: 291. 1881. Fig. 1.

Herbs, prostrate or suberect, succulent, up to 60 cm high, sometimes with rhizomatous roots. Leaves alternate, margin distantly serrulate, acute, narrowed at base, 2-16 x 0.1-2.5 cm, glabrous, sessile, stem clasping. Heads axillary, ca 1.3 cm across, sessile. Involucral bracts 2, membranous, orbicular or broadly ovate, crenulate or dentate. All florets pale blue or white, bisexual; outer florets intermixed with linear, acute paleae; inner without paleae. Corolla tubular, ca 2 mm long, 5-lobed. Achenes obovoid, ca 1.5 x 1 mm, flat, winged and sparsely hairy. Pappus of 2, ovate scales, ribbed on the back.

Fl. July - Oct.; *Fr.* Nov.-April.

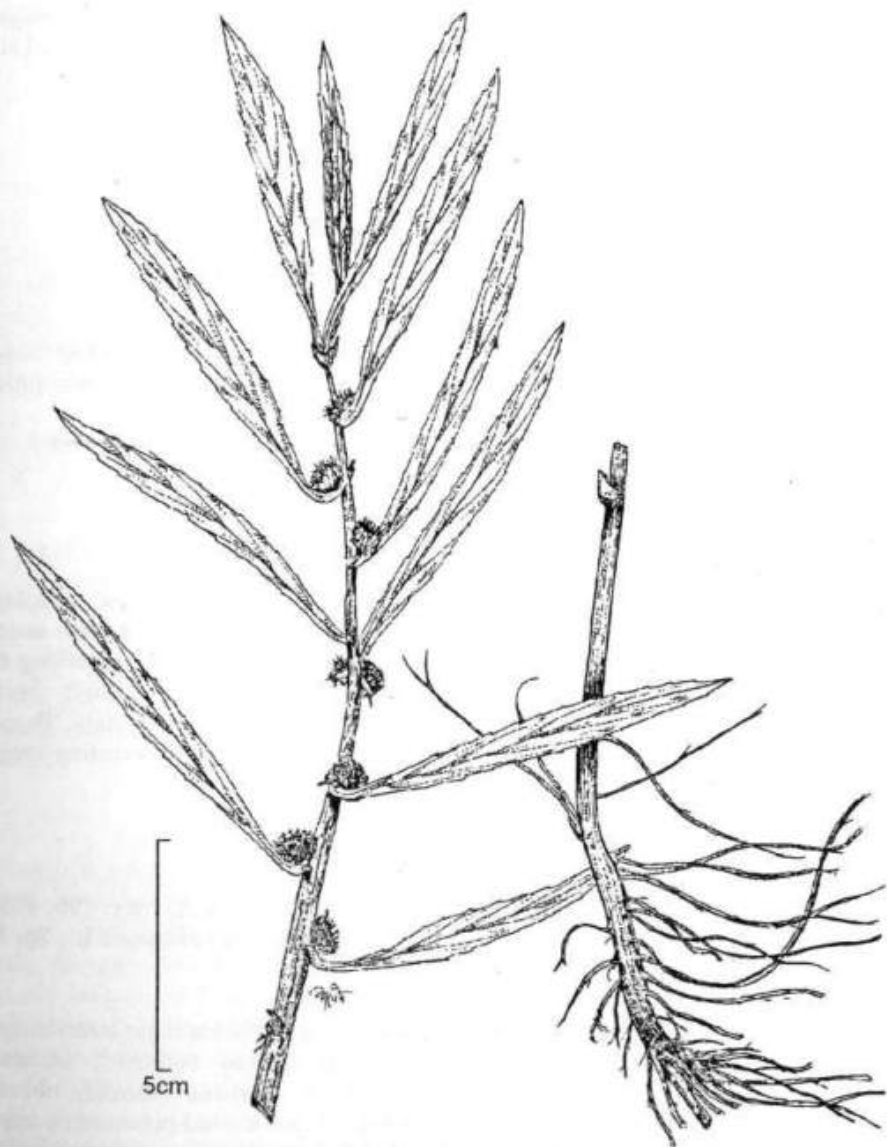


Fig. 1. *Caesulia axillaris* Roxb.

Distrib. India: Throughout in plains, ascending to 1000 m. in Himalayas, commonly found in paddy fields, shallow ditches, moist low lying areas and also along river banks.

Pakistan, Nepal, Bangladesh and Myanmar.

Subtribe 2. BUPTHALMEAE Less.

(S. Kumar)

Heads heterogamous. Involucral bracts few. Style arms of female florets diverging. Receptacles rigidly palaeaceous. Ray florets ligulate. Disc florets tubular.

1 genus and 1 species in India.

Anisopappus Hook. et Arn.

Scabrid or pubescent, erect herbs. Leaves alternate, toothed, petiolate. Heads heterogamous, radiate, hemispherical. Involucral bracts in few series, oval or oblong, pubescent. Receptacle paleaceous; palea folded, sheathing the disc florets. Ray florets many; corolla 3-dentate. Disc florets many; corolla tubular, 5-dentate; anther-base sagittate. Achenes subterete, costate. Pappus coroniform, of short free or nearly free pectinate scales with alternating longer narrow bristles.

Tropical Africa and Asia; ca 20 species, 1 in India.

Anisopappus chinensis (L.). Hook. et Arn., Bot. Beech. Voy. 196. 1837; C.B. Clarke in J. Linn. Soc. Bot. 25: 38. 1889. *Verbesina chinensis* L., Sp. Pl. 901. 1753.

Herbs, robust, erect, scabrid to pubescent, up to 50 cm high; stems simple below, terete, striate, shortly pubescent, sometimes branched; branches subangular with short, crisp pubescens. Leaves alternate, narrowly oblong-lanceolate, obtuse, obtusely dentate, 1-4 x 0.5-1 cm, scabrid-puberulous, upper surface dark green; petiole 5-6 mm. Heads 1.5-2 cm across, on rigid peduncles. Involucral bracts 2-3-seriate; outer ones 3 mm long, densely hairy; inner up to 7 mm, pubescent. Receptacle paleaceous; palea 5-6 mm long. Ray florets many; corolla yellow, 5-7 mm long, 2-3 dentate. Style branches diverging. Disc florets many; corolla tubular, 3-4 mm long, 5-lobed. Achenes subterete, 2-2.5 mm, ribbed, pubescent. Pappus coroniform, of short scales alternating with narrow bristles.

Distrib. India: Manipur, Meghalaya and Nagaland; very rare.

China and Africa.

Subtribe 3. EUINULEAE DC.

(S. Kumar)

Heads heterogamous, only rarely homogamous or discoid. Ray florets female, fertile or neuter. Disc florets bisexual, fertile or sterile. Receptacle naked. Anther base not tailed. Style arms of bisexual florets usually truncate, or style of sterile florets undivided.

5 genera and 38 species in India.

KEY TO THE GENERA

- | | |
|--|----------------------|
| 1a. Heads disciform; achenes beaked; pappus absent | 1. <i>Carpesium</i> |
| b. Heads radiate; achenes not beaked; pappus present | 2 |
| 2a. Achenes terete, not ribbed; pappus 1-seriate or 0 | 4. <i>Pentanema</i> |
| b. Achenes ribbed; Pappus 2-seriate | 3 |
| 3a. Achenes gland-dotted; leaves gland-dotted | 3. <i>Pegolettia</i> |
| b. Achenes not gland dotted; leaves otherwise | 4 |
| 4a. Outer pappus of scales often forming a cup, inner of hairs | 5. <i>Pulicaria</i> |
| b. Outer as well as inner pappus of hairs; hairs unequal | 2. <i>Inula</i> |

1. *Carpesium* L.

Herbs, erect, branched; stems pubescent. Leaves alternate, entire or dentate. Heads heterogamous, disciform, terminal or axillary, usually cernuous, small. Involucre hemispherical. Involucral bracts multiseriate; the outer ones longer, leafy; the inner ones shorter or subscariosus. Receptacle flat, naked. Outer florets female, numerous, tubular, 3-5-lobed. Ray florets female, numerous, tubular, 3-5-lobed. Disc florets bisexual, 5-lobed. Achenes linear, elongate, striate, costate, narrowed and rostrate above; rostrum often glandular with a thickened corona. Pappus absent.

Temperate and subtropical Asia, S. Europe; ca 20 species, 3 in India.

KEY TO THE SPECIES

- | | |
|---|---------------------------|
| 1a. Heads numerous, almost erect, inserted along the whole length of branches; leaves sessile or subsessile | 1. <i>C. abrotanoides</i> |
| b. Heads solitary or few, nodding, terminal or subracemose; lower leaves petioled | 2 |

- 2a. Heads 0.4-0.6 cm across; involucre bracts mucronate, recurved; achenes glabrous, punctate at beak and base **3. *C. trachelifolium***
- b. Heads 0.6-2.5 cm across; involucre bracts acute or obtuse, not recurved; achenes glandular at beak and base **2. *C. cernuum***

1. *Carpesium abrotanoides* L., Sp. Pl. 860. 1753; Hook.f., Fl. Brit. India 3: 301. 1881. **Fig. 2.**

Herbs, perennial, sparsely pubescent or glabrate; branches leafy at tips. Leaves ovate-elliptic or lanceolate, attenuate at base; the lower ones acute or acuminate, margins obscurely dentate, 10-15 x 2.5-5 cm, pubescent on both surfaces; the upper leaves on flowering shoots smaller, 4-8 x 0.5-2 cm. Heads yellow, numerous, ca 6 mm across, sessile or on short peduncles forming leafy racemes, inserted along the whole length of the branches, horizontal. Involucre ca 5 mm.; involucre bracts 3-4 seriate; outer ovate, 2-3 mm long, pubescent at margins, herbaceous at tip; the inner ones oblong, obtuse, 5 mm long. Receptacle glabrous, pitted. Florets tubular, 1.5-2 mm, 5-toothed. Achenes elongate, finely ribbed, 3 mm long, tapering into a short beak surmounted by a minute whitish corona, glandular at base and on beak.

Fl. & Fr. Oct. - Nov.

Distrib. India: Ascending up to 3000 m in the Himalayas. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Pakistan, Iran, China, Japan, Austria, Turkey, Italy, Yugoslavia, Hungary, Georgia and Azerbaijan.

Notes. The plant possesses medicinal properties. Roots, leaves and seeds are considered laxative, anthelmintic, diuretic.

2. *Carpesium cernuum* L., Sp. Pl. 859. 1753; Hook.f., Fl. Brit. India 3: 300. 1881. *C. nepalense* Less. in *Linnaea* 6: 234. 1831; R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 21. 1988.

Herbs, perennial; stems upto 60 cm high, pubescent, hirsute villous or tomentose. Leaves variable, linear, lanceolate, ovate, elliptic-lanceolate or elliptic-ovate, entire or denticulate, 10-45 x 3-9 cm, hirsute-pubescent to densely woolly, subsessile or petiolate; petiole upto 12 cm long, occasionally winged, villous. Heads solitary, terminal, 0.5-2.5 cm across, erect or nodding, often



Fig. 2. *Carpesium abrotanoides* L. : a. Habit; b. Achene with floret.

with large leafy bracts at the base. Outer involucral bracts leafy, spreading or reflexed; inner oblong, oblanceolate or oblong-elliptic, upto 7.5 x 2.5 mm, obtuse, subacute or acute at the tip. Florets yellow; corolla tubular, ca 2 mm long, 3-lobed. Achenes linear-oblong, upto 5 mm long, 10-ribbed; rostrum often glandular, surmounted by corona.

Note. A highly variable species with the following varieties recognised by Hooker (1881). Subsequently, Kitamura (Fauna & Fl. Nepal Himal. 250. 1955) segregated var. *lanatum* and var. *glandulosum* from *C. cernuum* and placed them under *C. nepalense*, primarily on the basis of shape of the leaf and apices of the inner involucral bracts. However, the presence of intermediate characters in Indian specimens, necessitate a thorough study of type specimens for their proper delimitation. Till such time Hooker's (l.c.) treatment has been followed.

KEY TO THE VARIETIES

- | | |
|--|-------------------------------|
| 1a. Involucre villous | 2 |
| b. Involucre glabrate or pubescent | 3 |
| 2a. Stems, branches and leaves densely woolly or cottony with white hairs | 2.5. var. <i>lanatum</i> |
| b. Stems, branches and leaves hirsute or villous | 2.6. var. <i>nilagiricum</i> |
| 3a. Leaves ovate with winged petioles; heads on very long, stiff, naked peduncle | 2.7. var. <i>pedunculosum</i> |
| b. Leaves linear, ovate, elliptic-ovate or lanceolate, subsessile or petioled; peduncle not as above | 4 |
| 4a. Stems and branches tomentose; leaves linear, petioled | 2.4. var. <i>griffithii</i> |
| b. Stems and branches pubescent, sometimes cottony; leaves lanceolate, elliptic, ovate, or elliptic-ovate | 5 |
| 5a. Stems and branches very slender; leaves lanceolate or elliptic-ovate, shortly petioled | 2.2. var. <i>ciliatum</i> |
| b. Stems and branches robust; leaves elliptic or ovate subsessile or petioled; heads with large leafy bracts at base | 6 |
| 6a. Leaves long petioled | 2.3. var. <i>glandulosum</i> |
| b. Leaves subsessile | 2.1. var. <i>cernuum</i> |

2.1. var. *cernuum*

Fig. 3.

Fl. & Fr. Sept. - Nov.

Distrib. India: Himalayas and Meghalaya.

2.2. var. *ciliatum* Hook.f., Fl. Brit. India 3: 301. 1881. *C. nepalense* Less. var. *ciliatum* (Hook.f.) S. Kumar in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 21. 1988.

Fl. & Fr. Sept. - Nov.



Fig. 3. *Carpesium cernuum* L. var. *cernuum*

Distrib. India: Kerala.

Endemic.

2.3. var. glandulosum Hook.f. & Thomson in C.B. Clarke, Comp. Ind. 130. 1876; Hook.f., Fl. Brit. India 3: 301. 1881.

Distrib. India: E. Himalayas and N.E. region. Sikkim and Meghalaya.

2.4. var. griffithii Hook.f., Fl. Brit. India 3: 302. 1881. *C. nepalense* Less. var. *griffithii* (Hook.f.) S. Kumar in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 22. 1988.

Fl. & Fr. Sept. - Nov.

Distrib. India: E. Himalayas. Arunachal Pradesh; rare.

2.5. var. lanatum Thomson ex C.B. Clarke, Comp. Ind. 130. 1876; Hook.f., Fl. Brit. India 3: 301. 1881. *C. nepalense* Less. var. *lanatum* (Thomson ex C.B. Clarke) Kitam. in Fl. East. Himal. 335. 1966.

Fl. & Fr. Sept. - Nov.

Distrib. India: E. Himalayas and N.E. region, 1200-1500 m. Sikkim and Meghalaya.

Nepal.

2.6. var. nilagiricum C.B. Clarke, Comp. Ind. 131. 1876; Hook.f., Fl. Brit. India 3: 301. 1881. *C. nepalense* Less. var. *nilagiricum* (C.B. Clarke) S. Kumar, in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 22. 1988.

Fl. & Fr. Sept. - Nov.

Distrib. India : Ascending upto 2400 m. Tamil Nadu.

2.7. var. pedunculosum Wallich ex C.B. Clarke, Comp. Ind. 131. 1876; Hook.f., Fl. Brit. India 3: 301. 1881. *C. pedunculosum* Wallich ex DC., Prodr. 6: 281. 1836. *C. nepalense* Less. var. *pedunculosa* (C.B. Clarke) S. Kumar, in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 22. 1988.

Fl. & Fr. July - Aug.

Distrib. India: W. Himalayas, ascending upto 2400 m. Himachal Pradesh and Uttar Pradesh.

3. *Carpesium trachelifolium* Less. in *Linnaea* 6: 233. 1831; Hook.f., *Fl. Brit. India* 3: 301. 1881.

Herbs, slender; stems pubescent or hirsute, more or less covered with soft hairs. Lower leaves ovate or cordate, sinuate-toothed or lobulate, 5-7 x 3-5 cm, long petioled; the upper leaves ovate or elliptic-lanceolate, serrate or entire, subsessile. Heads very small, 0.4-0.6 cm across, sometimes sub-racemose. Involucral bracts unequal; the outer foliaceous, elliptic-spathulate, often hairy, the apex mucronate, recurved. Ray florets yellow, ligulate, female, sub-filiform. Disc florets numerous, tubular, 5-toothed. Achenes cylindrical, ribbed, glabrous, the apex and base punctate.

Fl. & Fr. Aug. - Sept.

Distrib. India: Temperate Himalayas, ascending up to 3000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Pakistan and China.

2. *Inula* L.

Herbs or undershrubs, annual or perennial, erect or prostrate. Leaves radical and alternate. Heads yellow, sometimes white, heterogamous, radiate, rarely disciform, solitary, corymbose or paniced. Involucral bracts green multiseriate, leafy, the inner usually rigid and narrow. Ray florets female, 1-multiseriate, fertile; ligule 3-toothed. Disc florets bisexual, fertile, tubular, 5-toothed; limb yellow, elongate. Achenes subterete, angled, usually ribbed. Pappus hairs, 1-2-seriate, few or many, smooth, scabrid or bearded.

Temperate and subalpine regions of Europe, Africa and Asia; ca 50 species, 20 in India.

KEY TO THE SPECIES

- | | | |
|---|---|---|
| 1a. Plants almost stemless with a rosette of spatulate leaves; heads densely collected at the centre of rosette | 17. <i>I. rhizocephala</i> var. <i>rhizocephaloides</i> | |
| b. Plants with well defined stem; not forming a rosette of leaves; heads not densely collected at the centre of rosette | | 2 |
| 2a. Shrubs or undershrubs | | 3 |
| b. Herbs | | 7 |

- 3a. Leaves succulent; plants with a balsamic odour 8. *I. grantioides*
 b. Leaves not succulent; plants not with balsamic odour 4
- 4a. Heads not more than 5 in a raceme; nerves on leaves subparallel 19. *I. rubricaulis*
 b. Heads many, always more than 5 in a corymb or raceme; nerves not subparallel with the leaf margins 5
- 5a. Heads discoid; branches and leaves silky villous or woolly on lower surface; pappus hairs yellowish 3. *I. cappa*
 b. Heads radiate; leaves glabrous or pubescent on both surfaces but not white woolly 6
- 6a. Leaves membranous; petioles slender; ligules broad, revolute; involucre bracts acute 5. *I. cuspidata*
 b. Leaves coriaceous; petioles stouter; ligules narrow, erect; involucre bracts acuminate 6. *I. eupatorioides*
- 7a. Achenes contracted at tip forming a small cup; pappus borne on minute cupule; heads turbinate; stems copiously branched 9. *I. graveolens*
 b. Achenes not contracted at tip; pappus free at base; heads not turbinate; stems not copiously branched 8
- 8a. Stems with a narrow, membranous wing; achenes 6 mm long; ligules deeply 3-fid 11. *I. macrosperma*
 b. Stems without wing; achenes less than 6 mm long; ligules not deeply 3-fid 9
- 9a. Outer involucre bracts broad, herbaceous; heads large, 10
 b. Outer involucre bracts narrower, dry, rigid; heads relatively small 11
- 10a. Heads solitary, 7-10 cm across, inner involucre bracts acuminate; leaves membranous 18. *I. royleana*
 b. Heads racemose, 3-5 cm across; inner involucre bracts acute; leaves coriaceous 16. *I. racemosa*
- 11a. Achenes silky or hairy 12
 b. Achenes glabrous or nearly so 15
- 12a. Ligules yellow; branches from a woody root stock; ray florets up to 8 mm long; pappus pale-reddish 13
 b. Ligules white; stems simple; ray florets 11-12 mm long; pappus white 14
- 13a. Stems and leaves beneath scaberulous or hairy; involucre bracts pubescent; heads small 14. *I. obtusifolia*
 b. Stems and leaves beneath shortly tomentose; involucre bracts villous; heads larger 4. *I. clarkei*
- 14a. Leaves elliptic or elliptic-lanceolate, acute at both ends, scaberulous above; ligules broad; heads small 13. *I. nervosa*
 b. Leaves oblong, base rounded, hairy on both surfaces; ligules narrow; heads large 20. *I. simonsii*
- 15a. Pappus white; achenes 2 mm long; perennial 16
 b. Pappus reddish or pale-reddish; achenes not more than 1.5 mm long; annuals 17
- 16a. Involucre shaggy; heads 1-3; stems villous; ligules equal to the size of disc florets 10. *I. hookeri*
 b. Involucre not shaggy; heads solitary; stems hirsute; ligules larger than disc florets 15. *I. orientalis*
- 17a. Pappus scanty, not more than 3 mm long; achenes glabrous 11. *I. kalapani*
 b. Pappus prominent, more than 3 mm long; achenes sparsely pubescent 18
- 18a. Leaves linear-oblong 7. *I. falconeri*
 b. Leaves hastate or elliptic or ovate-elliptic 19
- 19a. Ligules short, recurved, not exceeding the involucre bracts 1. *I. acuminata*
 b. Ligules 15-25 mm long, much exceeding the involucre bracts 2. *I. britannica*

1. *Inula acuminata* Royle ex DC., Prodr. 5: 471. 1856; Hook.f., Fl. Brit. India 3: 294. 1881.

Herbs, annual, stems 25-40 cm high, shining, glabrous at base, pubescent above, sometimes branched. Leaves suberect, elongate, hastate, gradually tapering from the broad base, acuminate, obscurely dentate, 2-10 cm long, glabrous. Heads subcorymbose, 1.2-2 cm in diam., few. Involucral bracts green, narrow, linear-acuminate, erect, puberulous. Ray florets ligulate; ligules short, recurved. Achenes minute, 1 mm long, nearly glabrous, sometimes with a few, short, erect hairs. Pappus pale-reddish, up to 4 mm long.

Distrib. India: W. Himalayas, on calcareous rocks, up to 2400 m. Jammu & Kashmir and Himachal Pradesh; rare.

2. *Inula britannica* L. Sp. Pl. 882. 1753. Stewart in Nasir et Ali, Ann. Cat. Vas. Pl. W. Pak. 752, 1972.

Herbs, biennial, erect, 15-75 cm, pubescent. Leaves elliptical or ovate-elliptical, entire or serrulate, lower 4-15 x 1-2.5(-4) cm; upper slightly amplexicaul, sparsely pubescent above, densely pubescent beneath, sessile. Capitula medium to large. Involucre hemispherical, 7-12 mm long. Outer involucral bracts linear-lanceolate, 7-12 x 0.5-0.8 m, deflexed; inner 5-8 x 0.4-0.6 mm. Ligules 15-25 mm long, much exceeding the involucre. Achenes 1-15 mm, hairy or subglabrous. Pappus with 15-25 setae.

Distrib. India: Jammu & Kashmir.

Europe.

3. *Inula cappa* (Buch.-Ham. ex D. Don) DC., Prodr. 5: 469. 1836. Hook.f., Fl. Brit. India 3: 1881. *Conyza cappa* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 176. 1875. Fig. 4.

Shrubs, erect, stout, aromatic; stems 1.2-2.5 m tall, branched, tomentose. Leaves oblong-lanceolate, base amplexicaul, acute-obtuse, margins dentate, 5-20 x 1-5 cm, thick, densely silky woolly on lower surface, hairy on the upper, subsessile. Heads in corymbs, up to ca 0.8 cm in diam., in corymbs, densely silky; peduncles up to 12 cm long. Involucral bracts multiseriate, very variable in size and number, linear, 4-6 mm, rigid, hairy. Disc florets yellow, tubular, ca 4.2 mm, 5-lobed, with prominent ribs, pappillate at tip. Achenes 1 mm long, silky hairy with a prominent base. Pappus white, up to 6 mm long.

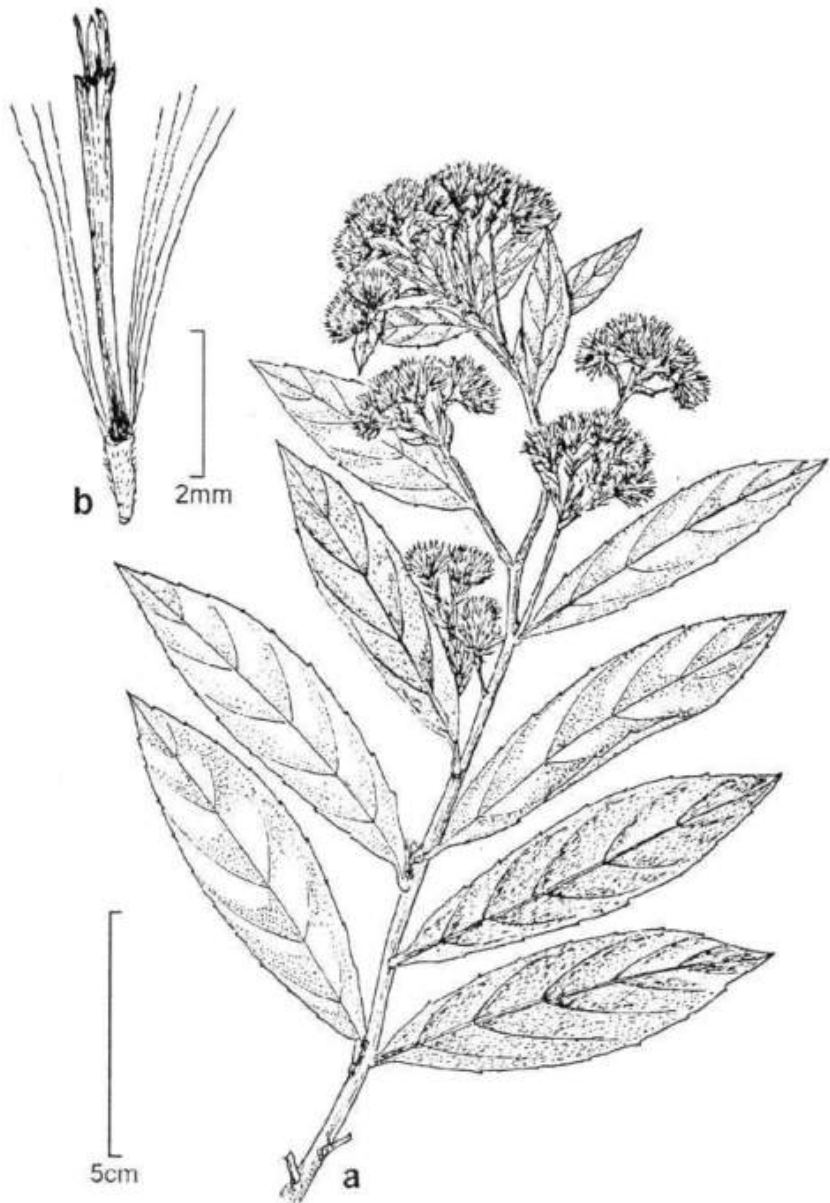


Fig. 4. *Inula cappa* (Buch.-Ham. ex D. Don) DC. : a. Habit; b. Achene with floret.

Fl. & Fr. Aug. - Feb.

Distrib. India: Himalayas and N.E. region, on open slopes up to 2400 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Assam, Nagaland, Manipur and Meghalaya

Bhutan, Myanmar, China, Thailand and Indonesia.

4. *Inula clarkei* (Hook.f.) Stewart in Nasir et Ali, Ann. Cat. Vas. Pl. W. Pak. 753. 1972. *I. obtusifolia* Kerner var. *clarkei* Hook.f., Fl. Brit. India 3: 294. 1881.

Herbs, perennial; stems 15-35 cm high, rigidly flexuous, tomentose. Leaves rigid, oblong or ovate, base rounded, obtuse, obscurely denticulate, 2-5 cm long, short tomentose beneath, sessile. Heads yellow, hemispheric, up to 4 cm in diam. Involucral bracts green, villous, pubescent; outer larger, leafy; inner linear-lanceolate, acute, rigid, pubescent. Ray florets ligulate; ligules shorter. Achenes slender, 2-2.5 mm long, silky. Pappus pale-reddish.

Fl. & Fr. June - Sept.

Distrib. India: W. Himalayas, up to 3400 m. Jammu & Kashmir and Himachal Pradesh.

4. *Inula cuspidata* (DC.) C.B. Clarke, Comp. Ind. 125. 1876; Hook.f., Fl. Brit. India 3: 296. 1881. *Amphiraphis cuspidata* DC., Prodr. 5: 343. 1836.

Fig. 5.

Shrubs, erect, branched; stems 45-100 cm high, young branches pubescent. Leaves elliptic, ovate-lanceolate, acute or shortly acuminate, rough on the upper surface, thinly pubescent outer lower surface, petiolate with up to 1.5 cm long petiole. Heads in terminal corymbs, 0.7-1 cm in diam., pedunculate; peduncle 6 cm long, slender. Involucral bracts in 2-3 whorls; the outer linear-oblong, 2-3 mm long, hairy on upper surface, midrib prominent; the inner pale, linear, acute or shortly acuminate, 5-6 mm long, appressed hairy. Ray florets ligulate, up to 10 mm long; ligule up to 4 mm, abruptly narrowed; 3-lobed, 5-ribbed; ribs prominent. Disc florets up to 9 mm long, 5-lobed; lobes recurved. Achenes dirty white, 2 ridged up to 2 mm, silky hairy. Pappus up to 5 mm long; hairs fimbriate or feathery at tip.

Fl. & Fr. June - Oct.



Fig. 5. *Inula cuspidata* (DC.) C.B. Clarke : a. Habit; b. Achene with floret.

Distrib. India: Himalayas, ascending up to 2100 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Bhutan, Pakistan and China.

6. *Inula eupatorioides* DC., Prodr. 5: 469. 1836; Hook.f., Fl. Brit. India 3: 295. 1881.

Shrubs, stout; stems 1-3 m tall, branched, pubescent. Leaves spirally arranged, elliptic-oblong, base cuneate or rounded, acute-acuminate, irregularly cuspidate, serrate, 4-22.5 x 1.5-7.5 cm; lateral nerves prominent; petioled. Heads in terminal or upper axillary panicles, 7-8 mm in diam., short peduncled. Involucral bracts linear, subulate. Receptacle areolate. Corolla yellow. Achenes silky, pubescent. Pappus pale-brownish.

Distrib. India: Himalayas and N.E. region, up to 1800 m. Uttar Pradesh, Sikkim, Nagaland and Meghalaya.

Nepal, Bhutan, China and Myanmar.

7. *Inula falconeri* Hook.f., Fl. Brit. Ind. 3: 294. 1881.

Herbs, annual; stems 30-45 cm high, slender, glabrous or tomentose, simple or branched. Leaves linear or oblong, amplexicaul, auricled, gradually contracted above the base 2.5-8 x 0.5-0.6 cm, nerves obscure. Heads yellow, corymbose, 1.2-2 cm in diam. Involucral bracts green, linear, acute, pubescent or tomentose, erect or recurved. Ray florets ligulate; ligules small. Achenes 1 mm long with few short, erect hairs. Pappus pale-reddish, up to 5 mm long.

Distrib. India: W. Himalayas, ca 2400 m. Jammu & Kashmir.

Pakistan and Tibet.

8. *Inula grantioides* Boiss., Diagn. Ser. 2. 3. 14. 1856; Hook.f., Fl. Brit. India 3: 296. 1881.

Shrubs or undershrubs; stems 15-60 cm high, glandular-hairy, much branched; branches short, stout, leafy. Leaves variously lobed, fleshy; the lower cuneate, shortly 3-lobed, petiolate; upper linear, 2-5 cm long, entire or 2-3-toothed at apex, glandular hairy, sessile. Heads yellow, numerous, 2-4 cm across, with 1-2 leafy bracts on stout hairy peduncle. Involucral bracts narrowly

linear-oblong, sub-acute, hairy, glandular; outer green, smaller, obtuse, inner yellow, long, narrower, acute. Ray florets yellow, 1-seriate, ligulate, few. Disc florets tubular, acutely toothed. Achenes oblong, 2.5-3 mm long, strongly ribbed, hispid. Pappus reddish, 5 mm long, scabrid, rigid.

Fl. & Fr. Nov. - Dec.

Distrib. India: Gujarat.

Pakistan.

Notes. The plant possesses a balsamic odour; is useful for asthma.

9. *Inula graveolens* (L.) Desf., Fl. Atl. 2: 275. 1799; Hook.f., Fl. Brit. India 3: 292. 1881. *Erigeron graveolens* L., Cent. Pl. 80. 1755.

Herbs, annual, erect, much branched; stems up to 1 m high, glandular hairy. Leaves linear-lanceolate, attenuate, acute, entire or slightly denticulate, 1-1.5 x 0.1-0.6 cm, sessile. Heads radiate, numerous, in loose racemes. Involucre 0.5-0.7 cm broad. Involucral bracts 3-seriate, linear-lanceolate; the outer 4.5 mm long, herbaceous; inner 6-7 mm long, membranous. Ray florets 6-8, 2-2.5 mm long, slightly exceeding the involucre. Disc florets 3.5-4 mm long, sometimes turning reddish on drying. Achenes 2-4 mm long, finely pubescent, viscid, glandular, shortly constricted at apex. Pappus brownish, 4-5 mm long, scabrous, borne on a minute cupule.

Distrib. India: W. Himalayas. Jammu & Kashmir and Himachal Pradesh.

Pakistan, Afghanistan, Iran, Iraq and Mediterranean region.

Notes. Medicinal as diuretic and in curing calculus disease. The plant contains a volatile oil.

10. *Inula hookeri* C.B. Clarke, Comp. Ind. 122. 1876; Hook.f., Fl. Brit. India 3: 294. 1881.

Herbs, perennial, erect; stems up to 1 m high, branched, villous above. Leaves elliptic-lanceolate, acute, margin gland-toothed, base auricled, 6-11 x 1-4 cm, hairy on both surfaces; nerves conspicuous; lower subsessile, narrowed into a petiole; upper sessile. Heads yellow, terminal, solitary or 2-3 together, hemispheric, up to 5 cm in diam., shaggy with long silky hairs. Involucral

bracts very slender, almost filiform, 1.5-2.5 cm, villous, recurved. Ray florets deeply lobed, conspicuously nerved. Achenes angled, ca 11.5 mm, glabrous. Pappus dirty white, 4 mm long.

Fl. & Fr. Aug. - Oct.

Distrib. India: E. Himalayas, in temperate forests up to 3600 m. Sikkim and Arunachal Pradesh.

Nepal, Bhutan, Myanmar and China.

11. *Inula kalapani* C.B. Clarke, *Comp. Ind.* 123. 1876; *Hook.f., Fl. Brit. India* 3: 294. 1881.

Herbs, erect; stems 30-45 cm high, simple, rarely branched, pubescent or hirsute. Leaves cauline and radical; the radical elliptic, ovate or lanceolate, obtuse or acute, subdentate, 5-7.5 cm long, petiolate; the cauline erect or spreading, oblong or ovate-oblong, amplexicaul at base, dilated, 2-4 cm long. Heads corymbose, few, 1.5-2.5 cm in diam. Involucral bracts green, few, linear, acute, spreading or recurved, hirsute. Ray florets ligulate; ligules ca 8 mm long. Achenes minute, upto 1.2. mm long, glabrous. Pappus reddish, ca 3 mm long, scanty.

Distrib. India: Meghalaya (ca 1500 m in Khasi hills).

Endemic.

12. *Inula macrosperma* Hook.f., *Fl. Brit. India.* 3: 292. 1881.

Herbs, erect stout; stems glabrous or pubescent, thick, winged; wings narrow, membranous. Leaves oblong-ovate, acuminate, base amplexicaul, decurrent, 7-10 x 2-3 cm, puberulous. Heads sub corymbose, 3.5-5 cm across, on stout, erect peduncle. Involucral bracts few, lanceolate, 1.5-2 cm long, subacute, pubescent. Receptacle hemispheric. Ray florets ligulate; ligules up to 1.5 cm long, deeply 3-fid. Achenes narrowly obovate-oblong, up to 6 mm long, compressed, strongly ribbed, hispid above. Pappus hairs red, 2.5 mm long, stout, scabrid.

Distrib. India: Alpine regions of Sikkim Himalayas; rare.

Endemic.

13. *Inula nervosa* Wallich ex DC., Prodr. 5: 471. 1836; Hook.f., Fl. Brit. India 3: 293. 1881.

Herbs, erect; stems 30-90 cm, simple or branched, young parts densely hairy. Leaves elliptic-lanceolate, cuneate at base, acute, distantly serrate, 5-13 x 1-4 cm, membranous, scaberulous on both surfaces; hairs with tubercled base; midrib prominent, veins subparallel; subsessile. Heads white with yellow centre, solitary or corymbose, ca 1.5 cm across, pedunculate. The outer green, ovate-oblong, obtuse 3 x 1.5 mm, pubescent, scabrid, leafy, middle yellow, ca 5-6 x 1 mm, scaly, densely appressed hairy; midrib prominent; inner linear, ca 6 x 0.7 mm. Ray florets ligulate, ca 11-12 mm, 3-lobed, ligule ca 7 x 2(3) mm. Disc florets yellow. Achenes up to 1 mm. Pappus dirty white, ca 5 mm long.

Distrib. India: Temperate Himalayas and N.E. region, up to 2100 m. Uttar Pradesh, Sikkim and Meghalaya.

Nepal, Bhutan, Myanmar, Thailand, China and Vietnam.

14. *Inula obtusifolia* Kerner in Ber. Naturw. Ver. Innsbruck. 1: 111. 1870; Hook.f., Fl. Brit. India 3: 293. 1881.

Herbs, perennial, with a woody rootstock; stems many from the rootstock, 12-30 cm high, rigidly flexuous, scabrid or hairy. Leaves oblong or ovate-oblong, rounded at base, obtuse, obscurely denticulate, 3-5 cm, rigid, often scaberulous above, sessile. Heads yellow, terminal, 1 or few, hemispheric, very variable in size, 1.3-3.5 cm in diam. Involucral bracts few; outer leafy; inner linear or linear-lanceolate, acute, sometimes acuminate, rigid, pubescent. Ray florets ca 8 mm long; ligule shorter. Achenes slender, up to 2.5 mm long, silky. Pappus pale-reddish.

Fl. & Fr. June - Aug. (Sept.).

Distrib. India: W. Himalayas, on rocks forming huge clumps, ca 4000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan and China.

15. *Inula orientalis* Lam., Encycl. 3: 255. 1789.

Fig. 6.

Herbs, erect, perennial, glandular, pubescent; stems up to 75 cm long, rarely branched, hirsute below, hairy above, leafy throughout. Leaves elliptic-



Fig. 6. *Inula orientalis* Lam.

ovate, cuneate, amplexicaul, acute, gland serrate, 5-12 x 1-3 cm, hairy, sessile. Heads yellow, solitary, terminal, 3-8 cm across. Involucral bracts blackish green, multiseriate, linear-lanceolate, ca 11 x 2 mm, thick hairy at margins midrib ending in a glandular apex. Ray florets yellow, ca 18 mm long, bifid to 3-lobed; ligules linear, oblong, 3-5-ribbed; tube ca 4-5 mm. Disc florets yellow, numerous, ca 7 mm, 5-lobed; corolla tubular, 5 mm long; limb 2 mm long. Style bifid, truncate. Achenes brown, oblong, ca 1 mm long, faintly ribbed. Pappus ca 6.5-7 mm long.

Fl. & Fr. July - Sept.

Distrib. India : Temperate Himalayas, up to 2000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal, Pakistan and Caucasus.

The shruberies are very common in Kashmir. The aromatic roots of this species are used as an adulterant of "Kuth" (*Saussurea costus*).

16. *Inula racemosa* Hook.f., Fl. Brit. India 3: 292. 1881.

Kash.: *Poshkar*.

Herbs, stout, erect; stems 0.3-1.8 cm tall, branched, furrowed; young parts densely hairy. Leaves elliptic-lanceolate or obovate, amplexicaul, short acuminate, the tip coriaceous, dorsiventral, woolly beneath, the upper surface pubescent. Heads yellow, many, in racemes, 4-5 cm across, on stout, hairy peduncle. Involucral bracts multiseriate, densely hairy; outer ovate, 1.5 x 0.8 cm, the tips recurved, densely woolly; inner bracts with hyaline margins, 1.3-1.5 x 0.5-0.8 cm, densely woolly outside, tubercled within. Ray florets 2.8-3 cm, ligulate; ligules ca 1.6 cm long, hyaline, conspicuously nerved. Disc florets ca 1.5 cm long. Achenes 0.2 cm long. Pappus up to 9 mm.

Fl. & Fr. July - Sept.

Distrib. India: W. Himalayas, along bunds of cultivated fields. Jammu & Kashmir.

Notes. A reputed medicinal plant, frequently cultivated. Its aromatic roots are employed as an adulterant of "Kuth". It is also used as an expectorant and resolvent. Roots contain inuline (10%) and an essential oil containing

alantolactone which is strongly anthelmintic, expectorent and diuretic. Seeds are aphrodisiac. It is also a good cure for rheumatism.

17. *Inula rhizocephala* Schrenk. var. *rhizocephaloides* (C.B. Clarke) Kitam., Fl. Pl. W. Pak. 151. 1964. *I. rhizocephaloides* C.B. Clarke, Comp. Ind. 124. 1876; Hook.f., Fl. Brit. India 3: 295. 1881. **Fig. 7.**

Herbs, almost stemless with a rosette of spatulate leaves. Leaves almost pressed to the ground, horizontal, 3-5 cm long, bristly-hairy, narrowed to a broad stalk. Heads yellow, 1.8-2.5 cm across, densely collected at the centre of rosette. Involucral bracts narrow, linear, pointed; the outer green with recurved tips; inner purplish. Ray florets few or absent. Achenes ribbed, up to 1.6 mm long, glabrous. Pappus red, up to 3 mm long.

Fl. & Fr. July - Aug.

Distrib. India: W. Himalayas, in alpine meadows, ca 3600 m. Jammu & Kashmir.

Pakistan and Tibet.

Notes. Quite unlike other species of the genus in being acaulescent.

18. *Inula royleana* DC., Prodr. 5: 464. 1836; Hook.f., Fl. Brit. India 3: 292. 1881.

Kash.: *Zabelniilkohee*

Herbs, erect, stout, perennial with creeping rhizomes; stems 30-60 cm high, striate, pubescent. Leaves both radical and cauline; radical leaves elliptic-ovate, cordate, base abruptly narrowed. margins dentate with obtuse tip, 6-20 x 4.5-10 cm, petioled with up to 18 cm long petiole winged in upper portion; cauline leaves elliptic-lanceolate, acute, dentate, auricled at base, 4-14 x 2.5 cm, densely hairy. Heads golden-yellow, solitary, terminal, showy, 5-10 cm across, long peduncled. Involucral bracts multiseriate, leafy, densely glandular hairy on both surfaces; outer bracts up to 12 x 6 mm; middle bracts yellow, 8 x 2 mm, scaly, hairs appressed, glandular; inner yellow, ca 11-12 x 1-2 mm, scaly, appressed hairy. Ray florets pale, ligulate, up to 4.5 cm; ligules 3.7 x 2 mm, 2-lobed; veins conspicuous. Disc florets tubular, up to 1 cm; tube up to 7 mm long, 5-lobed. Achenes ca 3 mm; those of ray ridged. Pappus up to 7.5 mm; hairs fimbriate.



Fig. 7. *Inula rhizocephala* Schrenk. var. *rhizocephaloides* (C.B. Clarke) Kitam.

Fl. & Fr. July - Sept.

Distrib. India: W. Himalayas, ascending up to 3300 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan.

Notes. Roots are employed as an adulterant of "Kuth". These are poisonous and used in the preparation of disinfectants and pesticides particularly for lice, fleas and ticks.

19. *Inula rubricaulis* (DC.) C.B. Clarke, *Comp. Ind.* 126. 1876; *Hook.f.*, *Fl. Brit. India* 3: 296. 1881. *Amphiraphis rubricaulis* DC., *Prodr.* 5: 343. 1836.

Fig. 8.

Shrubs, erect, branched; stems 0.9-1.8 cm tall, with long, slender, flexuous branches. Leaves elliptic-lanceolate, acuminate, serrate, 10-15 x 2.5-4 cm, membranous, glabrous; nerves parallel to margin; sessile. Heads yellow, heterogamous, 3-5 together in very short axillary racemes, 1.5 cm across, pedunculate with stout, tomentose peduncles. Involucral bracts in whorls of unequal length; the outer 5-6 mm; the inner subulate-lanceolate, acuminate, 8-9 mm long, hairy, the tip darker. Ray florets ligulate, 11-12 mm long; ligules 5-6 x 2-3 mm, 3-lobed; tube up to 4 mm long. Disc florets tubular, 7-8 mm long; the tube up to 6 mm long; limb 5-lobed. Achenes of ray florets; cylindrical, 1.8-2 mm long; those of disc floret 1-1.5 mm long, shining, silky hairy, dull white. Pappus up to 7 mm long.

Fl. & Fr. July - Oct.

Distrib. India: Subtropical Himalayas and N.E. region, ascending up to 1800 m. Uttar Pradesh, Sikkim, Assam and Meghalaya.

Nepal, Bhutan, Myanmar and China.

20. *Inula simonsii* C.B. Clarke, *Comp. Ind.* 121. 1876; *Hook.f.*, *Fl. Brit. India* 3: 293. 1881.

Herbs, perennial; stems 30-90 m high, hirsute with yellow glandular hairs. Leaves oblong, base rounded, acute, denticulate, 5-10 x 2-4 cm, hirsute on both surfaces, rigid, subsessile. Heads 2-3 cm in diam., long peduncled. Involucral bracts lanceolate; the outer shorter, hirsute. Ray florets white, ligulate, ligules long. Achenes narrowly oblong, silky. Pappus white.

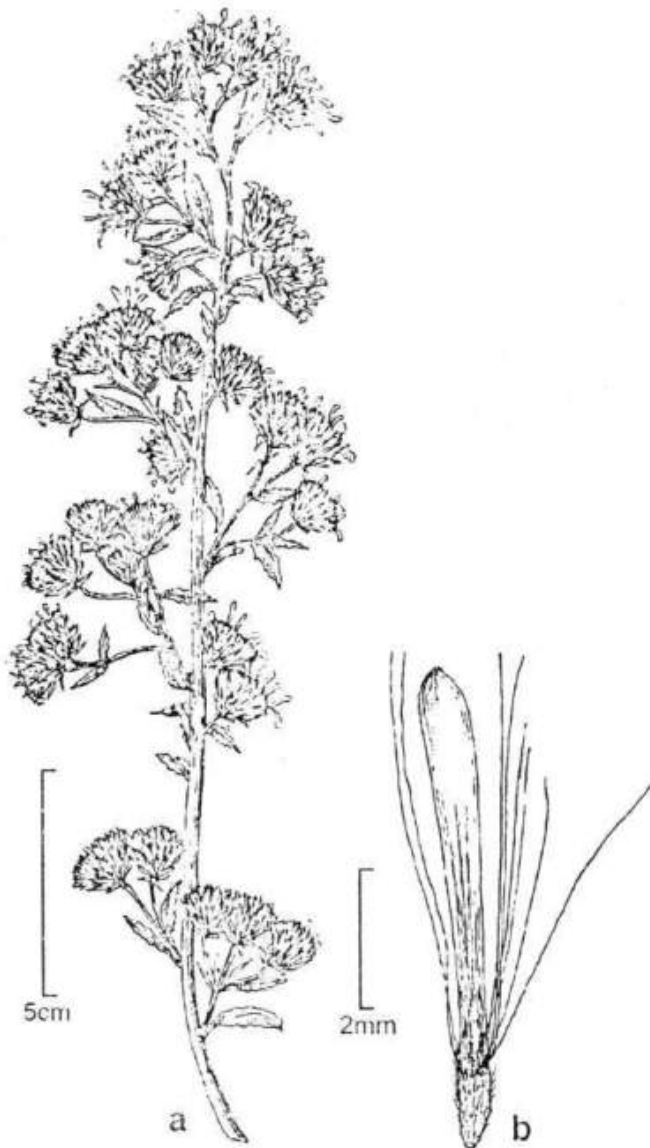


Fig. 8. *Inula rubricaulis* (DC.) C.B. Clarke : a. Habit; b. Achene with floret.

Distrib. India: Assam; very rare.

Bhutan.

3. *Pegolettia* Cass.

Herbs, much branched, glandular, aromatic. Leaves linear or oblanceolate, deltoid or subacute, narrowed at base, distantly dentate, glandular punctate, sessile; uppermost leaves bract like, subulate. Heads yellow or purple, corymbose, peduncled. Involucral bracts pauciseriate, fimbriate, gland dotted. Achenes 10-ribbed, gland dotted. Pappus hairs 2-seriate, multifid or plumose.

N. tropical and S. Africa, Madagascar; ca 12 species, 1 in India.

Pegolettia senegalensis Cass. in *Dict. Sci. Nat.* 38: 230. 1825; Bhandari, *Fl. Ind. Desert* 207. 1978.

Herbs, annual, glandular, aromatic, 6-25 cm high; stems subescent, striate, subglutinous with few sessile shining glands. Leaves linear or oblanceolate, deltoid or subacute, narrowed at base, margins entire or with few irregular distant teeth, 1-3 x 0.2-0.5 cm, surfaces pubescent, densely gland dotted, sessile. Heads solitary or laxly corymbose, 9-10 mm long. Involucral bracts pauciseriate, acute, margins more or less fimbriate, densely gland dotted; outer bracts smaller than the inner. Receptacle alveolate. Corolla tube gland dotted outwards. Anther bases sagittate with long tails, shortly barbellate. Achenes oblong, more or less closely 10-ribbed, pubescent, 4 mm long, gland dotted. Pappus biseriate; outer multifid, 1-2.5 mm; inner plumose, 5-6 mm long.

Fl. & Fr. Sept. - Oct.

Distrib. India: Abundant on rocks, and sandy soil. N.W. Rajasthan.

Pakistan, Arabia and Cape Verde Islands.

Note. The plant is used as a tonic for children along with "ghee"; boiled juice is applied for the wounds of camel (Bhandari, *Fl. Indian Desert* 207. 1978).

4. *Pentanema* Cass.

Herbs, annual or perennial. Leaves alternate, entire or dentate. Heads heterogamous, rayed, solitary, terminal or on leaf opposed peduncles. Involucre campanulate; involucre bracts multiseriate, narrow with scarious margins; outer smaller. Receptacle flat or subconvex, naked. Ray florets female, fertile, 1-2-seriate, 2 to 3-toothed. Disc florets bisexual, fertile, slender, 5-toothed. Achenes small, obscurely ribbed, tip rounded. Pappus hairs of ray florets few or absent; of disc florets few or many.

Tropical Asia and Africa; ca 6 species, 3 in India.

KEY TO THE SPECIES

- | | |
|--|-----------------------|
| 1a. Involucral bracts glabrous, erect, acute; ligules lanceolate; ray florets epappose | 2. <i>P. indicum</i> |
| b. Involucral bracts hairy, acuminate with recurved tips; ray florets pappose | 2 |
| 2a. Lower leaves subsessile; leaf apices acuminate; plants sparsely pubescent | 1. <i>P. cernuum</i> |
| b. All leaves sessile with auricled base; leaf apices obtuse to subacute; plants softly woolly | 3. <i>P. vestitum</i> |

1. *Pentanema cernuum* (Dalz. et Gibs.) Ling in Acta Phyt. Sin. 10: 180. 1965. *Vicoa cernua* Dalz. in Dalz. & Gibs., Bombay Fl. 126. 1861; Hook.f., Fl. Brit. India 3: 279. 1881.

Herbs, annual, erect; stem up to 50 cm high, branched, sparsely pubescent. Leaves elliptic-lanceolate, acuminate, serrate, 1.5-7 x 0.8-2.5 cm, lower subsessile; upper ones sessile. Heads yellow, heterogamous, 12-18 mm in diam., peduncled. Involucral bracts multiseriate, squarrose with filiform, recurved tips, more or less hairy. Ray florets yellow, 20-40, linear, spreading, 3-toothed at apex, longer than the involucre. Achenes oblong, ca 0.6 mm long, sparsely hairy. Pappus of few bristles.

Fl. & Fr. Nov. - Feb.

Distrib. India: Maharashtra and Madhya Pradesh.

China, Bhutan and Nepal.

2. *Pentanema indicum* (L.) Ling in Acta Phyt. Sin. 10: 179. 1965. *Inula indica* L., Sp. Pl. ed. 2. 1236. 1763. Hook.f., Fl. Brit. India 3: 297. 1881. *Vicoa indica* (L.) DC. in Wight Contrib. Bot. Ind. 10. 1834. **Fig. 9.**

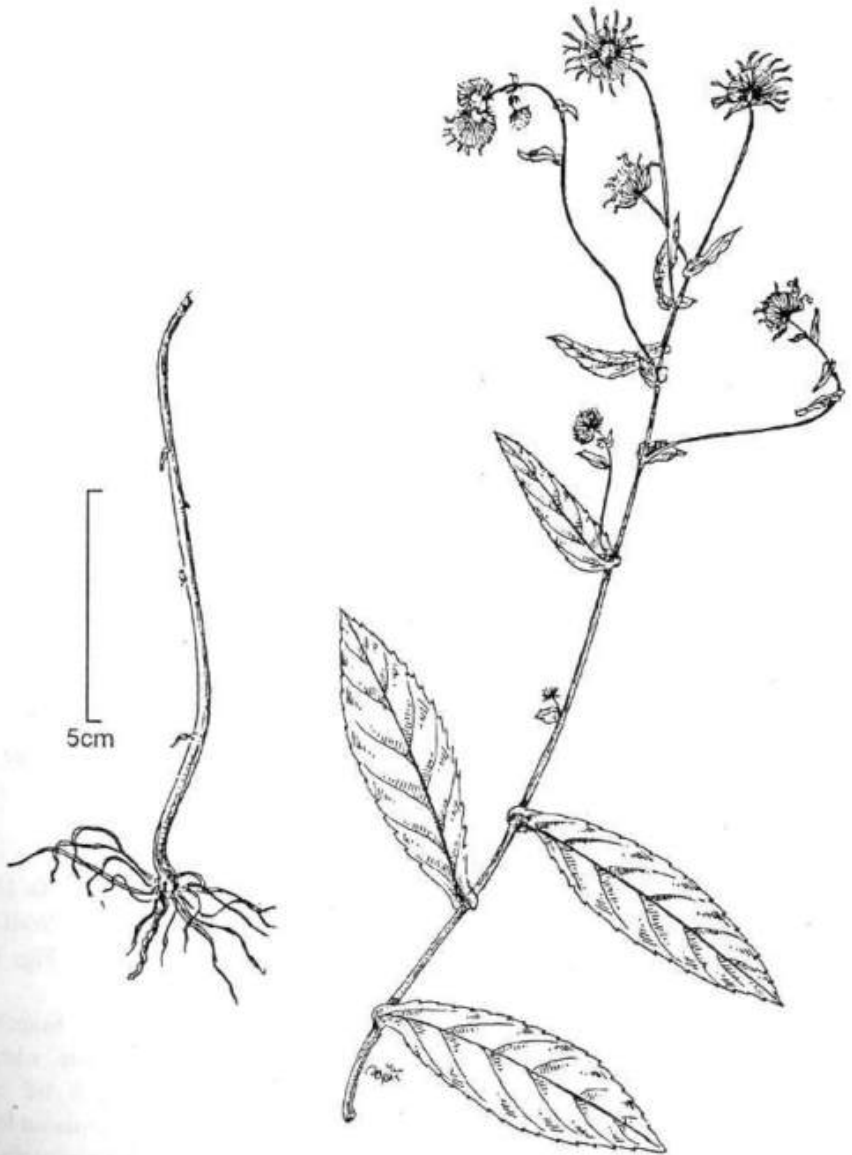


Fig. 9. *Pentanema indicum* (L.) Ling

Guj.: *Sona sali*; Kan.: *Mugutisoppu*; Tamil : *Jimikipoo*, *Poondu*.

Herbs, erect, viscid pubescent with a woody rootstock, simple or branched at the top, up to 75 cm high; stems terete, grooved, hispidly hairy, glabrous with age. Leaves oblong-lanceolate, with semi amplexicaul base, acuminate, entire or serrate-dentate with recurved margins, 2-10 x 0.1-1 cm, scabrid, dark green above pale beneath, sessile. Heads yellow, heterogamous, radiate, solitary, axillary or terminal 1-2 cm across, on 1-6 cm long peduncles. Receptacle convex, pitted. Involucre campanulate; involucre bracts 3 to 4-seriate, linear-lanceolate, 0.2-0.4 cm long, acute, glabrous, erect. Ray florets 1-seriate, female 0.8-1.0 cm long, shortly 3-toothed; corolla yellow. Disc florets yellow, bisexual, 0.5 cm long, 5-lobed. Achenes brown, obovate, 1 mm long, obtuse, narrowed at base, thinly hairy. Pappus white, hairs filiform, up to 0.3 cm long, few.

Fl. & Fr. Sept. - June.

Distrib. India: Throughout the drier parts, up to 1200 m. Madhya Pradesh, Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Maharashtra.

Pakistan, Myanmar, China, Sri Lanka, Thailand and Africa.

Notes. The plant is a good fodder and is said to be used in medicine in Madhya Pradesh, particularly for causing irreversible sterility in women.

3. *Pentanema vestitum* (Wallich ex DC.) Ling in Acta Phyt. Sin. 10: 180. 1965. *Inula vestita* Wallich ex DC. Prodr. 5: 470. 1836. *Vicoa vestita* (Wallich ex DC.) Benth. ex Hook.f., Fl. Brit. India 3: 297. 1881. **Fig. 10.**

Herbs, annual, erect, stout; stems 10-50 cm high, branched, branches glandular, softly pubescent villous. Leaves oblong to oblong-lanceolate, obtuse to subacute, at apex, serrate, with a semiamplexicaul base, 3-6 x 1-2 cm, appressed villous, sessile. Heads yellow, heterogamous, 1.5-2 cm across on long villous peduncle. Involucre bracts 4-seriate, linear-subulate, long acuminate with recurved tips, soft white hairy on both surfaces. Corolla of ray florets linear, 0.8-1.0 cm long, 2 to 3-toothed; corolla of disc florets 0.35-0.4 cm long. Achenes thinly hairy. Pappus white, hairs few.

Fl. & Fr. Mar. - June.

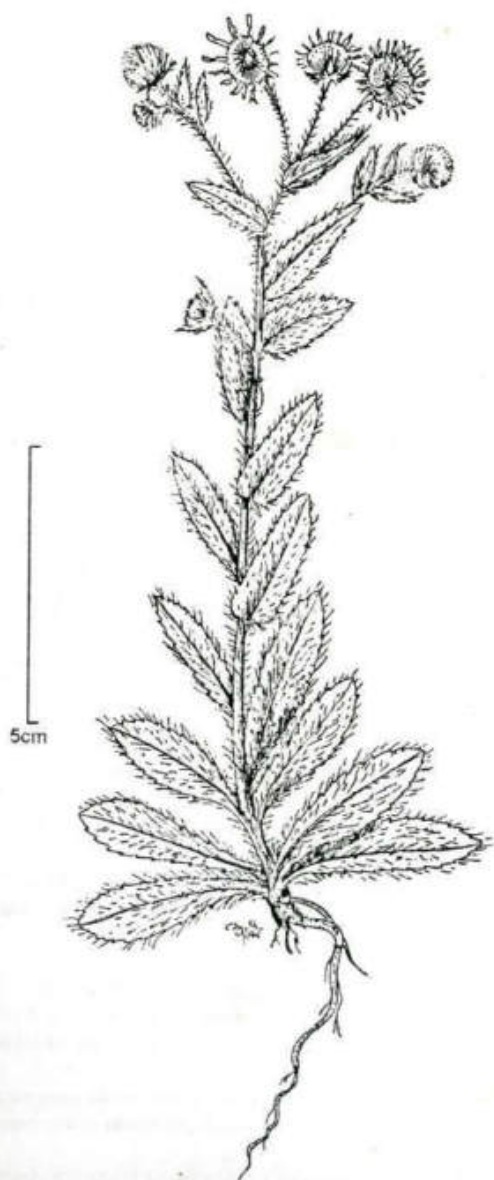


Fig. 10. *Pentanema vestitum* (Wallich ex DC.) Ling

Distrib. India: Jammu & Kashmir, Uttar Pradesh, Sikkim, Bihar and Maharashtra.

Pakistan and Afghanistan.

5. *Pulicaria* Gaertn.

Herbs, annual or perennial, usually woolly or villous. Branches 6-60 cm, ascending or spreading. Leaves alternate, often cordate, lanceolate, linear or oblong, amplexicaul, sessile, subsessile or petiolate. Heads rayed and heterogamous or disciform and homogamous, solitary. Involucre hemispheric or obconic; bracts few-seriate, narrow, linear, subequal, acute or subobtuse. Receptacle flat or subconvex, pitted. Ray florets female, 1-2-seriate; ligules narrow, minute or absent. Disc florets bisexual, slender, fertile, 5-fid. Anther bases sagittate with minute auricles. Achenes terete or ribbed, sparsely hairy or densely silky. Pappus double; the outer row of short jagged teeth or forming a setulose-laciniate cup; inner row of smooth or barbellate hairs.

Predominantly in the Mediterranean region, Europe, Asia and Africa; ca 25 species, 11 in India.

KEY TO THE SPECIES

- | | |
|---|---------------------------|
| 1a. Inner involucre bracts much longer than outer; leaves succulent | 5. <i>P. glaucescens</i> |
| b. Involucre bracts subequal; leaves not succulent | 2 |
| 2a. Leaves petiolate; achenes subfusiform with a constriction at apex | 7. <i>P. petiolaris</i> |
| b. Leaves sessile; achenes terete, oblong, elliptic, angular, without any constriction at apex | 3 |
| 3a. Ray florets tubular | 4. <i>P. foliolosa</i> |
| b. Ray florets ligulate | 4 |
| 4a. Pappus hairs thickened at apex, outer scales connate, deciduous | 5 |
| b. Pappus hairs not thickened at apex, outer row of free scales or forming a cup | 7 |
| 5a. Achenes densely silky; pappus not more than twice the size of achenes; annuals | 6. <i>P. gnaphalodes</i> |
| b. Achenes glabrous; pappus more than twice the size of achenes; perennials | 6 |
| 6a. Leaves crisped with recurved margins; involucre bracts acute; pappus 3 times longer than achenes | 2. <i>P. crispa</i> |
| b. Leaves serrate dentate with flat margins; involucre bracts acuminate; pappus 6 times longer than achenes | 9. <i>P. rajputanae</i> |
| 7a. Outer row of pappus forming a laciniate cup; achenes sparsely hairy | 8 |
| b. Outer row of pappus of free lanceolate scales; achenes silky | 9 |
| 8a. Heads 1.2-2 cm across; peduncles thickened below heads; plants 30-60 cm; pappus red | 11. <i>P. wightiana</i> |
| b. Heads up to 1 cm across; peduncles not thickened below heads; plants less than 30 cm; pappus white | 1. <i>P. angustifolia</i> |

- 9a. Ligules not exceeding the size of involucre bracts; achenes ellipsoid, 4-5 angled; annuals
8. *P. prostrata*
- b. Ligules exceeding the size of involucre bracts; achenes cylindrical or oblong, ribbed; perennials 10
- 10a. Leaves oblong-lanceolate, semi amplexicaul at base, wavy or toothed; pappus hairs very long 3. *P. dysenterica*
- b. Leaves obovate to subrotund, attenuate at base, margins entire; pappus hairs very small 10. *P. salvaefolia*

1. *Pulicaria angustifolia* DC., Prodr. 5: 479. 1836; Hook.f., Fl. Brit. India 3: 299. 1881.

Raj.: *Soneli*.

Herbs, annual, glaucous, with woody rootstock; stems 6-30 cm high, branched from the base, ascending, pubescent, divergent. Leaves linear-oblong or obovate, base narrowed, entire or serrulate, pubescent, 1-5 x 0.3-1.5 cm, hairy on both surfaces, sessile. Heads yellow, up to 1 cm in diam., on slender pubescent peduncle. Outer involucre bracts linear-oblong, 2 mm long, subobtusate, pubescent, glandular; inner involucre bracts scarious, 3 mm long, acute, with few hairs at apex. Ray florets ligulate, up to 7 mm long. Achenes terete or scarcely quadrangular, 1.5 mm long, with a few minute, scattered hairs. Outer row of pappus forming a setulose-laciniate cup; inner row of white barbellate hairs, up to 3 mm long.

Fl. & Fr. Throughout the year.

Distrib. India: On sandy soil, dry river beds, open grounds and grazed pastures. Uttar Pradesh, Orissa, Madhya Pradesh, Rajasthan, Gujarat and Karnataka; very rare.

Pakistan.

2. *Pulicaria crispa* (Forsskal) Benth. in Benth. & Hook.f., Gen. Pl. 2: 336. 1873; Hook.f., Fl. Brit. India 3: 299. 1881. *Aster crispus* Forsskal in Fl. Aegypt.-Arab. 150. 1775. Fig. 11.

Hindi : *Burhna*; Punj.: *Bui, Gidi, Phatmer, Sutei*; Raj.: *Dhola Lizru*; Delhi: *Haldwa*.

Herbs, perennial, erect, much branched; stems 30-70 cm high, leafy throughout, whitish tomentose. Upper leaves small, linear or lanceolate, auriculate, margins recurved, toothed, crisped, obtuse at apex, 1-3.5 (10) x 0.2-



Fig. 11. *Pulicaria crispa* (Forsskal) Benth. : a. Habit; b. Achene with floret.

0.8 cm, sessile. Heads yellow, hemispherical, solitary at the end of branches, radiate, 5-10 mm in diam., pedunculate. Involucral bracts multiseriate, linear, acute, thinly woolly, glandular; outer shorter, recurved at tip. Receptacle punctate, 3-4 mm in diam. Achenes glabrous. Pappus thrice as long as achenes.

Fl. & Fr. Throughout the year.

Distrib. India: Punjab, Haryana, Delhi, Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan and Gujarat.

Pakistan, Arabia, Africa and Canary Islands.

Notes. The whole plant is dried, powdered and is applied as vulnerary to bruises and sores of bullocks. A decoction of the plant is taken for fabrile condition. In Sahara, the plant is said to be a substitute for tea.

3. *Pulicaria dysenterica* (L.) Gaertn., Fruct. 2: 462. 1781; Hook.f., Fl. Brit. India 3: 298. 1881. *Inula dysenterica* L., Sp. Pl. 882. 1753.

Herbs, perennial, woolly; stems 30-75 cm high, usually branched above, striate, leafy throughout in upper part. Leaves alternate, oblong-lanceolate to cordate, semiamplexicaul at base, wavy or dentate at margins, 2.5-6 x 0.5-1.5 cm, pubescent on both surfaces, glandular beneath, sessile. Heads yellow, heterogamous 3 to many, 0.8-1.5 cm across, densely woolly. Involucral bracts purplish, 4-5-seriate, linear, acuminate, 3.5 mm long, pubescent and glandular, setaceous. Ligules 4.5-7 mm, exceeding the size of involucral bracts. Corolla of disc florets 3-3.5 mm long. Achenes oblong, 1-1.2 mm long, silky, 10-ribbed, with scarious border. Pappus copious, 4-5 mm long; outer scales lanceolate, free.

Distrib. India: W. Himalayas, Jammu & Kashmir.

Pakistan, Algeria, Asia, Africa, C.I.S. and Europe.

4. *Pulicaria foliolosa* DC., Prodr. 5: 480. 1834; Hook.f., Fl. Brit. India 3: 298. 1881.

Fig. 12.

Herbs, annual, erect, much branched, pubescent; stems up to 60 cm. Leaves linear-oblong or oblanceolate, with broad or semiamplexicaul base, apiculate



Fig. 12. *Pulicaria foliolosa* DC.

with recurved tip, entire, 2-8.5 x 0.6-2.0 cm, viscidly hairy, sessile. Heads small, woolly and glandular; peduncles slender, hairy. Involucral bracts narrow, setaceous, subequal, hairy, very acute. Ray florets filiform, tubular, 3-toothed. Outer row of pappus forming a minute toothed cup; the inner of few, white hairs, about double the size of achenes. Achenes minute, oblong, terete, sparsely appressed hairy.

Fl. & Fr. Feb. - Aug.

Distrib. India: Uttar Pradesh, Bihar, West Bengal, Sikkim, Orissa, Madhya Pradesh and Maharashtra.

Pakistan and Afghanistan.

5. *Pulicaria glaucescens* Jaub. & Spach., *Illus. Pl. Or.* 4: 79. t. 349. 1852; *Hook.f., Fl. Brit. India* 3: 300. 1881.

Herbs, perennial; stems pale yellow, woody, branched, up to 30 cm high, sparsely hairy or glabrous. Leaves linear to linear-spathulate, entire, 2-6.5 cm long, straight or slightly curved, fleshy, glabrous or nearly so, sessile. Heads 0.8 cm in diam., glabrous or pubescent, pedunculate with short peduncle. Involucral bracts glabrous, lanceolate, acute, rigid; the outer shorter. Ligules absent. Achenes short, oblong, silky. Pappus white or straw coloured, shining; outer row of pappus almost continuous with achenes, the inner row longer than florets.

Distrib. India: Uttar Pradesh and Punjab.

Pakistan and Iran.

6. *Pulicaria gnaphalodes* (Vent.) Boiss., *Diagn. ser.* 16: 76. 1854; *Hook.f., Fl. Brit. India* 3: 299. 1881. *Inula gnaphalodes* Vent., *Pl. Rar. Celo.* t. 75. 1800.

Herbs, annual; stems slender, erect, leafy throughout, softly woolly below, paniculately or corymbosely branched above. Leaves obovate-spathulate, semiamplexicaul, auriculate, obtuse, rugose, crispate pubescent beneath. Heads yellow, very small, terminal, pedunculate. Involucral bracts puberulous, few, oblong-lanceolate, sub-herbaceous, unequal. Disc florets short, ligulate; ligules

few, not exceeding the disc florets. Achenes cylindrical, silky. Pappus white or reddish, short, coroniform, barbellate, twice as long as achenes.

Distrib. India: W. Himalayas. Jammu & Kashmir; rare.

Afghanistan and Turkey.

7. *Pulicaria petiolaris* Jaub. & Spach., *Illus. Pl. Or* 4: 69. t. 344. 1852; Malhotra & Basu in *J. Bombay Nat. Hist. Soc.* 80: 451. 1983.

Herbs, perennial, erect, branched, stems 12-30 cm high, branches glandular appressed hairy, leafy above, leafless below. Leaves, ovate-lanceolate, cuneate or truncate, acute, dentate, 1.5 x 0.5-2 cm, petiolate. Petiole; petiole narrowly winged. Heads sub hemispherical, loosely corymbose, up to 1 cm in diam., pedunculate; peduncles up to 4 cm long. Involucral bracts multiseriate; outer smaller, linear, pubescent, thinly glandular, acute or subulate. Florets up to 7 mm long. Corolla tubular with 5 mm long tube. Achenes subfusiform, 2 mm long, thinly pubescent, contracted at apex below the pappus. Pappus 4 mm long, barbellate.

Fl. & Fr. May - Oct.

Distrib. India: Himalayas, up to 1500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Arabia and Africa.

8. *Pulicaria prostrata* (Gilib.) Asch., *Fl. Brandeno.* 1: 304. 1864. *Inula prostrata* Gilib., *Fl. Lituan.* 1: 205. 1782. *Pulicaria vulgaris* Gaertn.

Herbs, annual, erect, pubescent; stems 15-45 cm high, softly pubescent, copiously, dichotomously branched above. Lower leaves obovate, half-amplexicaul, petiolate; upper oblong-lanceolate, 1-3 x 0.5-1 cm, sessile. Heads 0.8-1.2 cm in diam., on short, stout peduncles, divaricate. Involucre 0.75-1 cm broad. Involucral bracts 4-5-seriate, subulate, woolly with subrecurved tips; outer linear, oblanceolate, 2.5-3 mm long, acute; inner linear, 3.5 mm long, acuminate. Ray florets 1-seriate, ligulate; ligules 1 x 0.3 mm. Disc florets numerous; corolla 2 mm long; lobes strongly glandular. Achenes ellipsoid, 4-5-angled, 1.2-1.5 mm long, silky. Pappus dirty white, 2.5 mm long; the outer scales lanceolate, serrate, free.

Fl. & Fr. June - Oct.

Distrib. India: W. Himalayas. Jammu & Kashmir.

Pakistan, Afghanistan, Iran, C. & N. Asia, Algeria, Bulgaria, Caucasus U.K. and Africa.

9. *Pulicaria rajputanae* Blatt. & Hallb. in J. Bombay. Nat. Hist. Soc. 26: 535. 1919.

Raj.: *Dhola Ligr.*

Herbs, perennial, with more or less a woody rootstock; stems white, up to 60 cm high, terete, densely woolly. Leaves linear oblong or spatulate, auriculate or semiamplexicaul at base, obtuse or rarely subacute, serrate or irregularly dentate, 2-6 x 1.2 cm, sessile. Heads heterogamous, solitary at apex or arranged in corymbs, up to 8 mm in diam. Involucres hemispherical, pubescent; bracts multiseriate, slender, acuminate; outer shorter than the inner, the margins scarios. Receptacle more or less convex, foveolate. Corolla of female florets yellow, ligulate. Achenes 0.6 mm long, glabrous. Pappus biseriate; outer row forming a laciniate cup, the inner row of barbellate hairs, up to 4.5 mm long, thickened at apex.

Fl. & Fr. Oct. - Jan.

Distrib. India: Rajasthan, frequent on dry hard soil.

Endemic.

Notes. *Pulicaria rajputanae* Blatt. & Hallb. has been treated under the genus *Francoeuria* as *F. rajputanae* by Parmar & Pandey (J. Econ. Tax. Bot. 4: 1030. 1983). Critical study of the type material of both the genera can only decide the correct status of this taxon.

10. *Pulicaria salviaefolia* Bunge in Mem. Sav. Etrang. Petersb. 7: 331. 1851; Stewart in Nasir et Ali, Ann. Cat. Vasc. Pl. W. Pak. 771. 1972.

Herbs, perennial; stems much branched, grooved, adpressed tomentose. Leaves obovate, attenuate, exauriculate, entire, subrotund. Heads terminal on glandular-lanate peduncle. Involucre silvery white hairy; bracts many, subequal, lanceolate, acuminate. Ray florets ligulate; ligules longer than the disc

florets. Achenes cylindrical, ribbed. Pappus copious, short, barbellate, coroniform.

Distrib. India: W. Himalayas. Jammu & Kashmir; very rare.

Pakistan and C. Asia.

11. *Pulicaria wightiana* (DC.) C.B. Clarke, Comp. Ind. 128. 1876; Hook. f., Fl. Brit. India 3: 299. 1881. *Poloa wightiana* DC. in Guill. Arca. Bot. 2: 515. 1833.

Raj.: *Sonela*.

Herbs, annual, erect, stout, much branched, leafy; stems 30-60 cm high, branches ascending nearly from the middle of stem, angular, pubescent, leafy. Leaves oblong, base half-clasping the stem, obtuse, entire or serrate, 2-7 x 0.6-1.5 cm, more or less puberulous on both surfaces; blades almost erect, sessile. Heads solitary, 1.2 cm in diam., on pubescent, leafy, stout, peduncle; peduncles thickened upwards. Involucral bracts multiseriate; outer subherbaceous, linear, oblong, subacute, pubescent; inner scarious, linear-lanceolate, acute, usually slightly longer than the outer ones. Ray florets yellow, ligulate; ligules 2 x 0.2 cm, 3-toothed at apex. Achenes brown, oblong, 1.5 cm long, terete or scarcely quadrangular, shining, sparsely hairy. Pappus in two rows; outer row forming a lacinate, setulose cup; inner of barbellate brownish hairs.

Fl. & Fr. Aug. - Dec.

Distrib. India: Peninsular India, in plains up to 400 m. Madhya Pradesh, Maharashtra, Goa, Karnataka, Andhra Pradesh and Tamil Nadu.

Subtribe 4. FILAGINEAE C.B. Clarke

(P.C. Pant)

Viscid pubescent, woolly or glabrous herbs or undershrubs. Leaves alternate, entire or pinnatifid, petioled or sessile. Heads often in dense clusters. Involucral bracts scarious or hyaline.

5 genera and 7 species in India.

KEY TO THE GENERA

- | | |
|--|---------------------------|
| 1a. Leaves pinnatifid | 1. <i>Athroisma</i> |
| b. Leaves entire | 2 |
| 2a. Glabrous shrubs-undershrubs; achenes ribbed | 2. <i>Blepharispermum</i> |
| b. Woolly-tomentose herbs; achenes not ribbed | 3 |
| 3a. Involucral bracts ferruginous | 4. <i>Ifloga</i> |
| b. Involucral bracts glistening white or tinged with green | 4 |
| 4a. Involucral bracts usually acuminate, more or less erect in fruit; receptacle not or scarcely dilated at apex | 3. <i>Filago</i> |
| b. Involucral bracts obtuse to subacute, stellate in fruit; receptacle strongly dilated at apex | 5. <i>Logfia</i> |

1. *Athroisma* DC.

Herbs, annual, viscid pubescent, with long tap root; stems striate. Leaves alternate, pinnatifid; segments oblong, irregularly toothed; petiolate. Heads heterogamous, disciform small, congested into terminal and leaf opposed peduncled clusters. Involucral bracts 1-2. Receptacle cylindrical, paleaceous, pales with 1-flower in axil. Ray florets female, fertile, filiform, few, 2-3 toothed. Disc florets bisexual, fertile, tubular; limb campanulate, 3-4 toothed. Anthers with caudate-sagittate arms. Style arms of bisexual florets obtuse. Achenes black, dorsally compressed and fimbriate-ciliate along the margins; ventral side flat. Pappus of short scales, fimbriate at apex.

Tropical Africa, Asia, Indonesia and Malaya; ca 8 species, 1 in India.

Athroisma laciniatum DC., Prodr. 5: 369. 1836; Hook.f., Fl. Brit. India 3: 276. 1881.

Annual, up to 30 cm high, rarely glabrous. Leaves ca alternate, pinnatifid, 1-12 cm, segments oblong, toothed, lobulate, 0.2-1.5 x 0.1-0.8 cm, surfaces viscid; petioles 0.3-2 cm. Heads in globose or ovoid terminal clusters, ca 1.5 mm across, sessile. Involucral bracts 1-2, elliptic or obovate, keeled. Ray florets with filiform corolla, ca 2.5 mm long, 3-4-lobed. Disc florets ca 2 mm long, 4-fid. Achenes black, more or less orbicular, ca 2 mm long, dorsally compressed, margins and top white hairy, minutely 3-angled. Pappus of 2 minute scales.

Fl. & Fr. April - May.

Distrib. India: Gangetic Plain, N.E. hill states, in marshy places along foot hills. Uttar Pradesh, Bihar, W. Bengal, and Meghalaya.

Indonesia and Malaya.

2. *Blepharispermum* DC.

Herbs or shrubs, glabrous. Leaves alternate, entire or toothed. Heads heterogamous, discoid, solitary or in crowded globose clusters, small, compressed, bracteate at the base. Involucre of 1-2 bracts, shorter than the paleae of the receptacle. Receptacle minute or cylindrical, with broad, rigid palea enclosing the florets. Outer florets female, fertile, few, slender; corolla of female florets 3-4 lobed. Disc florets 2-8, bisexual, fertile or sterile, tubular; those of bisexual florets enlarged above; limb campanulate, 5-lobed. Anther base sagittate; auricles subcaudate. Style arms of female florets linear; those of bisexual florets stout, obtuse. Achenes of fertile florets black, compressed, margins ciliate; outer ones with a ciliate rib. Pappus absent in sterile florets and of unequal paleae or bristles in fertile florets.

Tropical Africa and Asia; 15 species, 2 in India.

KEY TO THE SPECIES

- | | |
|--|-------------------------|
| 1a. Leaves ovate, membranous, long petioled; heads in corymbs | 1. <i>B. petiolare</i> |
| b. Leaves obovate, elliptic, coriaceous, shortly petioled or sessile; heads solitary | 2. <i>B. subsessile</i> |

1. *Blepharispermum petiolare* DC. in Wight, Contrib. Bot. 12. 1834; Hook.f., Fl. Brit. India: 3: 276. 1881.

Shrubs, erect or scrambling; stems divaricately branched, furrowed, brown with scattered lenticels. Leaves ovate, unequal at base, acute or obtuse, margins slightly revolute, 5.5-11 x 2-6 cm, membranous; petiole 0.8-1 cm long. Heads compound, 0.8-1.8 cm across, 2-5 on long peduncled corymbs; peduncle ca 7 cm long, quadrangular, laterally compressed, subtended by an ovate, acute bract. Involucral bracts 1-2-seriate; outer flat or very slightly concave, keeled on the back, each bearing a single female floret; inner bracts 3-toothed, strongly plicate, enfolding a hermaphrodite floret. Outer florets with filiform corolla, ca 1.8 mm long, 4-toothed. Corolla of disc florets ca 3 mm long, 5-toothed. Achenes of female florets dark brown, oblanceolate, fertile, ca 3 mm long, slightly curved, sharply 4-5-angled, strongly ciliate on the angles, truncate at apex bearing two stiff hairs; those of disc florets linear, ca 1.5 mm long, glabrous, sterile, epappose.

Fl. Oct. - Dec. & *Fr.* Dec. - April.

Distrib. India: W. Ghats, Tamil Nadu and Kerala.

Sri Lanka.

2. *Blepharispermum subsessile* DC. in Wight, *Contrib. Bot.* 12. 1834; Hook.f., *Fl. Brit. India* 3: 276. 1881.

Herbs or undershrubs, erect glabrous; rootstock woody; stems furrowed. Leaves obovate, elliptic, entire, very rarely toothed, obtuse or subacute at apex, base narrowed to very obscure petiole, 2-8 x 0.7-3.1 cm, coriaceous, glabrous, reticulately nerved, subsessile. Heads in terminal, globose clusters, compound, ca 2.5 cm across subtended by a leafy bract; bracts ovate, acute, ca 2.4 x 1.5 mm; peduncle 0.5-1.5 cm long. Involucral bracts 1-2-seriate; outer flat or slightly concave, keeled on back, each with a single female floret; inner bracts 3-fid, strongly plicate, enclosing white, hermaphrodite florets. Outer florets 2 in each head. Disc florets 3-8 in each head. Achenes black, ca 3 mm long, distinctly 3-angled, strongly ciliate on the angles; those of disc florets smaller, upto 2 mm. Pappus of few short hairs, smaller, ca 2 mm.

Fl. July - Sept. & *Fr.* Aug. - Jan.

Distrib. India: Deccan Plateau, hill slopes on Ghats and in Sal forests, 600-1170 m. Madhya Pradesh, Andhra Pradesh, Maharashtra, Tamil Nadu and Karnataka.

Notes. Reported as a cattle tonic. Crushed root is reported to be efficacious for children after purging.

3. *Filago* L.

Annuals, small, woolly tomentose; stems erect or procumbent, branched. Leaves alternate, entire, obovate-spathulate, oblong-obovate. Heads heterogamous, disciform, in axillary and terminal clusters, pyramidal, ovoid to cylindrical, very shortly peduncled. Involucral bracts few, small, scarious. Receptacle filiform, constricted at base; paleae 3-5 seriate, imbricate, scarious, concave, subtending the outer florets. Outer florets female, many-seriate, filiform, fertile, 2-4 toothed. Disc florets bisexual, few, fertile; limb scarcely dilated and 4-5 toothed. Anther base sagittate; auricles of short slender tails. Style arms of bisexual florets oblong or linear, obtuse. Achenes cylindrical to obovoid, slightly laterally compressed. Pappus hairs white, slender, scabrid, scanty or absent in ray achenes.

Turkestan, Pakistan, Spain, S.W. and E. N. America, N.W. Africa, S.W. Asia, Caucasia Transcaspie and most of Europe; ca 20 species, 2 in India.

Literature. CHERTEK, J. & J. HOLUB, (1963). Bemerkungen Zur Taxonomie und Nomenklatur der Gattungen *Evax* und *Filago*. *Preslia* 35: 1-17. MYRZAKULOV, P. (1968). Notulae de Subtribu Filagineae O. Hoffm. Familiae Compositarum. *Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Kazakh. SSR.* 5: 34-41. WAGENITZ, G. (1965). Zur Systematik und Nomenklatur einiger Arten Von *Filago* L. Emend. Gaertn. Subgen. *Filago* ('*Filago germanica*' - Gruppe). *Willdenowia* 4: 37-59. WAGENITZ, G. (1968). Weitere Beiträge Zur Kenntnis der Gattung *Filago* (Compositae-Inuleae). *Willdenowia* 5: 55-66. WAGENITZ, G. (1969). Abgrenzung und Gliederung der Gattung *Filago* L. sensu lato. (Compositae - Inuleae). *Willdenowia* 5: 395-444. WAGENITZ, G. (1970). Die Gattung *Filago* L. sensu lato (Compositae - Inuleae) in in der Agais. *Willdenowia* 6: 115-138. WAGENITZ, G. (1970). A key to the species of *Filago* L. Sensu lato (Compositae) in Palestine with notes on the distribution *Israel J. Bot.* 19: 260-265. WAGENITZ, G. (1970). Über Verbreitung einige *Filago* - Arten *Feddes Rep.* 81: 107-117.

KEY TO THE SPECIES

- 1a. Leaves oblong-spathulate; cluster of heads supported on leafy bracts; achenes pale brown
1. *F. hurdwarica*
- b. Leaves linear-lanceolate; cluster of heads without leafy bracts; achenes pearl grey
2. *F. paradoxa*

1. *Filago hurdwarica* (Wallich ex DC.) Wagenitz in *Willdenowia* 4: 291. t. 3. 1968. *Gnaphalium hurdwaricum* Wallich ex DC., *Prodr.* 6: 231. 1838. *Filago germanica* sensu Hook.f., *Fl. Brit. India* 3: 277. 1881, *non* L. 1753.

Fig. 13.

Herbs, erect or procumbent, woolly, branched, up to 2 cm high. Leaves spathulate, apiculate at apex, attenuate at base, entire, 2-1.3 x 0.05-0.5 cm, upper surface dull green, hairy, lower surface densely white woolly. Heads pale yellow, in dense globose clusters at the bifurcation and apices of branches; subsessile, 1-2 mm across; clusters surrounded by leafy bracts; subsessile. Involucral bracts 3-4-seriate; outermost brownish green at apex, ovate, lanate at base, scarious. Ray florets with filiform corolla, ca 3 mm long, obscurely 2-3-toothed. Disc florets bisexual, ca 3 mm long, 4-5 toothed. Achenes, ca 1 mm long; those of disc florets more or less spindle shaped. Pappus hairs white, scabridulus.

Fl. & Fr. Feb. - Aug.

Distrib. India: W. Himalayas, Gangetic Plains, among rocky boulders on dry slopes, moist sandy soil and along river banks, 500-3300 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Punjab.

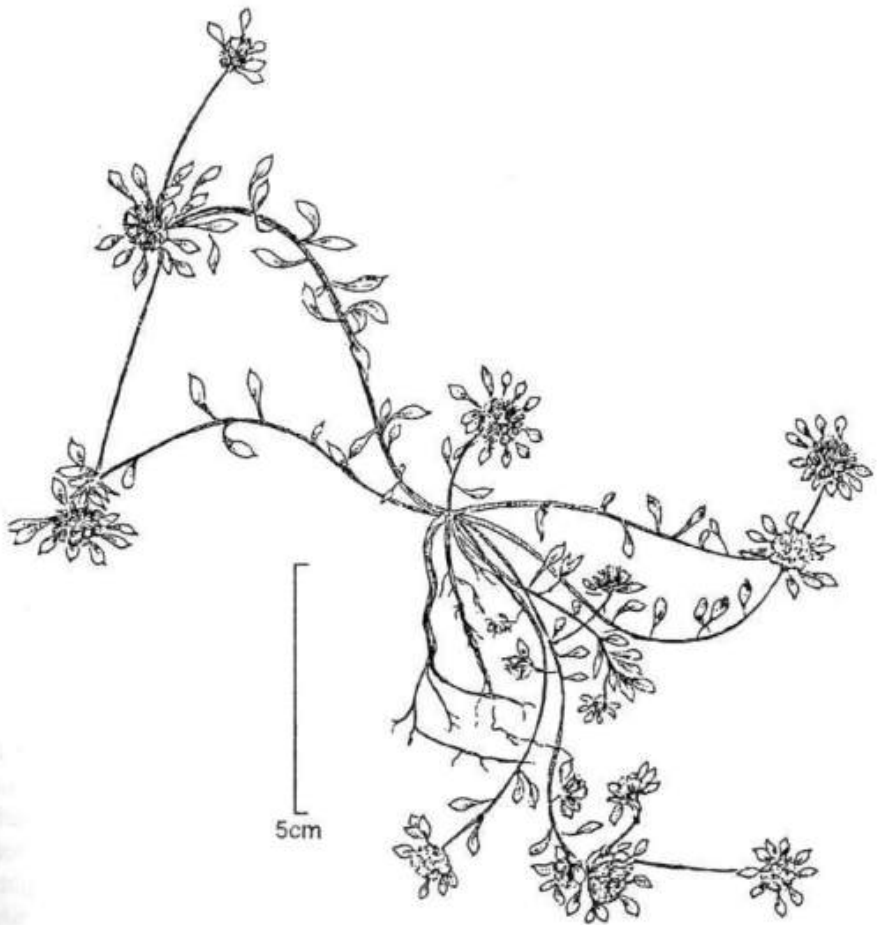


Fig. 13. *Filago hurdwarica* (Wallich ex DC.) Wagenitz

2. *Filago paradoxa* Wagenitz in Willdenowia 5: 429. 1969.

Herbs, erect, grey-tomentose, up to 20 cm high, dichotomously branched above. Leaves 1.5-2 mm broad, apex minutely mucronate. Heads 6-10. Involucral bracts ca 15, linear-lanceolate; outer and middle bracts more or less folded into plates. Ray florets female, many. Disc florets bisexual, 2-3. Achenes pearl grey-brown, ca 1 mm long, papillose. Pappus white.

Distrib. India: W. Himalayas, 2500 m. Jammu & Kashmir (Gulmarg).

Afghanistan, E. Persia, C. Asia and Iran.

Notes. Included on the basis of Wagenitz (l.c.) and Rechinger (Fl. Iran. 145: 26. 1980).

EXCLUDED SPECIES

Filago pyramidata L., Sp. Pl. 1199. 1753. *F. germanica* var. *pyramidata* (Gaud.) DC., Prodr. 6. 247. 1838.

During present studies of *Filago* Species complex in our herbaria, the occurrence of *Filago pyramidata* L. in Indian region could not be established satisfactorily.

4. *Ifloga* Cass.

Annuals, small, woolly; stems usually branched from base. Leaves alternate, entire, filiform, often clustered, sessile. Heads heterogamous, disciform, solitary or in clusters in leaf axils throughout the stem, forming leafy spikes, sessile. Involucral bracts few, minute, scarious. Receptacle short, more or less narrowly cylindrical with flat naked top; palea pluri-seriate, equalling the bracts, concave, each subtending a female floret. Outer florets female, fertile, 1-many-seriate, filiform, obscurely toothed, epappose. Disc florets bisexual, sessile; limb 5-toothed. Anther base sagittate; tails very slender. Achenes glabrous. Pappus hairs of bisexual florets white, plumose.

Europe, Egypt, S.W. Asia, Mediterranean, N. and S. Africa; ca 10 species, 1 in India.

Literature. HOLUB, J. (1975). *Ifloga* Cassini in DAVIS, P.H. ed. *Flora of Turkey* 5: 100-101.

Ifloga spicata (Forsskal) Sch.-Bip. in Webb. & Berth., Phyt. Canar. 2: 310. 1845. *Chrysocoma spicata* Forsskal, Fl. Aeg.-Arab. 73. 1775. *Ifloga fontanesii* Cass. in Dict. Sci. Nat. 23: 14. 1822; Hook.f., Fl. Brit. India 3: 277. 1881. Fig. 14.

Herbs, erect-decumbent, branched, woolly, up to 16 cm high. Leaves solitary or clustered, closely scattered throughout the branches, linear, filiform to subulate, entire, 1-2.5 x 0.05-0.1 cm, green on upper surface, silvery-grey woolly beneath, exceeding the heads. Heads subglobose to cylindrical, solitary, scattered in axils of leaves, forming leafy spikes, ca 1 mm across; peduncles 0.5-1 mm, tomentose. Involucral bracts 3-4-seriate, membranous; outer ferruginous, ovate, aristate; inner greenish, narrowly oblong, acute. Outer florets yellowish, female, often enclosed within the bracts; corolla extremely filiform, ca 2 mm long, obscurely toothed. Achenes spindle-shaped, ca 0.8 mm long. Disc florets orange yellow bisexual, with ca 1.5 mm long corolla, 5-toothed. Achenes olive coloured, elliptic, ca 0.5 mm long. Pappus hairs white, feathery.

Fl. & Fr. Dec. - April.

Distrib. India: Indo-gangetic plains, commonly on sandy soil and on sand dunes, up to 400 m. Jammu & Kashmir, Punjab, Haryana, Uttar Pradesh and Rajasthan.

Pakistan, Egypt, Turkey, Spain, N. Africa, S.W. Asia and Europe.

Note. Sharma & Kachroo ("Flora of Jammu 189. 1981") have mentioned about the occurrence of this species from Bhagwati Nagar, Blini Bridge and Simbal Tibba in Jammu, which could not be examined during the present study.

5. *Logfia* Cass.

Annuals, erect, more or less branched, woolly tomentose. Leaves alternate, linear-lanceolate, entire. Heads heterogamous, disciform, clustered in raceme or panicle like inflorescence, ovoid to cylindrical, very shortly peduncled. Involucral bracts ovate, scarious. Receptacle obconical; paleae 2-3 seriate,

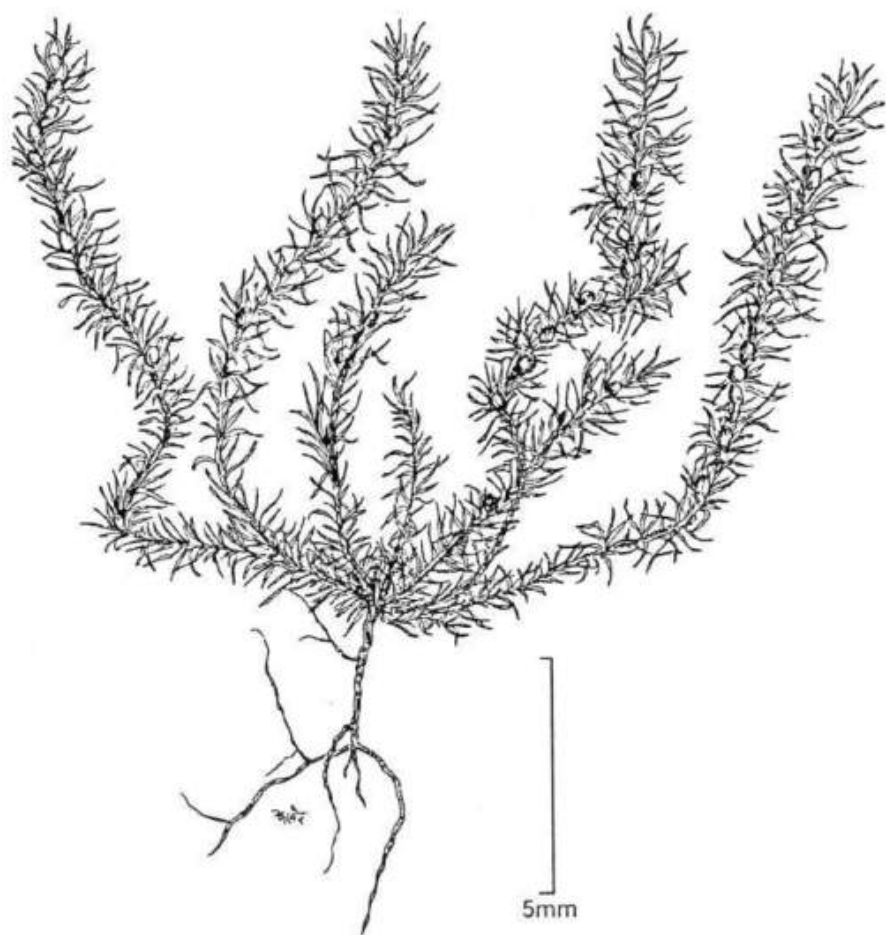


Fig. 14. *Ifloga spicata* (Forsskal) Sch.-Bip.

imbricate, outer ones spoon shaped, each subtending and enfolding a female floret. Outer florets female, fertile, filiform, finely 2-4-toothed, epappose. Disc florets, partly female, rest bisexual, fertile with tubular, 4-5 toothed corolla. Achenes oblong to obovoid, dimorphic; those of outer female florets slightly curved and smooth and those of bisexual florets straight and papillose. Pappus hairs whitish, scabrous.

Europe, Siberia, N.W. Africa, S.W. and C. Asia and Himalayas; 1 species in India.

Logfia arvensis (L.) Holub in Notes Roy. Bot. Gard. Edin. 33: 432. 1975.
Filago arvensis L., Sp. Pl. 1312. 1753; Hook.f., Fl. Brit. India 3: 277. 1881.
Gnaphalium lagopus Willd. Sp. Pl. 3. 1987. 1803. *Filago alpestris* C. Presl, Del. Prag. 100. 1822. *Oglifa arvensis* (L.) Cass. in Dict. Sci. Nat. 35: 448. 1825. Fig. 15.

Herbs, erect, diffusely branched, woolly, up to 15 cm high. Leaves linear-lanceolate, acute, entire, 0.2-1.5 x 0.1-0.3 cm, obscurely 1-nerved, upper surface greenish grey, hairy, lower surface white lanate. Heads in racemose panicle-like clusters 1-2.5 mm across, with few subtending, foliaceous bracts; peduncle ca 0.2 mm long, buff tomentose. Involucral bracts 3-4-seriate, obtuse-subacute, woolly; outermost bracts woolly outside, hyaline. Outer florets female, with filiform corolla, ca 3 mm long, obscurely toothed. Disc florets bisexual, ca 3 mm long, 5-toothed. Achenes oblong, ca 1 mm long, hairy. Pappus hairs white, silky, minutely bristly.

Fl. & Fr. July - Sept.

Distrib. India: W. Himalayas, gregarious on dry boulder strewn river banks and also on moist irrigated slopes, at about 1600-3400 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, Afghanistan, Turkey, W. Tibet, N.W. Africa and Europe.

Notes. Wagenitz (Fl. Iranica 145: 15-27. 1980) has treated *Logfia arvensis* (L.) Holub Under *Filago arvensis* L.

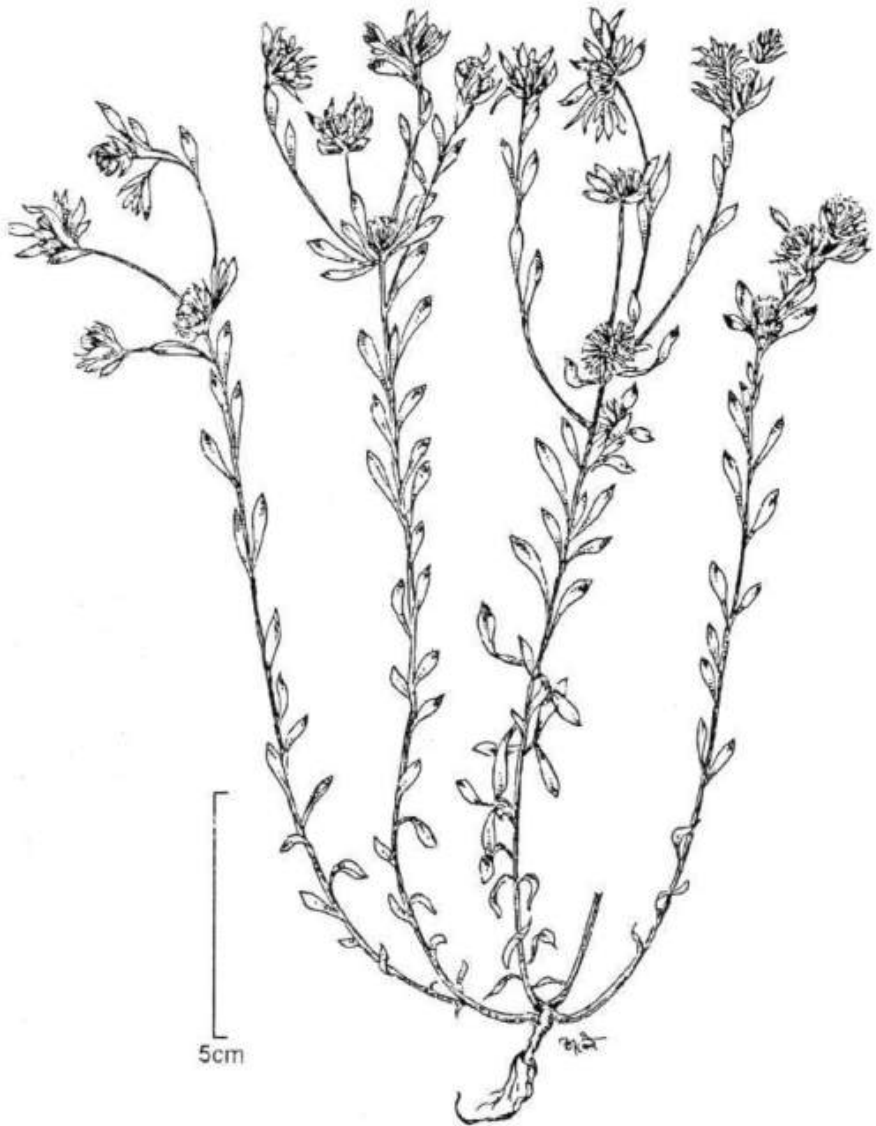


Fig. 15. *Logfia arvensis* (L.) Holub

Subtribe 5. GNAPHALEAE DC.

(P.C. Pant)

Herbs, shrubs or undershrubs, perennial, rarely annual, tufted or branched, mostly woolly tomentose or cottony. Leaves rosulate or radical, alternate, rarely subopposite. Heads androgynous or homogamous. Involucral bracts scarious, usually hyaline.

5 genera and 55 species in India.

KEY TO THE GENERA

- | | |
|--|------------------------|
| 1a. Bisexual florets all sterile; styles undivided or notched | 2 |
| b. Bisexual florets all or mostly fertile; styles divided | 3 |
| 2a. Pappus hairs connate or subconnate | 4. <i>Leontopodium</i> |
| b. Pappus hairs quite free | 1. <i>Anaphalis</i> |
| 3a. Involucral bracts subulate | 5. <i>Phagnalon</i> |
| b. Involucral bracts ovate-oblong, oblanceolate, spatulate, elliptic or linear | 4 |
| 4a. Perennials; female florets lesser than the bisexual florets | 3. <i>Helichrysum</i> |
| b. Annuals; female florets more than the bisexual florets | 2. <i>Gnaphalium</i> |

1. *Anaphalis* DC.

Herbs or undershrubs, annual or perennial; stems densely covered by cottony or woolly growth, rarely pubescent or glabrate. Leaves alternate or subopposite-opposite. Heads small, heterogamous, corymbose; outer most florets, disciform, unisexual female, fertile or subdioecious, many, filiform. Inner bisexual, usually sterile, tubular; limb usually yellow, sub campanulate. Involucre campanulate, turbinate or subglobose, usually woolly at base; bracts many seriate, scarious; outermost woolly on outer faces, sessile; middle ones longer and clawed; inner with a petaloid limb, white or tinged with yellow or pink. Receptacle naked. Corolla of female florets 2-4 toothed; of bisexual florets 5-toothed. Anther base sagittate; auricles connate, tailed. Style of bisexual florets filiform, obtuse, subcapitate or 2-cleft. Achenes oblong, very small, terete or angled, usually minutely scaly or papillose. Pappus hairs of female florets 1-seriate, slender, scabrid, caducous; those of bisexual florets often thickened at the tips.

Europe, Asia and America; ca 40 species, 31 in India.

Literature : CHEN, FENG-HUCI, LING, YONG, YILING CHEN, SHIN CHU & WAN WEI (1966). De genera *Anaphalis* DC. Familiae Compositarum Florae Sinicae. *Acta Phytotax. Sin* 11: 91-112.

KEY TO THE SPECIES

- 1a. Leaves subopposite-alternate, almost at right angle to the axis of stem; involucrel bracts usually laciniate 15. *A. kashmiriana*
- b. Leaves alternate, variously scattered, not at right angle; involucrel bracts slightly undulate 2
- 2a. Stems more or less winged with decurrent leaf bases 3
- b. Stems not winged 4
- 3a. Strigose herbs; stem solitary at base; achenes 0.75-1 mm 13. *A. himachalensis*
- b. Lanate to woolly herbs; stems many at base; achenes, 0.5 mm 7. *A. busua*
- 4a. Leaves closely imbricating, almost concealing the stem 5
- b. Leaves not imbricating; stem prominently visible 7
- 5a. Plants covered with smoky or tawny wool 22. *A. notoniana*
- b. Plants covered with greyish-white tomentum 6
- 6a. Leaves lanceolate; achenes bluntly 4-angled, glabrous 3. *A. barnesii*
- b. Leaves linear-oblong; achenes oblong, papillose 5. *A. brevifolia*
- 7a. Leaves usually below lower half of stem, densely congested or aggregated at basal end 8
- b. Leaves lax, scattered all over the stem 22
- 8a. Leaves prominently 1-nerved 9
- b. Leaves 3 or more nerved 19
- 9a. Basal leaves on non flowering branches bent downwards 10
- b. Leaves not bent downwards, spreading 11
- 10a. Branches slender, flowering ones ca 30 cm long 6. *A. bournei*
- b. Branches thick, flowering ones ca 25 cm long 21. *A. neelgerryana*
- 11a. Leaves slightly decurrent at base 25. *A. subdecurrens*
- b. Leaves auricled or adnate at base 12
- 12a. Leaves strongly scented, tapering at apex to a fine point 2. *A. aristata*
- b. Leaves not scented, acute-obtuse at apex 13
- 13a. Upper surface of leaves pilosely scabrous or glabrous, lower surface tomentose 14
- b. Both surfaces of leaves tomentose 15
- 14a. Upper surface of leaves pilosely scabrous; florets eglandular 30. *A. wightiana*
- b. Upper surface of leaves glabrous; florets glandular 18. *A. marcescens*
- 15a. Leaves ca 1-6 x 0.2-0.4 cm 16. *A. lawii*
- b. Leaves ca 0.3-3.5 x 0.05-0.3 cm 16
- 16a. Herbs 4-7 cm high; leaves obovate or clavate-spathulate 8. *A. cavei*
- b. Herbs 14-80 cm high; leaves linear 17
- 17a. Heads in compact corymbs; involucrel bracts ferrugineous 20. *A. meeboldii*
- b. Heads in lax corymbs; involucrel bracts creamy white 18
- 18a. Leaves clothed underneath with cinnamomeous wool 12. *A. griffithii*
- b. Leaves clothed underneath with white wool 9. *A. contorta*
- 19a. Roots twisted; achenes quadrangular 31. *A. xylorhiza*
- b. Roots not twisted; achenes oblong 20
- 20a. Surfaces of the leaves clothed with more or less ferrugineous tomentum 4. *A. beddomei*
- b. Surfaces of the leaves clothed with white tomentum 21
- 21a. Outer involucrel bracts tinged with pink 11. *A. elliptica*
- b. Involucrel bracts white 27. *A. travancorica*
- 22a. Stems, leaves or achenes glandular 23
- b. Plants eglandular 25
- 23a. Achenes glandular 10. *A. desertii*
- b. Leaves and stems glandular 24

- 24a. Leaves narrowly lanceolate
 b. Leaves linear-oblong
- 25a. Involucral bracts rose-pink
 b. Involucral bracts glistening white
- 26a. All leaves 1-nerved
 b. Leaves usually more than 1-nerved (sometimes leaves in the same plant up to 7-nerved)
- 27a. Heads 5-7 mm across
 b. Heads 2-4 mm across
- 28a. Leaves linear-oblong, elliptic-lanceolate; Outer bracts obovate-oblong; inner linear-oblong
 b. Leaves very slender, linear; outer bracts lanceolate, inner oblanceolate
- 29a. Leaves lanceolate, usually undersurface cinnamomeous woolly
 b. Leaves variable, obovate-spathulate or oblong subspathulate or elliptic, linear-oblong, undersurface white woolly
- 30a. Leaves leathery; achenes minutely hairy or with scattered shining dots
 b. Leaves not leathery; achenes tubercled
14. *A. hookeri*
 26. *A. subumbellata*
 24. *A. staintonii*
 26
 27
 29
 23. *A. royleana*
 28
 29. *A. virgata*
 17. *A. leptophylla*
 19. *A. margaritacea*
 30
 1. *A. adnata*
 28. *A. triplinervis*

1. *Anaphalis adnata* DC., Prodr. 6: 274. 1838; Hook.f., Fl. Brit. India 3: 282. 1881. Fig. 16.

Herbs, erect and stout, up to 80 cm high, densely white, floccose tomentose. Leaves obovate-oblong, subspathulate or oblanceolate, entire, mucronate at apex, narrowed at base, 2-10 x 0.3-2.4 cm, leathery, dull green above, lower surface densely white woolly, 1-3 nerved, sessile, clasping the stem. Heads in terminal and axillary corymbs, 1-2 mm across; peduncle ca 2 mm long, densely tomentose. Involucral bracts in many series, membranous, scarious, glistening, clawed; outermost rounded-ovate, acute-obtuse, densely woolly outside; claw pale yellow-brown; inner oblong-spathulate. Marginal florets pale yellow; corolla filiform, ca 0.2 mm long, obscurely toothed. Style bifid. Central florets brownish yellow, ca 0.2 mm long, 5-toothed. Achenes of marginal florets oblong, 0.02-0.05 mm long, minutely hairy; those of central florets 0.02-0.07 mm long, glabrous with scattered shining dots. Pappus hairs silky white.

Fl. & Fr. Aug. - March.

Distrib. India: W. and E. Himalayas, Gangetic Plain & Deccan Plateau, common on shady slopes, crevices of rocks and in *Quercus-Rhododendron* forest, ascending to 3200 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Madhya Pradesh, West Bengal, Meghalaya, Manipur, Andhra Pradesh, Karnataka and Orissa.

Bhutan, Pakistan, Nepal, Myanmar, Philippines, Indo-China, China, Thailand, Taiwan and Sri Lanka.



Fig. 16. *Anaphalis adnata* DC. : a. Habit; b. Outer involucre bract; c. Inner bract; d. Marginal female floret; e. Central bisexual floret.

2. *Anaphalis aristata* DC., Prodr. 6: 274. 1838; Hook.f. Fl. Brit. India 3: 285. 1881.

Herbs, erect, unbranched, or sparsely branched, viscidly pubescent, up to 1 m high; branches striate, glandular-pubescent. Leaves lanceolate, oblanceolate, auricled or amplexicaul at base, acute at apex, often with recurved mucronate tip, margins recurved, 0.8-5.5 x 0.1-0.6 cm, hairy on both surfaces, densely on the lower surface, 1-nerved, sessile. Heads in densely corymbose clusters, ca 4 mm across; peduncle 1-2 mm long, densely white woolly tomentose. Involucral bracts white, tinged with pink, 3-4-seriate, minutely toothed towards apices; outer elliptic-ovate; inner linear-oblong, pale yellowish towards basal end. Marginal florets with filiform corolla, ca 2 mm long, 4-toothed. Corolla of central florets ca 2 mm long. Achenes oblong, ca 0.5 mm long, oblong, papillose. Pappus hairs white, minutely bristly.

Fl. & Fr. July - April.

Distrib. India: W. Ghats, and C. India, common near waterfalls, 1150-2340 m. Rajasthan, Tamil Nadu and Kerala.

Endemic.

Notes. Reported from Rajasthan by Singh & Shetty (*Flora of Rajasthan* 392. 1987).

3. *Anaphalis barnesii* C. Fischer in Kew Bull. 5: 249. 1939.

Herbs, up to 75 cm high, woody below, sparsely branched; stems brown, striate. Leaves lanceolate, erect and adpressed, recurved at margins, 1-1.3 x 0.5 cm, surfaces greyish tomentose. Heads 0.6-1 cm in diam., sessile or peduncled; peduncle ca 6 mm long. Involucral bracts 5-6-seriate; outermost white with a brown median stripe on lower half and white with greenish or olivaceous marking on upper half; ovate, densely long silky tomentose on the back; inner spatulate, obtuse or subacute. Marginal florets yellow, ca 2.5 mm long, 4-toothed. Disc florets with slender corolla, slightly swollen at base and expanded at mouth, toothed. Achenes narrowly oblong, ca 1.5 mm long, truncate at apex, faintly and bluntly 4-angled, glabrous. Pappus hairs white, bristly.

Fl. & Fr. Sept. - Dec.

Distrib. India: W. Ghats, probably in high altitude grass lands, 2344 m. Kerala (High Range, Idduki District); endangered.

Endemic.

Notes. Stem almost concealed by imbricating leaves.

4. *Anaphalis beddomei* Hook.f., Fl. Brit. India 3: 282. 1881.

Herbs, or undershrubs, erect-decumbent up to 60 cm high; stems stout, densely clothed with appressed ferruginous woolly tomentum. Leaves elliptic-lanceolate, entire, acute at apex, sometimes with a mucro, base narrowed, semiamplexicaul, 1.5-5 x 0.5-1.3 cm, upper surface densely ferruginous tomentose, 5-nerved. Heads in dense, rounded, corymbose clusters, ca 0.2 mm across; peduncle ca 3 mm long, densely ferruginous woolly. Involucral bracts 3-4 seriate; of the outermost whorl elliptic-oblong, usually obtuse, brownish at base; enveloped by dense woolly pubescence; inner spatulate-oblong, brownish at base. Ray florets with filiform corolla, ca 1.8-2 mm long, 4-toothed. Style bifid. Bisexual florets ca 2 mm long, 5-toothed. Achenes oblong, ca 0.5 mm long, papillose. Pappus hairs white, barbellate.

Fl. & Fr. June - Aug. & Oct.

Distrib. India: W. Ghats, on slopes, at about 2350 m. Tamil Nadu and Kerala; rare.

5. *Anaphalis bournei* Fyson in Kew Bull. 1914: 209. 1914.

Herbs or undershrubs, up to 50 cm high, with many slender flowering branches; stems densely yellowish grey pubescent. Leaves dense, congested at base and sparse in flowering branches, linear, acute at apex, subamplexicaul, acute, margins somewhat revolute, 0.5-1.3 x 0.05-0.2 cm, faintly 1-nerved on lower surface, densely greyish-white woolly on both surfaces, sessile. Heads in compact terminal corymbs, ca 0.5 cm across; peduncle 0.5-1 cm long, densely woolly tomentose. Involucral bracts white, 3-4-seriate; outermost lanceolate, enveloped by woolly tomentum; inner lanceolate. Ray florets with filiform corolla, ca 2 mm long, 5-toothed; style bifid. Corolla of disc florets ca 2.2 mm long, tubular, 5-toothed. Achenes oblong, minutely papillose, of ray florets 0.05 mm long; those of disc florets 0.5 mm long. Pappus white, plumose.

Fl. & Fr. July & Aug. - Dec.

Distrib. India: W. Ghats, in sholas, hill slopes and also common along road sides, upto 2500 m. Tamil Nadu and Kerala.

Notes. The leaves at the base quite congested and spreading, while those of flowering branches sparse and more or less adnate to stem. This species is allied to *Anaphalis brevifolia* DC. but differs in having narrower and longer leaves which are more widely spreading on the scapes.

6. *Anaphalis brevifolia* DC., Prodr. 6: 273. 1837; Hook.f., Fl. Brit. India 3: 286. 1881.

Herbs, perennial, erect; stems much branched from base, woody; branches densely leafy, white lanuginose. Leaves ca 5 x 1 mm; lower spreading, linear-oblong, obtuse with recurved margins; upper erect, narrower, often imbricate, surfaces cottony, more so on lower surface. Heads in terminal corymbose clusters, ca 6.5 mm across; peduncle small. Involucral bracts white, oblong-lanceolate, obtuse. Ray florets female, filiform, minutely toothed. Disc florets bisexual with 5-lobed corolla. Stigma 2-lobed. Anthers sagittate. Achenes brown, oblong, minutely papillose. Pappus hairs scabrid, setose.

Fl. & Fr. Sept. - April.

Distrib. India: W. Ghats, 2000-2340 m. Tamil Nadu (Anamallay Hill); rare and endangered.

Sri Lanka.

7. *Anaphalis busua* (Buch.-Ham. ex D. Don) DC., Prodr. 6: 275. 1838. *Gnaphalium busuum* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 173. 1825. *Anaphalis araneosa* DC. Prodr., 6: 275. 1838; Hook.f., Fl. Brit. India 3: 283. 1881.

Fig. 17.

Herbs, erect, 30-80 cm high, sparingly branched; stems somewhat winged, clothed with white lanate or woolly pubescence. Leaves linear-lanceolate to oblong-lanceolate, sometimes basal ones oblanceolate, decurrent at base, sometimes auricled, acute at apex, margin often minutely recurved, 1-7.5 x 0.2-1 cm, 1-nerved, upper surface arachnoid hairy, lower surface densely woolly. Heads in terminal corymbs, 0.2-0.3 cm across, woolly; peduncle 0.5-2 cm long,

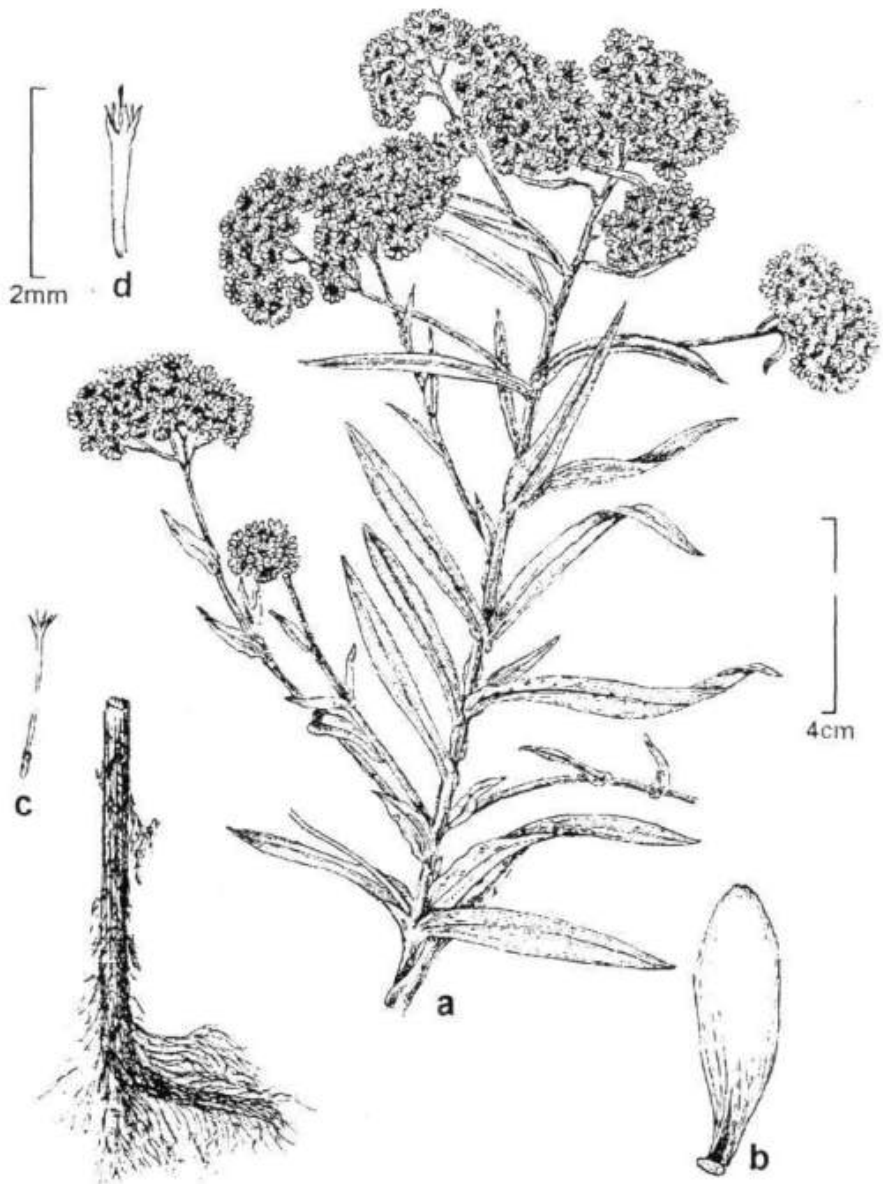


Fig. 17. *Anaphalis busua* (Buch.-Ham. ex D. Don) DC. : a. Habit; b. Involucral bract; c. Marginal female floret; d. Central bisexual floret.

tomentose. Involucral bracts 2-3-seriate, obovate-spathulate, entire or sometimes notched. Ray florets with filiform corolla, ca 2 mm long. Disc florets yellow, 1-2 mm long. Achenes 0.5 mm long. Pappus hairs white, barbed.

Fl. & Fr. Almost throughout the year.

Distrib. India: W. Himalayas, Gangetic Plains, N.E. region and S. India, fairly common in shady slopes, as an undergrowth of Pine forest amidst grasses and also in *Quercus-Rhododendron* forest (In W. Himalayan region). Rare in sub montane tract along sandy river bank, 600-3340 m. Jammu & Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Tripura, Meghalaya, West Bengal and Tamil Nadu.

Bhutan, Pakistan, Nepal and China.

8. *Anaphalis cavei* Chatterjee in Bull. Bot. Soc. Bengal 3: 17. 1949.

Herbs, perennial, caespitously branched, densely woolly, 3.5-7 cm high; roots adventitious, slender, woolly. Leaves oblanceolate, obovate or clavate, spathulate, narrowed at base, obtuse at apex, entire, 5-10 x 2-4 mm, papery, surfaces with grey tomentum, sessile. Heads in dense corymbs, 8-10 mm across; peduncle 2-3 mm long, woolly. Involucral bracts pale yellow, many, scarious, often constricted in the middle, linear-lanceolate, base of the limb striate. Female florets tubular to linear. Bisexual florets ca 3 mm long, 5-toothed. Achenes dark brown, ovoid, elongate, ca 1 mm long, sparsely papillose. Pappus hairs grey white, minutely barbellate.

Fl. & Fr. July - Nov.

Distrib. India: E. Himalayas, 5000-5300 m. Sikkim (Guchala); rare.

Nepal.

9. *Anaphalis contorta* (D. Don) Hook.f., Fl. Brit. India 3: 284. 1881. *Antennaria contorta* D. Don in Bot. Rég. 7: t. 605. 1825. *Anaphalis tenella* DC., Prodr. 6: 273. 1838.

Herbs, erect or decumbent, branched, 14-40 cm high; stems usually coated with white cottony tomentum. Leaves usually crowded, narrowly linear or oblong, auricled at base, acute or obtuse at apex, usually slightly cusped,

margins often revolute, 0.3-3.5 x 0.05-0.3 cm, 1-nerved, upper surface dull green, puberulous, lower surface felted with white woolly pubescence, sessile. Heads 2-4 mm across, in simple or branched terminal corymbose clusters, 2-4 mm across; peduncle ca 2 mm long, white tomentose. Involucral bracts many-seriate; outer broadly ovate or oblong, scarious, shining, generally pubescent at base, obtuse or acute; inner white or creamy, sometimes brownish or yellowish at base, narrowly linear-oblong, obtuse or acute. Ray florets yellowish, with filiform corolla, ca 2.5 mm long, obscurely toothed. Disc florets yellowish brown when dry, ca 2.5 mm long, 5-toothed. Achenes of ray florets oblong, ca 0.3 mm long, smooth or verrucose; those of disc florets oblong, ca 0.5 mm long. Pappus hairs white, minutely barbed.

Fl. & Frt. : July - March.

Distrib. India: Himalayas, common in *Quercus-Rhododendron* forest, rocky slopes, meadows (In West Himalayan region), between 1800-4200 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Punjab, Haryana, Sikkim, Arunachal Pradesh and Meghalaya.

Afghanistan, Pakistan, Nepal, Bhutan, Tibet, Philippines and China.

Notes. A highly polymorphic species showing considerable variation in the nature of leaves and indumentum.

10. *Anaphalis desertii* J.R. Drumm. in Kew Bull. 1910: 76. 1910.

Herbs, perennial, rhizomatous; stems terete. Leaves linear-oblong, narrowly decurrent, margins flat, ca 5 x 0.4 cm, 1-nerved, upper surface black green, becoming glabrescent, lower surface greyish puberulous. Heads pale yellow, small, dense. Involucral bracts scarious, in many series; outer brown tomentose, obovate; inner white, shining, ovate-lanceolate, obtuse, acuminate. Achenes minute, subcylindric, sparsely glandular on upper surface, obscurely ribbed below. Pappus white, long, scabrous.

Distrib. India: E. Himalayas. Sikkim (Lonok); extremely rare.

Tibet and China.

11. *Anaphalis elliptica* DC., Prodr. 6: 274. 1838. *A. oblonga* DC. var. *elliptica* (DC.) Hook.f., Fl. Brit. India 3: 283. 1881.

Herbs, erect, white woolly, up to 30 cm high. Leaves 2-3 x 0.5-1 cm; basal ones aggregated, sub spatulate, oblong-obovate, scattered upwards, somewhat decurrent towards base, obtuse at apex, margins flat or slightly recurved, surfaces densely woolly tomentose, 5-7 nerved. Heads in dense, compact, terminal, simple or branched corymbs, ca 3-4 mm across; peduncle ca 1 mm, densely woolly tomentose. Involucral bracts 3-4 seriate, glistening white, embedded in dense woolly tomentum; outermost pink at apex, pale brown at base, ovate, inner bracts linear. Ray florets female with filliform corolla, ca 1.5 mm long, 4-toothed, pink at mouth. Disc florets bisexual, ca 2 mm long, 5-toothed. Style deeply cleft. Achenes oblong, ca 0.5 mm long, hairy. Pappus hairs minutely bristly.

Fl. & Fr. April - Nov.

Distrib. India: W. Ghats, in grasslands, up to 2340 m. Tamil Nadu; rare.

12. *Anaphalis griffithii* Hook.f., Fl. Brit. India 3: 280. 1881. Fig. 18.

Herbs, erect or ascending, slender, unbranched, up to 80 cm high. Leaves linear-lanceolate, acute or apiculate at apex, semiamplexicaul at base margins flat or revolute, ca 1.5-4 x 0.1-0.3 cm, upper surface sparsely hairy or tomentose, lower surface dense, sub cinnamomeus woolly, 1-nerved. Heads in terminal corymbs, 5-8 mm across; peduncle ca 3 mm long, densely ferruginous tomentose. Involucral bracts 3-4-seriate, glistening white, ovate or elliptic-ovate, subacute. Ray florets filiform, ca 5 mm long, obscurely toothed. Disc florets bisexual with corolla ca 4 mm long, 5-toothed. Achenes oblong, ca 0.05 mm long, hairy. Pappus hairs white, very slender.

Fl. & Fr. Oct. - Feb.

Distrib. India: E. Himalayas, undergrowth of Pine forests and also in grasslands, 1200-2670 m. Sikkim, Arunachal Pradesh and Meghalaya.

Nepal and S.W. China.

13. *Anaphalis himachalensis* Aswal *et* Goel in Nord. J. Bot. 8(4): 337-338. 1988.

Herbs, erect, strigose, up to 80 cm high; stem solitary from base, branched above. Leaves linear to oblong-lanceolate, acute-cuspidate at apex, margins flat,

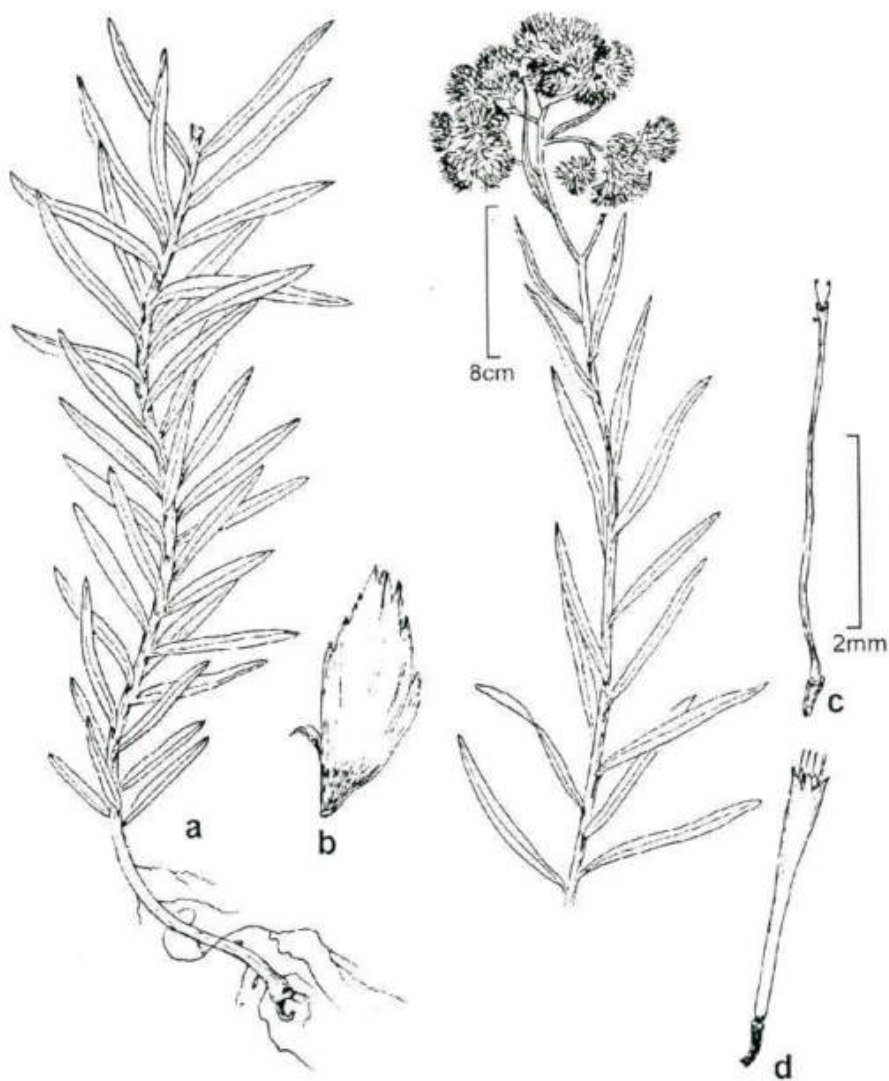


Fig. 18. *Anaphalis griffithii* Hook.f. : a. Habit; b. Involucral bract; c. Marginal female floret; d. Central bisexual floret.

2.0-4.5 x 0.25-0.8 cm, strigose, 1-nerved, rarely with 2-obscure lateral nerves. Heads in branched corymbs, subglobose up to 7.5 mm across. Involucral bracts white, up to 4-seriate, oblong-elliptic to spatulate. Ray florets female. Corolla filiform, ca 2.5 mm long. Style ca 2.25 mm long. Disc florets yellowish, bisexual. Corolla 3.0-3.5 mm long, 5-lobed. Achenes 0.75-1 mm long. Pappus hairs white.

Fl. & Fr. Aug.

Distrib. India: W. Himalayas, occasional on moist shady slopes, 2400 m, Himachal Pradesh (Lahul-Spiti District, Tandi)

14. *Anaphalis hookeri* C.B. Clarke ex Hook.f., *Fl. Brit. India* 3: 282. 1881. Fig. 19.

Herbs, erect, simple or branched, slender up to 50 cm high; stems minutely striate, hairy, glandular. Leaves narrowly lanceolate, base subamplexicaul, acuminate at apex, mucronulate, margins slightly recurved, 2.7-7.5 x 0.3-0.6 cm, 3-nerved, upper surface cobwebby, lower surface hairy and subglandular, sessile. Heads in branched corymbs, ca 3 mm across; peduncle ca 4 mm long, densely woolly tomentose. Involucral bracts 3-4 seriate; outermost white, woolly, broadly ovate, charred brown at basal end; inner linear-oblong, obtuse-acute at apex. Ray florets with filiform corolla, ca 2.2 mm long, 4-toothed. Disc florets bisexual with corolla ca 2 mm long, 5-toothed. Achenes narrowly cylindrical, ca 0.4 mm long, minutely hairy. Pappus hairs white, minutely bristly.

Fl. & Fr. Nov.

Distrib. India: E. Himalayas, 3000-3670 m. Sikkim (Lachen and Lachoong Valleys); rare.

Notes. A species closely allied to *Anaphalis subumbellata* C.B. Clarke, but clearly distinguishable in having narrowly lanceolate, spreading leaves. A rare species known from Scanty collection.

15. *Anaphalis kashmiriana* P.C. Pant, R.R. Rao & Arti Garg, in *J. Jap. Bot.* 69(5): 258-261. 1994. Fig. 20.

Herbs, erect, feebly branched, up to 30 cm high; stems sparingly striate, cottony woolly. Leaves subopposite-alternate, horizontal to the ground, oblong,

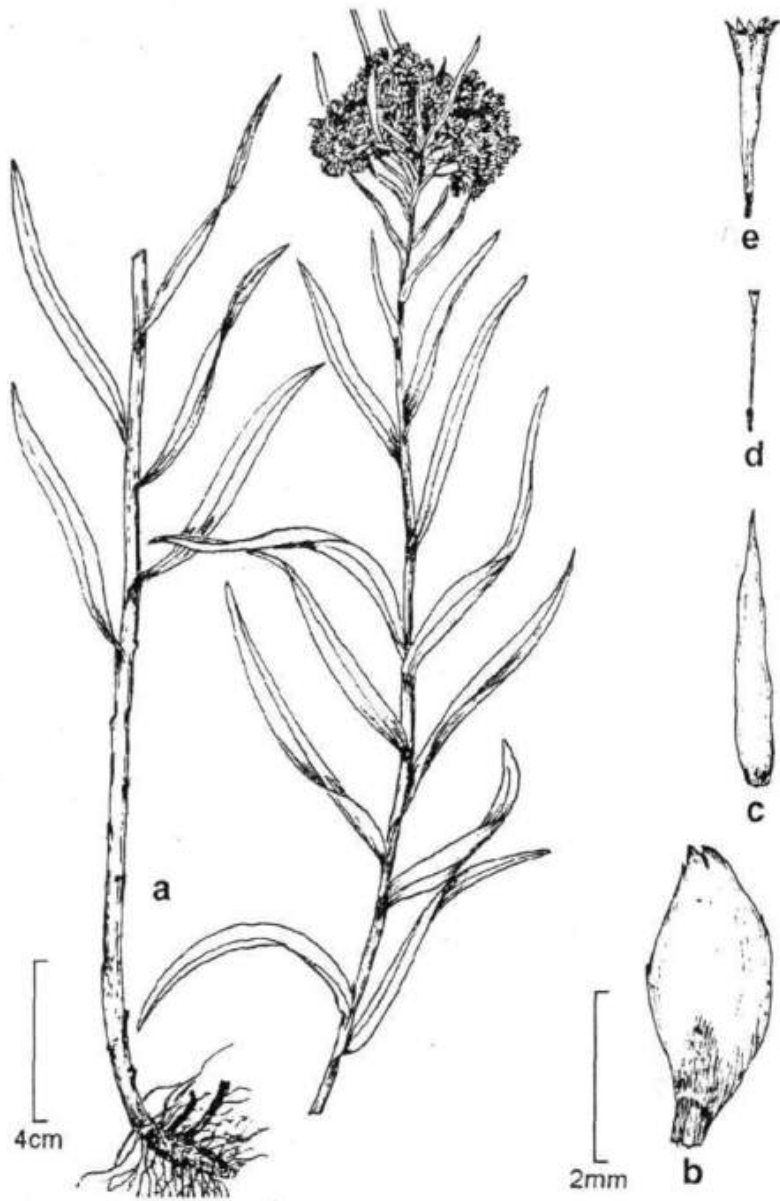


Fig. 19. *Anaphalis hookeri* C.B. Clarke ex Hook.f. : a. Habit; b. Outer involucre bract; c. Inner bract; d. Marginal female floret; e. Central bisexual floret.

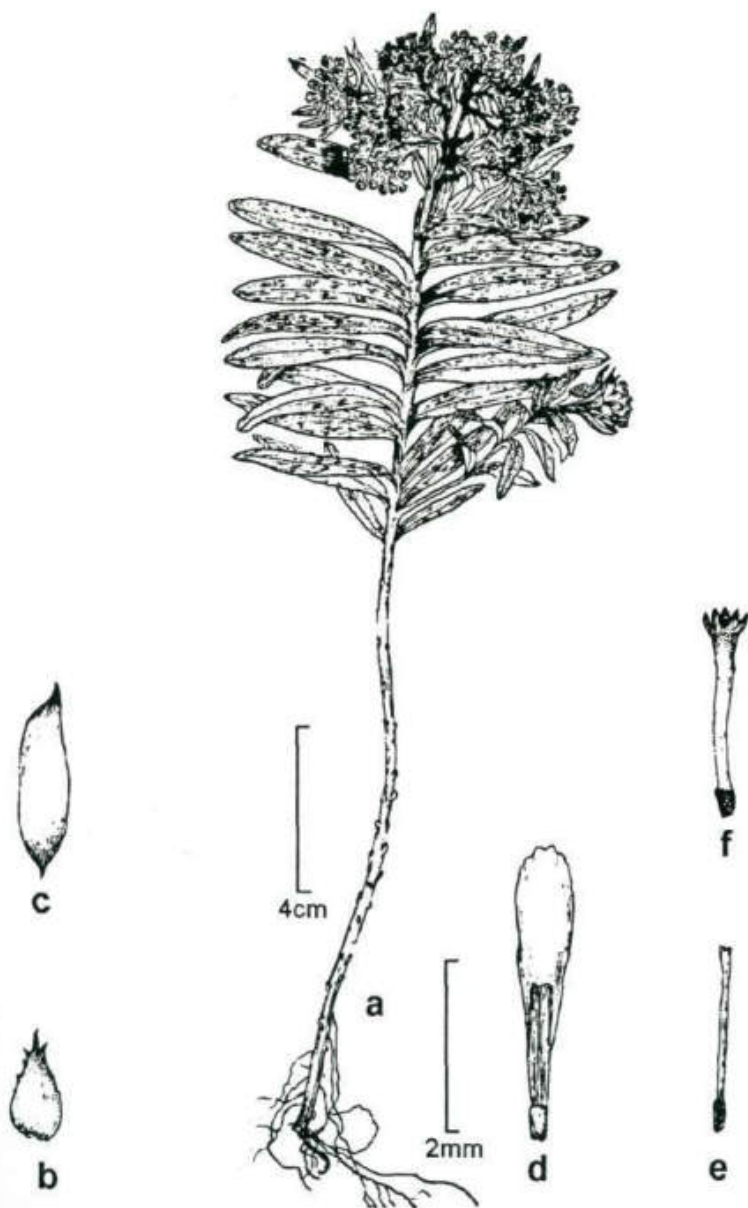


Fig. 20. *Anaphalis kashmiriana* P.C. Pant, R.R. Rao et Arti Garg : a. Habit; b. Outer involucre bract; c. Middle bract; d. Innermost bract; e. Marginal female floret; f. Central bisexual floret.

amplexicaul at base, obtuse at apex, 1.5 x 0.3-0.8 cm, laxly hairy above, densely woolly on undersurface. Heads in terminal, much branched corymbs, ca 2 mm across; peduncle ca 2 mm long, densely woolly tomentose. Involucral bracts many-seriate; outermost broadly cordate-ovate, densely white woolly, purplish at apex, margins usually lacinate, particularly towards the upper portion; middle bracts oblong-lanceolate, purplish tinged at either ends; innermost spatulate. Ray florets female, filiform. Corolla 2-3 mm long, narrowly 4-lobed. Style linear. Disc florets; bisexual; florets ca 2.2 mm long, 5-toothed. Achenes oblong, ca 0.05 mm, long, pubescent. Pappus hairs white, minutely bristly.

Fl. & Fr. Sept.

Distrib. India: W. Himalayas, 3330-3835 m. Jammu & Kashmir (Pir Pass, Banihal ridge).

Notes. This species closely resembles the highly polymorphic *A. contorta*, but differs essentially with the latter having alternate, narrow-linear, ca 0.05-4 mm broad, spreading leaves; outer involucral bracts glistening white, lanceolate-ovate, scarious, margin undulate or entire and inner bracts narrowly linear-oblong, and psilate, pollen exine.

16. *Anaphalis lawii* (Hook.f.) Gamble, Fl. Pres. Madras 2: 489. 1957. (Rep. ed.). *A. oblonga* DC. var. *lawii* Hook.f., Fl. Brit. India 3: 283. 1881.

Herbs, erect, up to 35 cm high; stems clothed with white cottony tomentum. Leaves linear-oblong or linear-oblongate, acute-obtuse at apex, margins entire, 1-6 x 0.2-0.4 cm sessile, surfaces white woolly, more so on lower surface, 1-nerved. Heads in corymbs, ca 3 mm across. Involucral bracts white tinged with pink; 3-4-seriate; outermost ovate-oblongate, covered with white woolly tomentum; inner linear-oblong. Ray florets female with filiform corolla, ca 1.6 mm long. Ovary 0.4 mm; style 1.5 mm, linearly 2-fid, tip obtuse. Bisexual florets with corolla 0.5 mm across; tube 1.5 mm, 5-lobed. Achenes 0.6 mm long, terete or angled, minutely scaly.

Fl. & Fr. Sept. - March.

Distrib. India: Common on Ghats on road cuttings or open grassy hills, especially on poor soil on plateau and bare rocky slopes, 740-1500 m. West Bengal, Kerala, Karnataka, Orissa and Maharashtra.

17. *Anaphalis leptophylla* (DC.) DC., Prodr. 6: 273. 1838; Hook.f., Fl. Brit. India 3: 285. 1881. *Helichrysum leptophyllum* DC., in Wight Contrib. Bot. Ind. 20. 1834.

Herbs, annual, erect, slender, up to 40 cm high, sparingly branched above; stems cottony woolly. Leaves, narrowly linear, amplexicaul at base, acute at apex, margin strongly recurved, 1-4 x 0.1-0.2 cm, obscurely, upper surface dark, laxly hairy, lower surface densely white woolly, 1-nerved, sessile. Heads in subumbellate terminal corymbs, 1.5-1.8 mm across; peduncle ca 2 mm long, densely woolly tomentose. Involucral bracts white, 3-4-seriate, outer lanceolate, covered with woolly tomentum, yellowish brown at base; inner somewhat oblanceolate, yellowish towards lower half. Ray florets with filiform corolla, ca 1 mm long, obscurely toothed. Corolla in disc florets ca 1 mm long, 5-toothed. Achenes oblong, ca 0.2 mm long, angular, subcompressed, minutely papillose. Pappus of ray florets white, barbellate, united in a ring on the top of the achenes; those of disc florets barbellate.

Fl. & Fr. June - Oct.

Distrib. India: W. Ghats, on slopes and damp marshy places, between 1000-2670 m. Tamil Nadu and Kerala.

Endemic.

Notes. "White Everlasting". The much narrower leaves and larger flower heads distinguish this species from *A. lawii* (Hook.f.) Gamble.

18. *Anaphalis marcescens* (Wight) C.B. Clarke, Comp. Ind. 110. 1876; Hook.f., Fl. Brit. India 3: 286. 1881. *Gnaphalium marcescens* Wight. Ic. t. 1115. 1856.

Herbs, slender, branched and woody, up to 45 cm high; stems and undersurface of leaves clothed with white cottony pubescence. Leaves spreading or reflexed, linear, slightly dilated at base acute at apex, margins recurved, 0.8-3 x 0.1-0.4 cm, upper surface glabrous, lower surface fulvous cottony tomentose, sessile, 1-nerved, adnate to stem. Heads in dense, rounded, terminal, subcorymbose clusters, ca 4 mm across; peduncle ca 3 mm long, densely clothed with rusty brown wool. Involucral bracts white, 3-4-seriate, marcescent; outermost obovate-oblong, brownish at base, covered with rusty brown tomentum; inner lanceolate-oblong, brownish at basal end. Ray florets female

with filiform corolla, ca 2 mm long, 4-toothed; lobes glandular. Achenes ca 0.5 mm long, hairy. Pappus hairs white, minutely bristly.

Fl. & Fr. July - Jan.

Distrib. India: W. Ghats, on the banks of streams or wet rocks, 2340-2670 m. Tamil Nadu, Kerala and Karnataka.

Sri Lanka.

Notes. The involucre bracts are glistening white at the centre and white at apex.

19. *Anaphalis margaritacea* (L.) Benth. in Benth. & Hook.f., Gen. Pl. 2: 303. 1873. *Gnaphalium margaritaceum* L., Sp. Pl. 850. 1753. *Anaphalis cinnamomea* C.B. Clarke, Comp. Ind. 104. 1876; Hook.f., Fl. Brit. India 3: 279. 1881.

Herbs, erect-decumbent, up to 60 cm high, feebly branched above; stems woolly. Leaves narrowly lanceolate, entire, narrowed at both ends, 1.5-10 x 0.8-2.4 cm, glabrous and dark green above and densely cinnamomeous tomentose beneath, mostly 3-nerved. Heads many, in terminal, dense corymbs, 3-9 mm across; peduncle 2-8 mm long, densely woolly. Involucre bracts many-seriate; outermost white, ovate, obtuse or acute, scarious, light brownish at basal end; inner pale yellow-brown, narrow, linear-oblong. Ray florets female with filiform corolla, 2-3 mm long, obscurely toothed. Disc florets bisexual. Corolla ca 3 mm long, 5-toothed. Style bifid. Achenes somewhat compressed and narrowly linear-oblong in outline, 1-2 mm long; those of disc florets ca 0.3 mm long.

Fl. & Fr. Aug. - Nov.

Distrib. India: W. and E. Himalayas, Gangetic Plain and N.E. region, common as an undergrowth of *Pinus*, *Cedrus* and *Quercus-Rhododendron* forests on shady slopes, ascending up to 4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh, Sikkim, Nagaland, Manipur, Meghalaya and West Bengal.

Pakistan, Nepal, Bhutan, Tibet, China, E. Russia, Indo-China, Japan, China, Sri Lanka, Korea, C. Europe and N. America.

Notes. Leaves and young plants are said to be eaten as a pot herb.

20. *Anaphalis meeboldii* W.W. Smith in Rec. Bot. Surv. India 4: 284. 1911. Fig. 21.

Herbs, tufted, woody, up to 30 cm high; rootstock thick woody; stems densely ferruginous woolly. Leaves spreading or ascending, linear, bristly and stem clasping at base, apex subobtuse-acute, margins revolute, 3-8 x 0.5-1 mm, surfaces densely woolly, 1-nerved, sessile. Heads sessile, terminal on branches, densely clothed with brown woolly tomentum, ca 4 mm across. Involucral bracts light yellow, 3-4-seriate, linear, spatulate, densely woolly. Ray florets with filiform corolla, ca 1.8 mm long, 4-toothed. Disc florets bisexual, ca 1.8 mm long. Achenes ca 0.5 mm long, angled and minutely papillose; those of disc florets minute, ca 0.2 mm long. Pappus hairs minutely bristly.

Fl. & Fr. Nov. - March.

Distrib. India: W. Ghats, 2075-2740 m. Tamil Nadu and Kerala.

Endemic.

Notes. Leaves very closely arranged, giving a whorled appearance.

21. *Anaphalis neelgerryana* (Sch.-Bip. ex DC.) DC., Prodr. 6: 272. 1838; Hook.f., Fl. Brit. India 3: 287. 1881. *Gnaphalium neelgerryanum* Sch.-Bip. ex DC. in Wight Contrib. Bot. Ind. 21. 1834.

Sans.: *Raktaskandana*, *Vranapta*

Herbs, perennial, erect, ca 25 cm high, with woody root-stock; branches many, slender, whole plant clothed with white cottony tomentum. Leaves linear, base rounded and adhering to stem, acute at apex, margins recurved, 0.2-1 x 0.1-0.3 cm, surfaces densely white woolly 1-nerved, sessile. Heads densely crowded or solitary or in corymbose clusters, ca 0.3 cm across; peduncle ca 3 mm long, densely white woolly tomentose. Involucral bracts 4-5-seriate; outermost brown, ovate-elliptic, enveloped in woolly tomentum; inner bracts glistening white with brownish or darker base, oblanceolate. Ray florets with filiform corolla, ca 1.8 mm long, obscurely toothed. Corolla of disc florets tubular, ca 2 mm long, 5 or more toothed. Achenes ca 0.4 mm long, terete, minutely papillose. Pappus hairs white, minutely plumose.

Fl. & Fr. July - Oct.

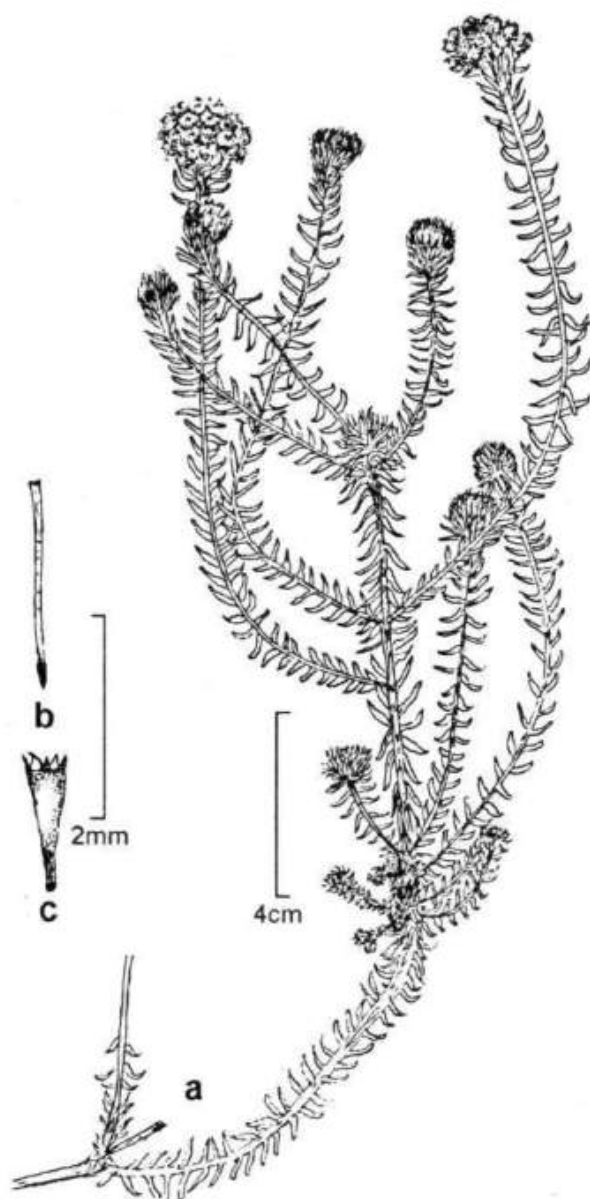


Fig. 21. *Anaphalis meeboldii* W.W. Smith : a. Habit; b. Marginal female floret; c. Central bisexual floret.

Distrib. India: W. Ghats, abundant in dry exposed places, 2500-3000 m. Tamil Nadu and Kerala.

Endemic.

Notes. Leaves turning blackish with age.

22. *Anaphalis notoniana* (DC.) DC., Prodr. 6: 273. 1838; Hook.f., Fl. Brit. India 3: 284. 1881. *Helichrysum notonianum* DC. in Wight Contrib. Bot. Ind. 20. 1834.

Herbs, perennial, erect, up to 35 cm high, subcorymbosely branched from base, densely clothed with dull brown-yellow wool. Leaves oblong, usually imbricate, erect, base subamplexicaul, obtuse at apex, margins sometimes very slightly recurved, 0.4-1.6 x 0.1-0.3 cm, surfaces densely fulvous, 1-nerved, sessile. Heads campanulate, crowded in branched terminal corymbs, ca 2 mm across; peduncle obscure and softly woolly. Involucral bracts many-seriate, scarious, yellow or pinkish tinged; outermost obovate, densely clothed with yellow tomentum, usually toothed at apex, base with brownish blotch; inner ones oblong. Ray florets filiform, ca 1 mm long, 4-toothed. Disc florets bisexual, ca 1.2 mm long, 5-toothed. Achenes minute, ca 0.2 mm long, papillose. Pappus hairs white, shining, minutely bristly.

Fl. & Fr. Dec. - May.

Distrib. India: W. Ghats, common in open grasslands, 1925-2670 m, Tamil Nadu and Kerala.

Endemic.

Notes. The densely crowded leaves completely conceal the stem.

23. *Anaphalis royleana* DC., Prodr. 6: 272. 1838; Hook.f., Fl. Brit. India 3: 280. 1881.

Herbs, perennial, erect or decumbent, up to 50 cm high; root-stock woody; branches simple to caespitose. Leaves linear or linear-oblong, acute at apex, usually with a brownish mucro, usually with entire, recurved margins, 4-4 x 0.1-0.4 cm, dark and more or less scaberulous above, densely greyish white, woolly beneath, 1-nerved. Heads white, many in terminal corymbs, 5-7 mm across; peduncle buff coloured, 2-8 mm, woolly tomentose. Involucral bracts

many-seriate; outer ovate, white, scarious to brown suffused, pale yellow at base obtuse-acute; inner narrowly elliptic or oblong, greenish tinged. Ray florets pale brown with filiform corolla, ca 2.5-3 mm long, obscurely toothed. Disc florets brown on drying, ca 3 mm long, 5-toothed. Achenes oblong, ca 1 mm long, papillose and minutely hairy; those of disc florets oblong, ca 0.5 mm long, minutely papillose. Pappus hairs white, barbed.

Notes. Very variable species with three clearly distinguished varieties as below.

KEY TO THE VARIETIES

- | | |
|--|----------------------------|
| 1a. Leaves puberulous or scaberulous above and greyish white tomentose beneath | 23.3. var. <i>royleana</i> |
| b. Leaves hairy on both surfaces | 2 |
| 2a. Caespitously branched, stems slender; leaves linear | 23.1. var. <i>cana</i> |
| b. Branches simple, stems thick, leaves broader, oblong | 23.2. var. <i>concolor</i> |

23.1. var. *cana* Hook.f., Fl. Brit. India 3: 280. 1881.

Fl. & Fr. July - Sept.

Distrib. India: Alpine Himalayas, common on grassy slopes, crevices of boulders, sandy slopes, river banks as undergrowth of pine forest, 2800-3600 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

23.2. var. *concolor* Hook.f., Fl. Brit. India 3: 280. 1881. Fig. 22.

Fl. & Fr. July - Oct.

Distrib. India: Alpine Himalayas, open meadows, amidst boulders and glacial soil, 3000-5000 m. Himachal Pradesh, Uttar Pradesh and Sikkim.

23.3. var. *royleana* Fig. 23.

Fl. & Fr. July - Sept.

Distrib. India: W. and E. Himalayas, on slopes, crevices of rocks, sometimes found in association with *Caragana* sp. (In W. Himalayan region), 3000-5000 m. Jammu & Kashmir and Sikkim.

Pakistan, Tibet, Bhutan, Nepal, China, N. Myanmar and Taiwan.

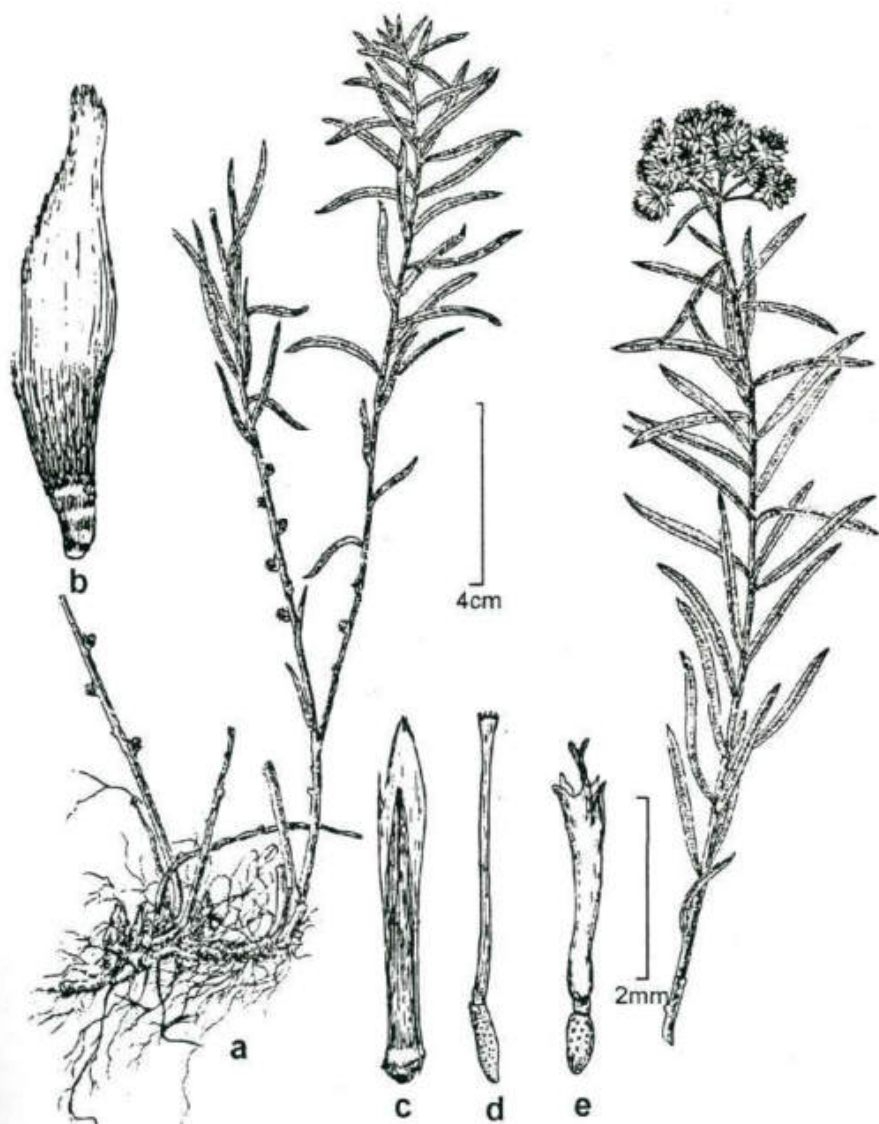


Fig. 22. *Anaphalis royleana* DC. var. *concolor* Hook. f. : a. Habit; b. Outer involucre bract; c. Inner bract; d. Marginal female floret; e. Central bisexual floret.



Fig. 23. *Anaphalis royleana* DC. var. *royleana* : a. Habit; b. Outer involucre bract; c. Inner bract; d. Marginal female floret; e. Central bisexual floret.

24. *Anaphalis staintonii* Georgiadou in Candollea 33: 137. 1978.

Undershrubs, hairy, up to 50 cm high; stems slender, striate. Leaves narrow, linear, usually closely convolute or elliptic-lanceolate, flat, acute at apex, 0.5-2 x 0.5-0.4 cm, surfaces grey-snowwhite tomentose. Heads laxly arranged, 2.2-5 mm across; peduncle 2-7 mm long, densely white tomentose. Involucral bracts 5-6-seriate, glistening white; outermost brown, ovate, immersed in woolly tomentum; inner bracts spatulate, often tinged with pink. Bisexual florets 3 mm long, 5-toothed. Achenes oblong, ca 0.5 mm long. Pappus hairs white, clavicate.

Fl. & Fr. July - Sept.

Distrib. India: W. Himalayas, common on exposed, dry rocky slopes, 2700-4500 m. Jammu & Kashmir.

Pakistan.

Notes. This species is closely allied to *Anaphalis virgata* Thomson ex C.B. Clarke, but differs in having involucral bracts usually of rose-pink color and thick clavicate pappus hairs. Heads in some of the material examined for this species were found to be unisexual.

25. *Anaphalis subdecurrens* (DC.) Gamble, Fl. Pres. Madras 2: 489. 1957. (Rep. ed.). *Gnaphalium subdecurrens* DC. in Wight, Contrib. Bot. Ind. 21. 1834. *Anaphalis oblonga* (Blume) DC., Prodr. 6: 274. 1838; Hook.f., Fl. Brit. India 3: 283. 1881. p.p.

Herbs, erect, up to 35 cm high; branches slender, many from the base, clothed with white cottony wool. Leaves linear-oblong, spatulate, obovate, margins flat, base subamplexicaul and slightly decurrent, acute-obtuse at apex, sometimes shortly mucronate, 0.5-2 x 0.1-0.7 cm, upper surface laxly hairy, lower surface densely white tomentose 1-nerved, sessile. Heads in dense, terminal, sometimes branched corymbs, ca 2.2 mm across; peduncle ca 0.5 mm long, densely woolly tomentose. Involucral bracts white, 3-4-seriate, outermost covered with dense white woolly tomentum. Ray florets with filiform corolla ca 1.8 mm long, toothed. Disc florets bisexual, with corolla ca 2 mm long, 5-toothed. Achenes minute, ca 0.7 mm, thinly pubescent. Pappus hairs white.

Fl. & Fr. July - March.

Distrib. India: C. and S. India. 1000-2400 m. Orissa, Madhya Pradesh, Tamil Nadu, Kerala and Karnataka.

Sri Lanka.

Notes. Leaves highly variable; those at base are oblong-obovate and clustered, and terminal ones are linear-oblong, spatulate and sparse.

26. *Anaphalis subumbellata* C.B. Clarke, Comp. Ind. 108. 1876; Hook.f., Fl. Brit. India 3: 281. 1881.

Herbs, erect, glandular, pubescent, viscid, up to 40 cm high; stems feebly striate, white cottony tomentose. Leaves linear-oblong, lowest spatulate, bases sub-simplicaul, apices acute or apiculate, margins flat, 3-7 x 0.5-2 cm, upper surface laxly tomentose, lower surface densely white tomentose, obscurely 3-nerved. Heads in lax, rounded or subumbellate corymbs, ca 1.3 cm in diam.; peduncle 1-1.5 cm long, densely woolly tomentose. Involucral bracts white, blotched with brown at basal end; many-seriate, outermost lanceolate; inner narrowly lanceolate-oblong. Ray florets with filiform corolla, obscurely toothed. Disc florets with campanulate corolla, 5-lobed. Pappus hairs white, minutely bristly.

Fl. & Fr. Oct.

Distrib. India: E. Himalayas. 3400-4000 m. Sikkim; rare.

Nepal.

27. *Anaphalis travancorica* W.W. Smith in Rec. Bot. Surv. India 4: 284. 1911.

Herbs to undershrubs, up to 60 cm high; stems woody, clothed with thick, white cottony tomentum. Leaves oblong or oblong-lanceolate, aggregated and deflexed at basal end, sparse above, truncate at base, acute at apex, margins distinctly recurved, 1.5-4 x 0.2-1 cm, sessile, green above and ashy beneath, densely clothed with soft woolly tomentum below, 3 or more nerved, sessile and firmly adnate. Heads in compact, terminal corymbs, ca 6 mm across; peduncle ca 4 mm long, densely white cottony-woolly. Involucral bracts white or yellowish, in many series; outermost linear-lanceolate, enveloped in white wool, brownish at basal end; inner ones oblong, charred brown in the lower half. Ray florets ca 2.5 mm long, filiform, 5-toothed. Disc florets bisexual, ca 2.8 mm

long, 5-toothed. Achenes ca oblong, 0.5 mm, minutely scaly. Pappus hairs white, minutely bristly.

Fl. & Fr. Sept. - Feb.

Distrib. India: W. Ghats, common on rocky slopes and exposed places, 2270-2500 m. Tamil Nadu, Kerala and Karnataka.

Endemic.

28. *Anaphalis triplinervis* (Sims.) C.B. Clarke, *Comp. Ind.* 105. 1876; Hook.f., *Fl. Brit. India* 3: 281: 1881. *Antennaria triplinervis* Sims. in *Bot. Mag.* 51: t. 2468. 1823.

Herbs, erect, rhizomatous, 3-45 cm high; stems often flexuous, sometimes many from stoloniferous rootstock, striate, appressedly ashy white, hairy. Leaves very variable, broadly elliptic or linear-oblong or lanceolate or lowest obovate-spathulate, sometimes basal ones clustered, base clasping or amplexicaul or narrowed down to a flat petiole, acute with dark mucro or a scarious naked awn, entire, 0.4-13.5 x 0.1-5.5 cm, arachnoid hairy above and densely matted with white-grey tomentum beneath, 1-7 nerved. Heads solitary or more in terminal corymbs, 0.3-1.5 cm across; peduncles 0.3-3 cm long, densely woolly. Involucral bracts glistening white, scarious, many-seriate, ovate or elliptic-lanceolate, acute or obtuse, brownish at base. Ray florets female with filiform corolla, ca 2-3 mm long, obscurely or distinctly 4-toothed. Disc florets bisexual ca 2-3 mm long, 5-toothed. Style bifid. Achenes oblong, ca 0.3-0.8 mm long, tubercled-hairy. Pappus hairs white, bristly.

Notes. Highly variable, polymorphic species with the following varieties.

KEY TO THE VARIETIES

- | | |
|---|--------------------------------|
| 1a. Leaves broadly elliptic or obovate, 3-7 nerved | 28.3. var. <i>triplinervis</i> |
| b. Leaves narrowly lanceolate or obovate-spathulate, 1-3 nerved | 2 |
| 2a. Heads many, 3-4 mm across | 28.1. var. <i>intermedia</i> |
| b. Heads 1-5, 0.8-1.5 cm across | 28.2. var. <i>monocephala</i> |

28.1. var. *intermedia* (DC.) Airy-Shaw in *Bot. Mag.* 158: t. 9396. 1935. *Antennaria triplinervis* var. *intermedia* DC., *Prodr.* 6: 270. 1838. *Anaphalis nubigena* DC., *Prodr.* 6: 272. 1838; Hook.f., *Fl. Brit. India* 3: 279. 1881 p.p. *A. cuneifolia* (DC.) Hook.f., *Fl. Brit. India* 3: 280. 1881. *Antennaria triplinervis* var. *cuneifolia* DC., *Prodr.* 6: 270. 1838.



Fig. 24. *Anaphalis triplinervis* (Sims.) C.B. Clarke var. *triplinervis*

Fl. Fr. June, July - Sept.

Distrib. India: W. and E. Himalayas, in open shady places and along streams, 3000-3500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh and Sikkim.

28.2. var. *monocephala* (DC.) Airy-Shaw in Bot. Mag. 158: t. 9396. 1935. *A. monocephala* DC., Prodr. 6: 272. 1838. *A. nubigena* DC., Prodr 6: 272. 1838; Hook.f., Fl. Brit. India 3: 279. 1881. p.p.

Fl. & Fr. Aug. - Sept.

Distrib. India: N.W. and E. Himalayas, on rocky slopes and along streams, 2800-5000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Bhutan, Nepal, Tibet, S. China and Taiwan.

28.3. var. *triplinervis*

Fig. 24.

Fl. Fr. June, July - Oct.

Distrib. India: W. and E. Himalayas, common in meadows, shady slopes and sometimes found as undergrowth of *Quercus-Rhododendron* forest (In West Himalayan region), between 1800-3500 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Nagaland.

Pakistan, Nepal, Bhutan, Afghanistan, S. Tibet, S. China and Taiwan.

29. *Anaphalis virgata* Thomson ex C.B. Clarke, Comp. Ind. 107. 1876; *A. stoliczkai* C.B. Clarke, Comp. Ind. 108. 1876; Hook.f., Fl. Brit. India 3: 283. 1881. **Fig. 25.**

Herbs, perennial, erect, caespitously branched, up to 40 cm high; stems slender, pubescent. Leaves narrowly linear-oblong or elliptic-lanceolate, narrowed at base, acute at apex, sometimes with a dull brown mucro, margin flat or recurved, 0.5-3 x 0.05-0.6 cm, upper surface laxly hairy, dull green, undersurface ashy white, woolly, 1-nerved. Heads few, in terminal corymbs, 2-4 mm across; peduncle ca 2-4 cm long, woolly, buff coloured. Involucral bracts 3-4-seriate; outermost obovate-oblong; inner linear, oblong. Ray florets female with filiform corolla, up to 2.5 mm long, obscurely toothed. Style bifid.

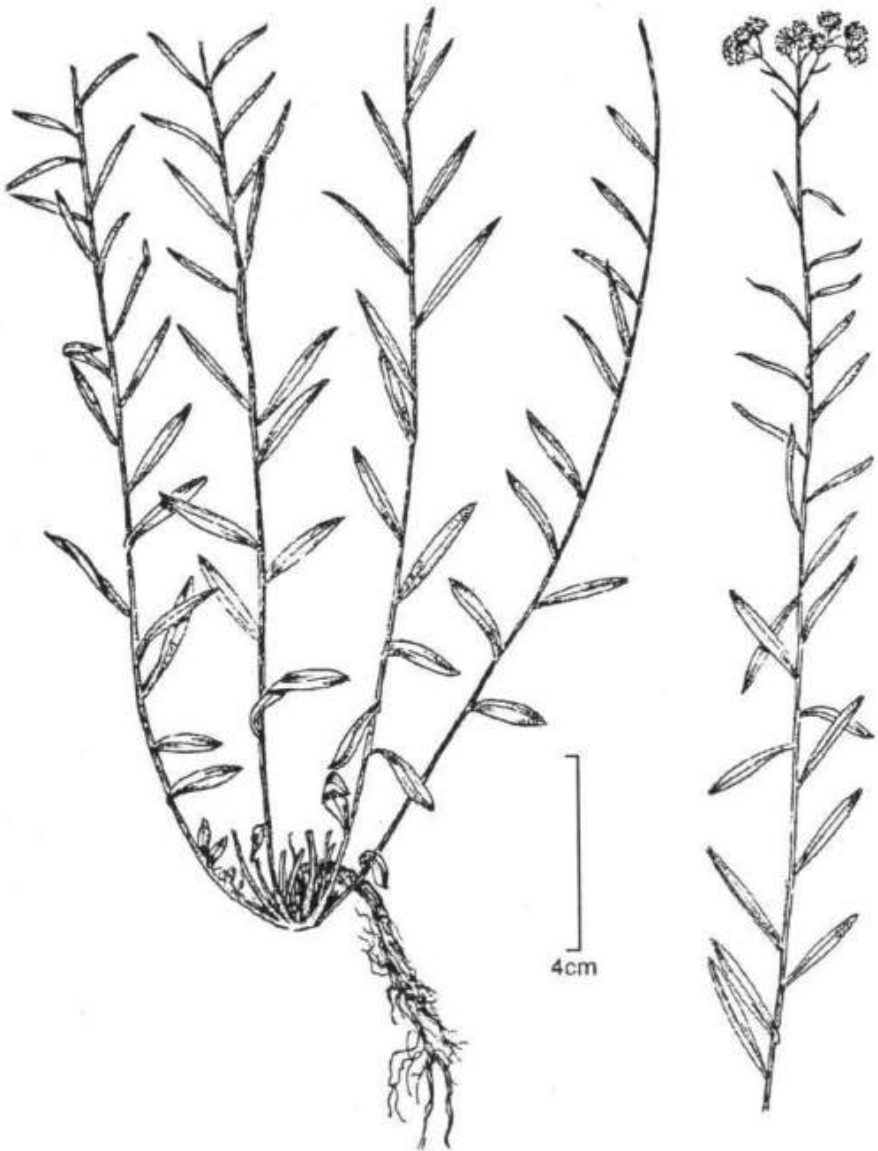


Fig. 25. *Anaphalis virgata* Thomson ex C.B. Clarke

Disc florets pale yellow, bisexual. Corolla ca 2 mm long, 5-toothed. Achenes dark brown, oblong, ca 0.5 mm long, or more or less rectangular, surfaces pitted. Pappus hairs silky white.

Fl. & Fr. July - Sept.

Distrib. India: W. Himalayas, common on exposed rocky soil and dry slopes, 2700-4400 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan, Nepal, Bhutan, Tibet and China.

30. *Anaphalis wightiana* (DC.) DC., *Prodr.* 6: 273. 1838; Hook.f., *Fl. Brit. India* 3: 286. 1881. *Gnaphalium wightianum* DC. in *Wight Contrib. Bot. Ind.* 21. 1834. Fig. 26.

Herbs, perennial, erect, sparsely branched, up to 60 cm high; rootstock woody; stems grooved, younger parts cottony woolly. Leaves linear-oblong, subamplexicaul, obtuse-acute at apex, margins recurved, 1-4.5 x 0.5-0.8 cm, upper surface pilosely scabrous, lower surface densely grey-white woolly, 1-nerved, sessile. Heads in dense corymbose clusters, ca 4 mm across; peduncle small, ca 1 mm long, densely woolly tomentose. Involucral bracts 3-4-seriate; outer white, ovate with a short brown suffused limb, enveloped by woolly tomentum; inner linear-oblong, brown suffused at lower end. Ray florets with filiform corolla, ca 2 mm long, minutely 4-toothed. Corolla in disc florets 2 mm long, 5-toothed. Achenes ca 0.5 mm long, terete or papillose. Pappus hairs white, minutely barbed.

Fl. & Fr. Sept. - June.

Distrib. India: W. Ghats, damp and cool places along streams and in grasslands, 750-2340 m. Tamil Nadu, Karnataka and Kerala.

Endemic.

Notes. Leaves on lower portion of stem are oblanceolate while those of terminal portion are linear, appressed and laxly arranged.

31. *Anaphalis xylorhiza* Sch.-Bip. ex Hook.f., *Fl. Brit. India* 3: 281. 1881. Fig. 27.

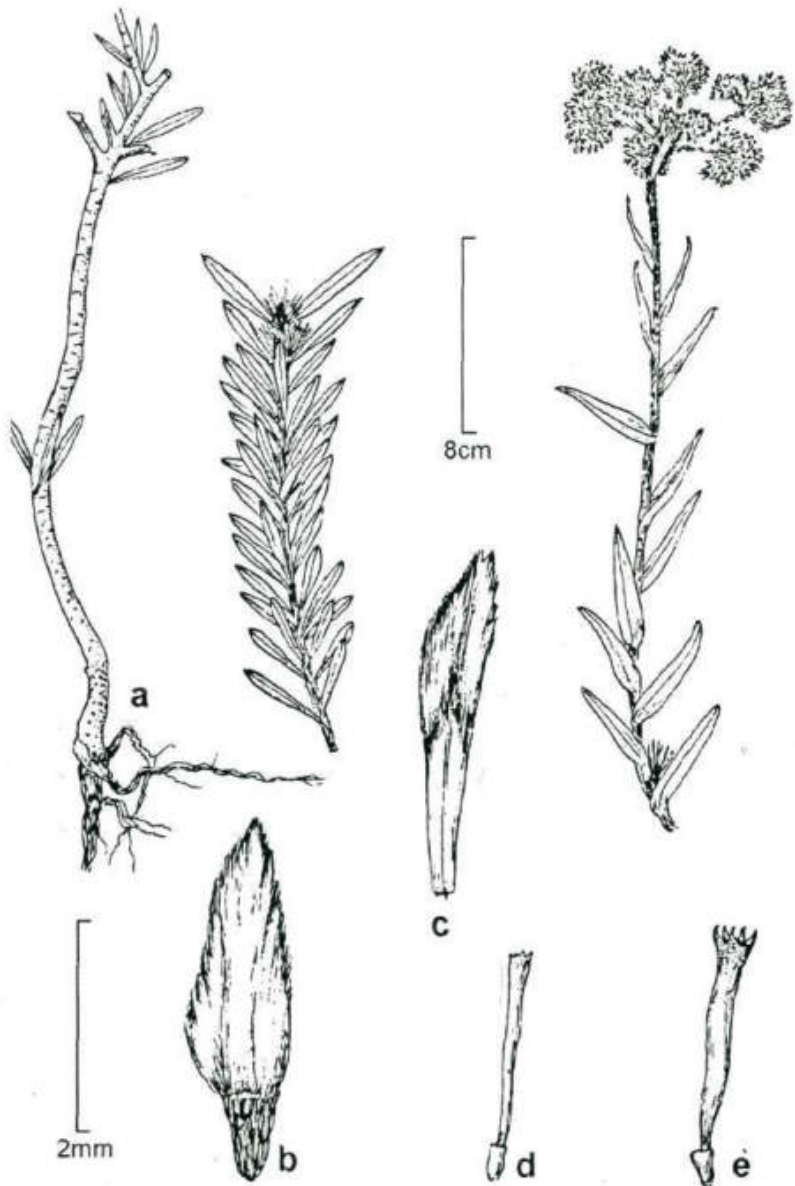


Fig. 26. *Anaphalis wightiana* (DC.) DC. : a. Habit; b. Outer involucre bract; c. Inner bract; d. Marginal female floret; e. Central bisexual floret.

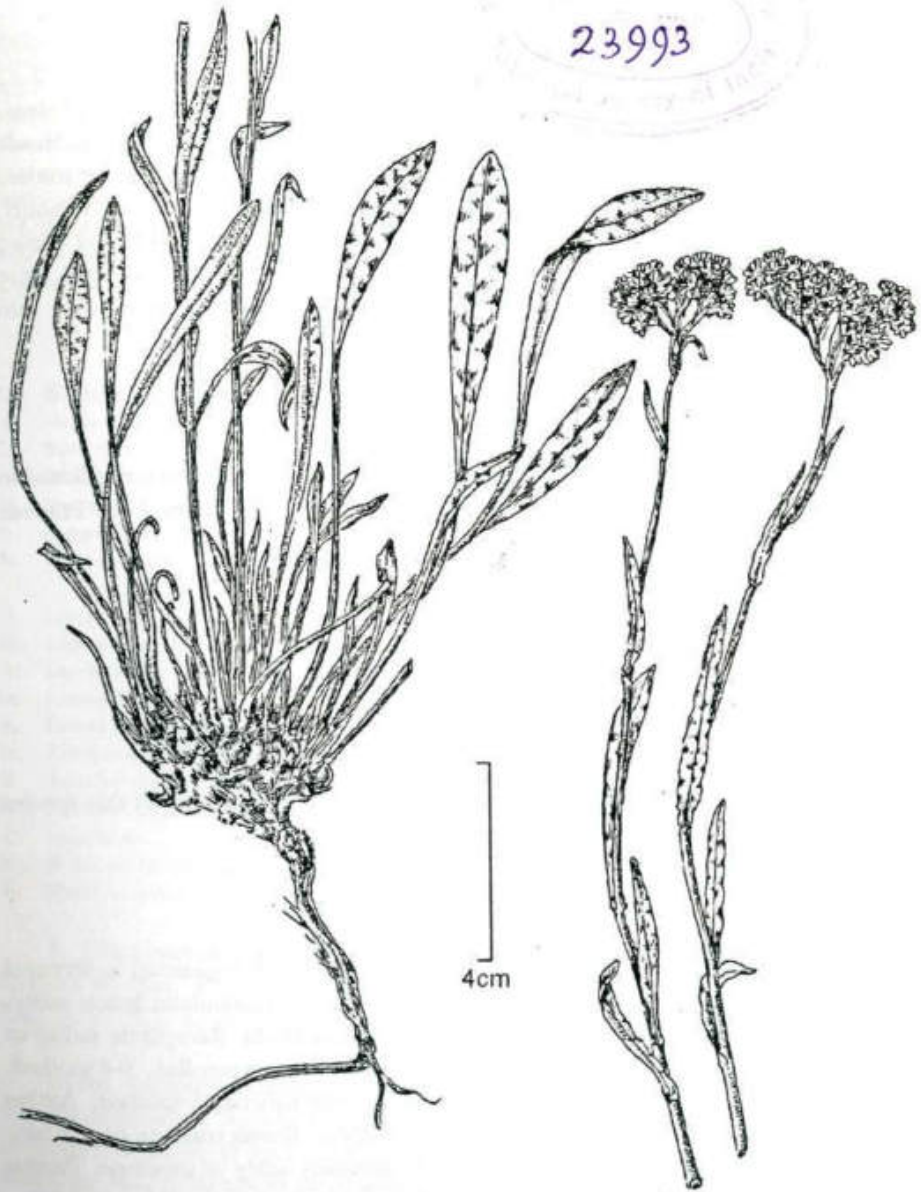


Fig. 27. *Anaphalis xylorhiza* Sch.-Bip. ex Hook.f.

Herbs, erect, up to 30 cm high; rootstock stout and twisted; stems clothed with soft brown woolly hairs. Leaves heterophyllous, linear-spathulate, ca 2-13 x 0.4-1 cm, at basal end, and linear-oblong, 2-3.5 x 0.1-0.4 cm, on aerial stem, upper surface pubescent-hairy, lower surface densely woolly, 3-nerved. Heads in terminal corymbs, ca 4 mm across; peduncle 2 mm long, woolly tomentose. Involucral bracts white, 3-4-seriate, scarious, ovate; outer bracts with short, suffused brown claw; inner narrowly oblong-spathulate with suffused brown claw. Ray florets with filiform corolla, ca 2.5 mm long, obscurely toothed. Disc florets bisexual, ca 2 mm long, 5-toothed. Achenes quadrangular, ca 1 mm long, papillose. Pappus hairs white, minutely barbed.

Fl. & Fr. Aug. - Oct.

Distrib. India: Himalayas, common on rocky crevices, sometimes found to occur in association with *Polygonum* sp. ascending up to 4725 m. Uttar Pradesh and Sikkim.

Bhutan, Nepal, Tibet and China.

EXCLUDED SPECIES

Anaphalis saxatilis Boerl., Hand. Fl. Nedl. India 2: 1. 1891.

There is a solitary specimen of this in CAL, but the identity of this species is doubtful as sufficient material is not available.

2. *Gnaphalium* L.

Hoary or woolly herbs. Leaves alternate. Heads heterogamous, in terminal or axillary corymbs or fascicles. Involucre ovoid or campanulate; bracts many, scarious or with a white, yellow or brown scarious blade. Receptacle naked or pitted. Ray florets female, fertile, 2-many, with filiform corollas, 3-4 toothed. Disc florets bisexual, few, tubular, slender; limb dilated, 5-toothed. Anther bases sagittate; tails slender. Style arms of bisexual florets truncate or capitate. Achenes oblong or obovoid, small, usually minutely scaly or papillose. Pappus hairs 1-seriate, plumose, slender or thickened at tip, connate at base or not.

Cosmopolitan in distribution; ca 300 species, 10 in India.

Literature. CABRERA, A.L. (1961). Observations Sobre Las Inulcae Gnaphalineae (Compositae) de America del sur. *Bot. Soc. Argent. Bot.* 9: 359-386. DRURY, D.G. (1970). A

fresh approach to the classification of the genus *Gnaphalium* with particular reference to the species present in New Zealand (Inuleae- Compositae). *New Zealand J. Bot.* 8: 222-248. GRIERSON, A.J.C. (1971). The Identity of *Gnaphalium indicum* Linn. *Notes Roy. Bot. Gard. Edinb.* 31: 135-138. GRIERSON, A.J.C. (1975). *Gnaphalium* Materials for a flora of Turkey XXXI. *Notes Roy. Bot. Gard. Edinb.* 33(3): 421-424. HILLARD, O.M. & B.L. BURTT (1981). Some generic concepts in Compositae. *Bot. J. Linn. Soc.* 82: 181-232. JEFFERY, C. (1979). Notes on the lectotypification of the names of *Cacalia* L., *Matricaria* L. and *Gnaphalium* L. *Taxon* 28(4): 349-351. KITAMURA, S. (1978). La Correspondance du Museum national d'histoire naturelle Paris. *Acta Phytotax. Geobot.* 53(5): 129-130. KOSTER, JOSEPHINE TH. (1941). Notes on Malayan Compositae. *Blumea* 4(3): 482-485.

KEY TO THE SPECIES

- | | |
|---|----------------------------|
| 1a. Heads in leafless corymbose clusters | 4. <i>G. luteo-album</i> |
| b. Heads in leafy spikes or in axillary or terminal clusters | 2 |
| 2a. Stout herbs; leaf bases semiamplexicaul, more or less decurrent | 3. <i>G. hypoleucum</i> |
| b. Slender herbs; leaf bases attenuate or narrowed to the stem | 3 |
| 3a. Pappus hairs coherent at base to form a ring | 4 |
| b. Pappus hairs free, | 6 |
| 4a. Lower surface of leaves white pannose, the subappressed hairs tightly emeshed | 8. <i>G. purpureum</i> |
| b. Lower surface of leaves loosely villous lanate to appressed white tomentose | 5 |
| 5a. Leaves large; inflorescence prominently leafy | 5. <i>G. pensylvanicum</i> |
| b. Leaves small; inflorescence almost leafless | 1. <i>G. coarctatum</i> |
| 6a. Leaves flaccid | 2. <i>G. flaccidum</i> |
| b. Leaves not flaccid | 7 |
| 7a. Achenes subsilky or scabrid | 9. <i>G. stewartii</i> |
| b. Achenes minutely papillose | 9 |
| 8a. Prostrate, diffusely branched herbs | 7. <i>G. pulvinatum</i> |
| b. Erect herbs | 8 |
| 9a. Heads in terminal, globose clusters | 10. <i>G. thomsonii</i> |
| b. Heads in spikes | 6. <i>G. polycaulon</i> |

1. *Gnaphalium coarctatum* Willd., Sp. Pl. 3: 1886. 1804; Singh & Sharma in Bull. Bot. Surv. India 30(1-4): 182. 1988. *G. spicatum* Lam., Encycl. 2: 757. 1788. non Miller.

Herbs, annual-perennial, upto 30 cm high, erect to decumbent, appressed whitish tomentose, simple or branched. Leaves oblanceolate or spatulate, obtuse or subacute at apex, margins somewhat crisped, 0.5-2 x 0.3-1.5 cm, characteristically discolourous. Heads in short axillary clusters, forming more or less interrupted spike, 2.5-3 mm across. Involucral bracts 3-seriate; outer ovate-elliptic, hairy at base; inner oblong or oblong-lanceolate, tips reddish-purple, turning to golden brown. Ray florets female, with filiform corolla, 3-4 toothed. Disc florets bisexual, narrowly tubular, dilated upwards, 5-toothed. Achenes oblong, 0.3-0.5 mm long, minutely glandular. Pappus hairs white.

Fl. & Fr. : March - Oct.

Distrib. India: W. Himalayas. Himachal Pradesh.

S. America.

2. *Gnaphalium flaccidum* Kurz in C.B. Clarke, *Comp. Ind.* 115. 1876; *Hook.f., Fl. Brit. India* 3: 290. 1881.

Herbs, erect, thinly viscid; stems simple or branched. Leaves obovate-cuneate, subamplexicaul at base, rounded at apex, flaccid. Heads in dense, terminal, globose clusters, subtended by shorter leaves. Involucral bracts broadly oblong with glistening white or rose coloured tips, often more or less olive coloured.

Fl. & Fr. Feb. - March.

Distrib. India: Indo-Gangetic Plain. W. Bengal; rare.

Myanmar.

Notes. Extremely rare, known by an old collection of C.B. Clarke. The description is based on the published literature as no specimens could be examined.

3. *Gnaphalium hypoleucum* DC. in Wight, *Contrib. Bot. Ind.* 21. 1834; *Hook.f., Fl. Brit. India* 3: 288. 1881.

Herbs, erect, robust, up to 90 cm high, branched above; stems pubescent, woolly upwards. Leaves linear, entire, base dilated, subamplexicaul-auricled, acuminate, apiculate, entire, 1.5-7.5 x 0.1-0.6 cm, dull green, puberulous rough on upper surface, white lanate beneath, sessile. Heads in dense, corymbose clusters, densely woolly, 0.1-0.3 cm across; peduncle small, 1-2 mm long, densely hairy. Involucral bracts yellow or snow white, glistening, 3-4-seriate, oblong, acute-obtuse and sometimes crisped at apex. Ray florets female, with filiform corolla, ca 2 mm long, 3-4 toothed. Disc florets bisexual, few, sterile or fertile. Corolla ca 2.2 mm, 5-toothed. Achenes ca 1 mm long, oblong-obovoid, compressed, smooth to minutely pitted; those of disc florets 1-2 mm long. Pappus hairs white, minutely bristly.

Fl. & Fr. May - Oct.

Distrib. India: Temperate region of E. & W. Himalayas, N.E. region, Thar desert, Gangetic Plain, W. Ghats, occasional in moist situations, in cultivated fields, exposed rocky soil, edges of forests, ascending to 3000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, West Bengal, Assam, Meghalaya, Tamil Nadu and Rajasthan.

Pakistan, Bhutan, Nepal, Myanmar, Thailand, China, Japan, Indo-China and Philippines.

4. *Gnaphalium luteo-album* L., Sp. Pl. 851. 1753; Hook.f., Fl. Brit. India 3: 288. 1881. *G. luteoalbum* L. subsp. *pallidum* (Lam.) Maheshw. in J. Bombay Nat. Hist. Soc. 57(2): 377. 1960.

Eng.: *Jersy Cudweed.*; Punj.: *Balraksha.*

Herbs, erect, often branched, 40-60 cm high; stems white woolly tomentose. Leaves 2-6 x 0.5-1.2 cm, entire sessile lower oblong-spathulate, narrowed down to the stem, obtuse, surfaces dull green, hairy above, densely white woolly tomentose beneath, 1-nerved, sometimes the upper leaves narrower, linear-lanceolate. Heads clustered in dense terminal, glistening corymbs, 3-4.5 mm across; corymbs woolly pubescent; peduncle ca 2 mm, densely buff tomentose. Involucral bracts yellow to pale or dark brown, many-seriate, elliptic-lanceolate, intermixed with few spathulate ones, obtuse. Ray florets female, many-seriate, ca 2 mm long, filiform, 3-4 toothed. Disc florets bisexual, 8-2 mm long, 5-toothed. Achenes linear, ca 0.5 mm long, papillose. Pappus hairs white, minutely barbed.

Notes. Koster (Blumea 4: 482-485. 1941) mentions two subspecies namely *G. luteo-album* L. subsp. *luteo-album* and *G. luteo-album* subsp. *affine* (D. Don) Koster. *G. luteo-album* L. subsp. *pallidum* (Lamk.) Maheshwari, has been merged under subspecies *luteo-album*. Further Tayal and Lalita (Bull. Bot. Surv. India 12(1-4): 205. 1970) have also mentioned under this species one var. *jacquemontii* from Uttar Pradesh. As no material of the said variety is available, this variety needs to be reexamined.

KEY TO THE SUBSPECIES

- | | |
|---|---------------------------------------|
| 1a. Involucral bracts pale to dark brown or reddish brown | 4.2. subsp. <i>luteo-album</i> |
| b. Involucral bracts citrine to golden yellow | 4.1. subsp. <i>affine</i> |

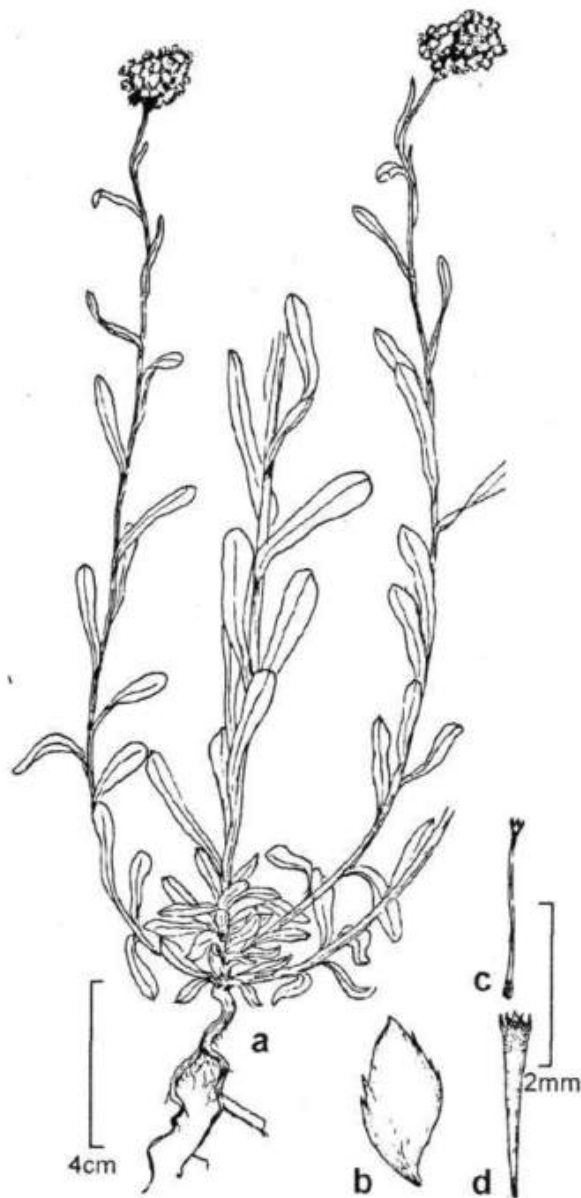


Fig. 28. *Gnaphalium luteo-album* L. subsp. *affine* (D. Don) Koster :
 a. Habit; b. Involucral bract; c. Marginal female floret; d. Central
 bisexual floret.

4.1. subsp. *affine* (D. Don) Koster in Blumea 4(3): 484. 1941. *G. affine* D. Don., Prodr. Fl. Nepal. 173. 1825. *G. luteo-album* L. var. *multiceps* DC., Prodr. 6: 222. 1838; Hook.f., Fl. Brit. India 3:288. 1881. Fig. 28.

Fl. & Fr. Almost throughout the year.

Distrib. India: More or less throughout India on dry sandy river beds, in moist situations, grassy slopes, fallow lands, as weed of cultivated fields and as undergrowth in Pine forests, ascending up to 3334 m. All Plain districts and Himalayas.

Pakistan, Nepal, Bhutan, Myanmar, Sri Lanka, China, Tibet, Japan, Thailand, Indo-China, Indonesia, Latvia, S. Sweden, Brazil, Asia, Africa, Australia and Europe.

4.2. subsp. *luteo-album*

Fl. & Fr. Almost round the year.

Distrib. India: Throughout, commonly along river banks, temporary ponds, road sides, ascending to 2800 m.

Mauritius, Philippines, Indo-China, Indonesia, New Guinea, Australia, Africa and Europe.

Notes. The distinguishing characters for the above two subspecies seem to be environmentally induced, and therefore, detailed biosystematic studies are essential to clearly delimit these taxa. The leaves of subsp. *luteo-album* are reported to be astringent, vulnerary (Chopra *et al.* Gloss. Indian Med. Pl. 126. 1956). Flowers and leaves are said to be edible (Deb, Flora of Tripura 2: 221. 1983).

5. *Gnaphalium pensylvanicum* Willd., Enum. Hort. Berol. 867. 1809. *G. peregrinum* Fernald in Rhodora 45: 479. t. 795. 1943. *G. purpureum* auct. non L.; Hook.f., Fl. Brit. India 3: 289. 1881. Fig. 29.

Herbs, erect, cottony woolly, 9-50 cm high, simple or branched, often decumbent; stems often with pearl grey cottony tomentum. Leaves dull green, spathulate-lanceolate, tapering at base, apiculate at apex, 1-9.5 x 0.5-2 cm, glabrescent to laxly villous on upper surface, white woolly or loosely villous-

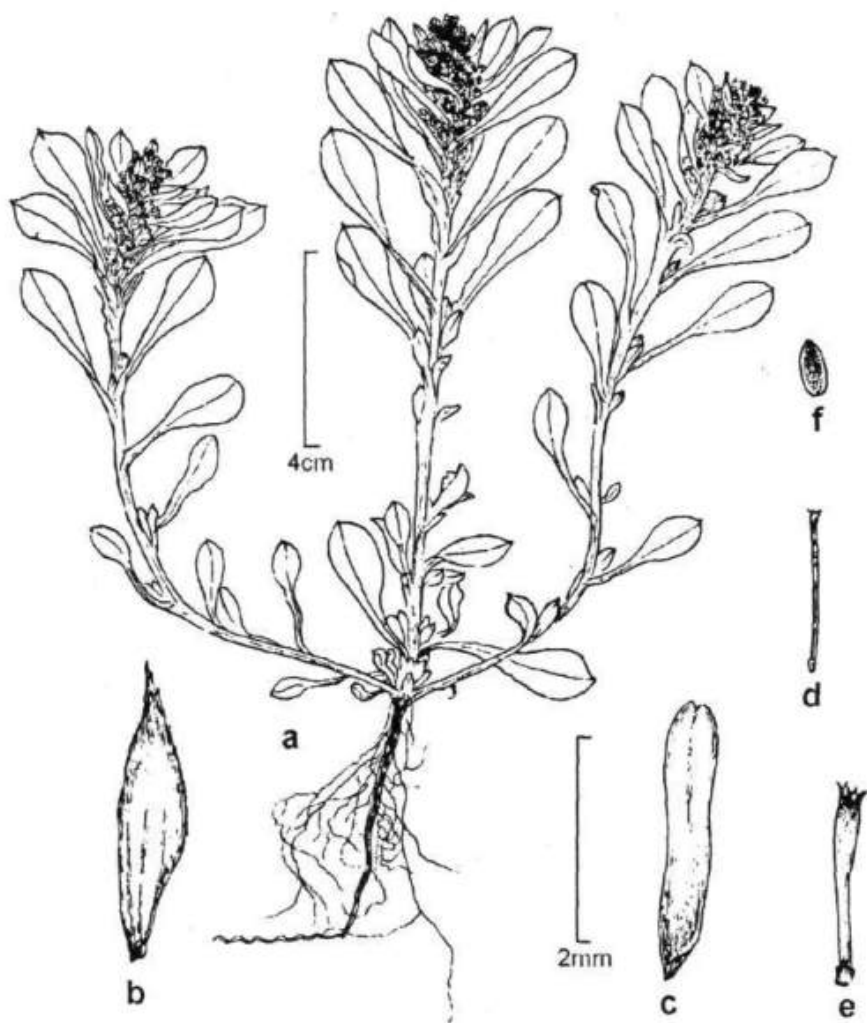


Fig. 29. *Gnaphalium pensylvanicum* Willd. : a. Habit; b. Outer involucre bract; c. Inner bract; d. Marginal female floret; e. Central bisexual floret; f. Achene.

lanate beneath. Heads axillary and in terminal clusters, densely white woolly tomentose, 1-2 mm across; peduncle obscure, ca 0.5 mm long, tomentose. Involucral bracts 2-3-seriate; outer ones light brown, ovate-lanceolate, acuminate; inner light brown, greenish towards the base, often narrowly oblong. Ray florets female, with extremely filiform corolla, ca 2 mm long, obscurely toothed. Disc florets bisexual, few. Corolla ca 2.3 mm long, 5-toothed. Achenes brown, oblong, 3-4 mm long. Pappus hairs white.

Fl. & Fr. Jan. - Nov.

Distrib. India: Major parts of country, in open dry places, sandy soil, dried ponds and canal banks, ascending to 2250 m.

Iraq, China, Sri Lanka, Mauritius, New Caledonia, Hawaii, Jamaica, S. America, S. Africa and Australia.

6. *Gnaphalium polycaulon* Pers., Syn. Pl. 2: 421. 1807. *G. indicum* auct. non L. (1753); Hook.f., Fl. Brit. India 3: 289. 1881. *G. strictum* Roxb., Fl. Ind. 3: 424. 1832. *G. multicaule* Roxb., Fl. Ind. ed. 2. 3: 425. 1832.

Tam.: *Saambapachchai*.

Herbs, slender, erect-decumbent, 50 cm high, usually with soft, white woolly tomentum, branched from the base. Leaves sessile, narrowly linear-obovate or oblanceolate-spathulate, obtuse, apiculate, 0.4-3.5 x 0.1-0.5 cm, glabrate-pubescent, dull green above, densely white woolly beneath, sometimes lowermost shortly petioled. Heads in dense, terminal and axillary, leafy spikes or crowded into ovoid clusters, ca 2 mm across; peduncle ca 1.5 mm long, densely hairy. Involucral bracts pale brown-glistening white; linear-oblong, acute, membranous, outermost woolly outwards. Ray florets female, fertile, with filiform corolla, ca 1 mm long, obscurely toothed. Disc florets female, with corolla ca 1 mm long, 5-toothed. Achenes oblong, minute, minutely papillose. Pappus hairs white, not coherent.

Fl. & Fr. Throughout the year.

Distrib. India: Throughout, common along banks of canals, river beds, sandy soil, dried ponds and as weed of cultivated fields, ascending to 750 m.

Pakistan, Nepal, Myanmar, Egypt, China, Japan, Senegal, Brazil, Australia and Tropical Africa.

7. *Gnaphalium pulvinatum* Del., Fl. Aegypt. 122. t. 44. f. 1. 1812; Hook.f., Fl. Brit. India 3: 289. 1881.

Herbs, prostrate, diffusely branched and woolly, 2-13 cm long. Leaves dull green, spatulate, narrowly attenuate at base, mucronate, 0.4-1.5 x 0.1-0.4 cm, hairy above and densely white woolly beneath, prominently 1-nerved; terminal leaves crowded, densely white woolly tomentose. Heads in rounded, axillary or terminal clusters among terminal leaves, ca 0.3 cm across; peduncle very obscure. Involucral bracts greenish tinged, narrowly elliptic-linear, membranous, recurved, tips acute, hyaline. Flowers pale brown to yellowish. Ray florets female, fertile, extremely filiform with corolla ca 1 mm long, obscurely toothed. Style bifid. Disc florets bisexual, few, fertile or sterile. Corolla ca 1 mm long, 5-toothed. Style bifid. Achenes oblong or turbinate, 0.3-0.5 mm, minutely papillose. Pappus hairs white.

Fl. & Fr. Dec. - April.

Distrib. India: Throughout, abundant on sandy soil, marshy lands, dried up ponds and road sides.

Pakistan, China, Egypt and Sinai.

8. *Gnaphalium purpureum* L., Sp. Pl. 854. 1753; Hook.f., Fl. Brit. India 3: 289. 1881. Fig. 30.

Herbs, erect, up to 50 cm high; stem, with thin, white cottony tomentum. Leaves spatulate, narrowed at base, broadly rounded and shortly mucronate at apex, entire, 1-7 x 0.1-1 cm, puberulous on upper surface, white pannose on lower surface. Heads in short spicate clusters, ca 2 mm across; peduncle ca 1 mm long. Involucral bracts 3-4-seriate; outermost brown, occasionally pink at apex, oblong-spatulate, obtuse-acute, with white woolly tomentum at base. Ray florets female, with filiform corolla, ca 1 mm long, pink at mouth. Disc florets bisexual, ca 2 mm long, 5-toothed. Achenes oblong, ca 0.5 mm. Pappus hairs white, united at base.

Fl. & Fr. Aug. - May.

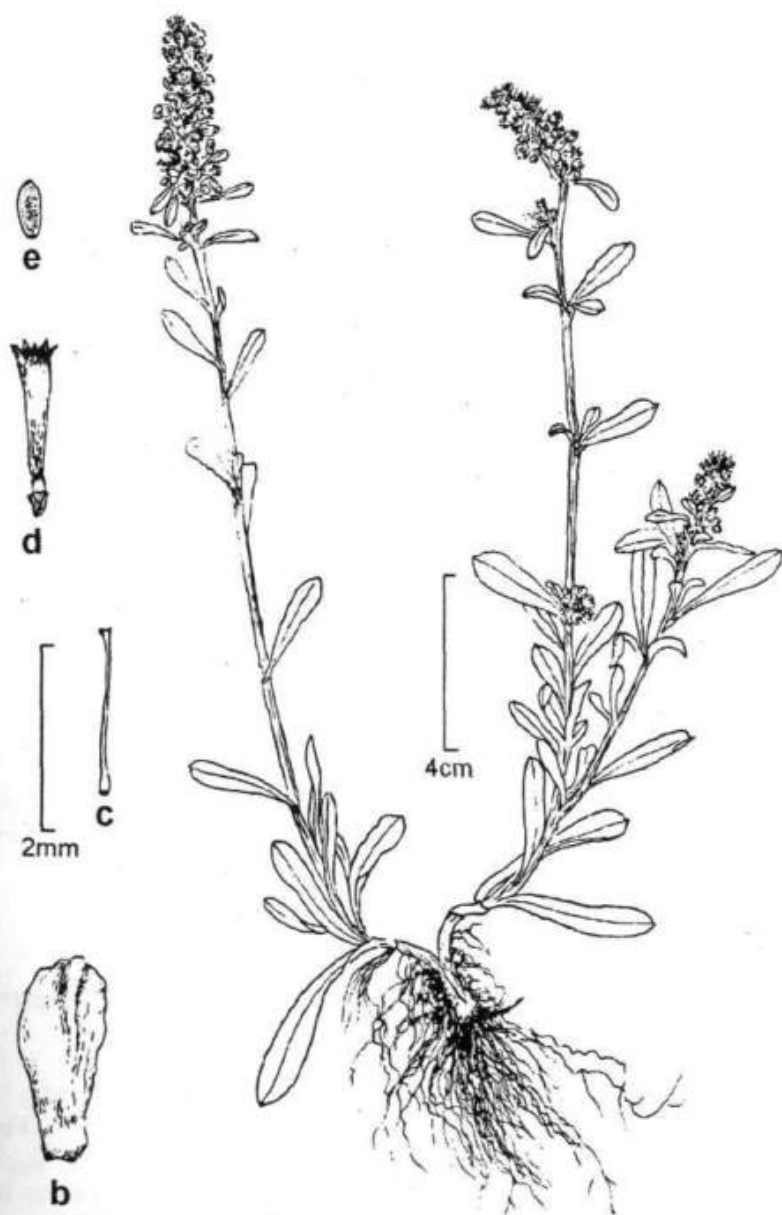


Fig. 30. *Gnaphalium purpureum* L. : a. Habit; b. Involucral bract; c. Marginal female floret; d. Central bisexual floret; e. Achene.

Distrib. India: Himalayas, W. Ghats, as a weed of tea gardens in Nilgiris, up to 1600 m. Jammu & Kashmir, West Bengal, Tamil Nadu and Maharashtra.

Pakistan, N. and S. America.

9. *Gnaphalium stewartii* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 289. 1881. Fig. 31.

Herbs, densely tufted, 3-12 cm high; stems densely cottony woolly. Leaves linear, 0.5-1 x 0.3-0.1 cm, sessile, radical in a rosette, acute at apex, entire, surfaces densely greyish-white tomentose, sometimes lower surface chestnut brown, 3-4 nerved; upper cauline leaves 0.3-1.2 x 0.1-0.2 cm, with woolly tomentum on surfaces. Heads axillary, solitary or in lax or densely leafy racemes, ca 2 mm across; peduncle ca 2 mm, densely tomentose. Involucral bracts chestnut brown towards the upper end and glistening white towards lower end, 2-3-seriate, linear-oblong, acute-obtuse. Ray florets female, ca 3 mm long, filiform, obscurely 3-4 toothed. Disc florets with corolla ca 3 mm long, 5-toothed. Achenes narrowly oblong, ca 1 mm long, minutely scabrid. Pappus hairs white, not cohering.

Fl. & Fr. July - Sept.

Distrib. India: W. Himalayas, common in patches in alpine meadows and moist plains below moraines, 3550-4400 m. Jammu & Kashmir and Himachal Pradesh.

Afghanistan, Pakistan, Caucasus, China and Turkey.

Notes. A remarkable species of *Gnaphalium* with the densely aggregated basal leaves forming almost a spherical cluster.

10. *Gnaphalium thomsoni* Hook.f., Fl. Brit. India 3: 290. 1881.

Fig. 32.

Herbs, erect, branched, 3-13 cm high, softly tomentose. Leaves linear-falcate, base narrowed, apices acute, entire, 0.5-3.5 x 0.1-0.2 cm, upper surfaces dull green, laxly appressed hairy, densely hairy beneath, sessile. Heads solitary or 2-3 in axils or terminal, ca 1 mm across, densely white woolly; peduncle ca 3 mm, tomentose. Involucral bracts specked with greenish-brown, 3-4-seriate, linear-oblong, subacute-obtuse, scarious. Ray florets female, 2-

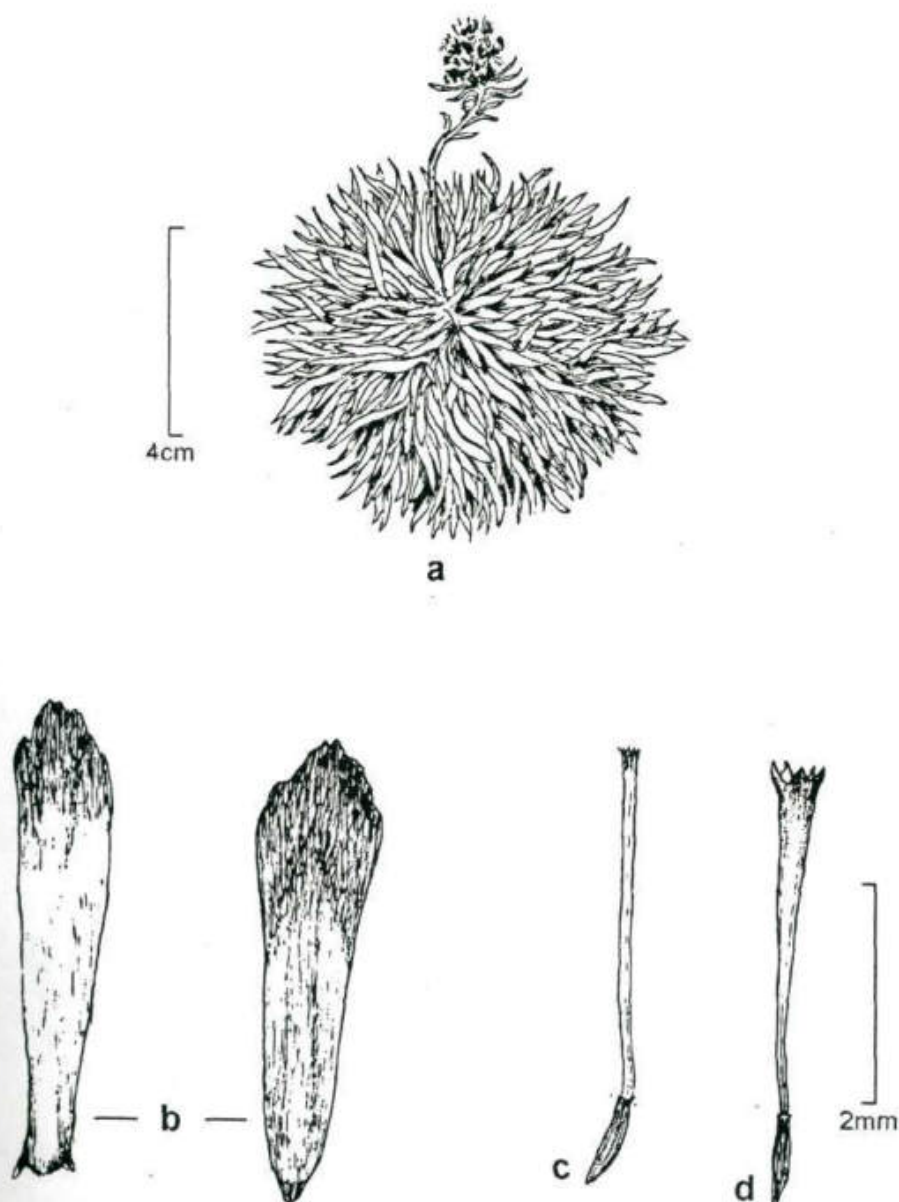


Fig. 31. *Gnaphalium stewartii* C.B. Clarke ex Hook.f. : a. Habit; b. Involucral bracts; c. Marginal female floret; d. Central bisexual floret.

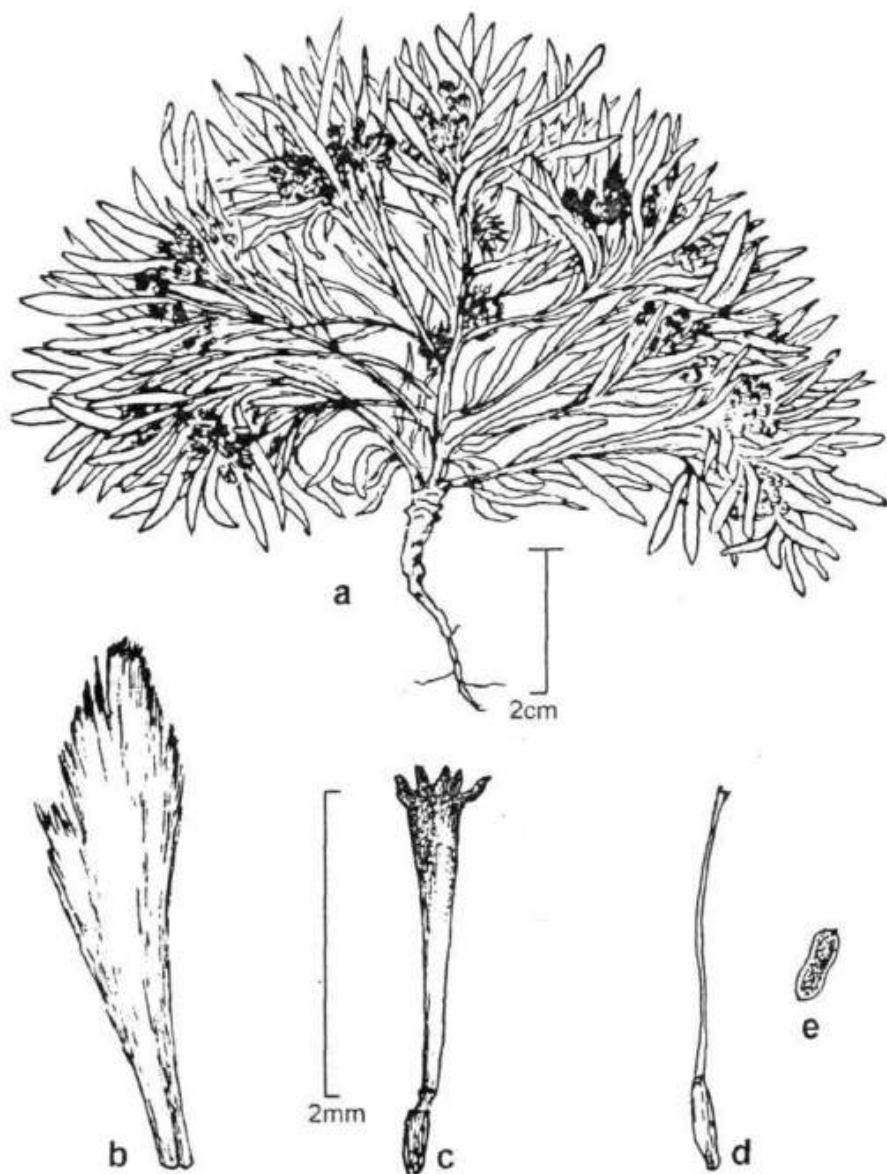


Fig. 32. *Gnaphalium thomsoni* Hook.f. : a. Habit; b. Involucral bract; c. Central bisexual floret; d. Marginal female floret; e. Achene.

more-seriate, 2-3 mm long, filiform, 3-4 toothed. Disc florets with corolla ca 2 mm long, 5-toothed. Achenes quadrangular, ca 0.5 mm long, sparingly papillose. Pappus hairs white.

Fl. & Fr. July - Oct.

Distrib. India: W. Himalayas, common along river banks and hill slopes, occasional along rocky beds of stream, 2800-3950 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan and China.

3. *Helichrysum* Miller

Herbs, shrubs or undershrubs, often densely white tomentose. Leaves alternate, entire, sometimes basal leaves clustered. Heads heterogamous or homogamous, many, solitary or in dense corymbs. Involucral bracts yellow, dull brown or white, many, scarious. Receptacle flat, naked or with bristly or paleaceous pit margins. Anther base sagittate with simple or branched tails. Ray florets female, filiform, fertile, minutely toothed. Disc florets bisexual, fertile or rarely sterile, tubular; limb 4-5-lobed. Achenes terete, angled or subcompressed, often papillose-scabrous. Pappus hairs 1-many-seriate, bearded or feathery above.

S. Europe, tropical & S. Africa, Madagascar, S.W. Asia, Sri Lanka, Australia and S. Africa; ca 500 species, 5 in India.

Literature. BURBRIDGE, N.T. (1958). A monographic study of *Helichrysum* Subgen. *Ozothamus* (Compos.) and two related genera formerly included therein. *Austr. J. Bot.* 6: 229-284. NAMUR, C. de & R. VERLAQUE (1976). Contribution a l'etude biogeographique du genre *Helichrysum* Miller. *Biol. Ecol. Medit.* 3(2): 17-22. RAO, R.S. & U.R. DESHPANDE (1968). *Helichrysum cutchicum* (C.B. Clarke) R.S. Rao & Desh., an interesting species from Western India. *Bull. Bot. Surv. India* 10: 225-227. t. 1, fig. 11.

KEY TO THE SPECIES

- | | |
|---|---------------------------|
| 1a. Plants glabrous; heads large, ca 3.5 cm across | 1. <i>H. bracteatum</i> |
| b. Plants clothed with cottony tomentum; heads small, ca 4 mm across | 2 |
| 2a. Stems slender, tufted; leaves 1-nerved | 3. <i>H. cutchicum</i> |
| b. Stems thick, not tufted; leaves many nerved | 3 |
| 3b. Leaves scattered althrough; achenes scabrid | 2. <i>H. buddleioides</i> |
| b. Basal leaves in rosette or clustered; achenes scaly | 4 |
| 4a. Appressed cinnamomeous woolly herbs; leaves recurved at tip, nerves prominently impressed | 5. <i>H. wightii</i> |
| b. Floccose woolly herbs; leaves not recurved at tip, nerves obscure | 4. <i>H. perlanigerum</i> |

1. *Helichrysum bracteatum* (Vent.) Andr., Bot. Repos. Sub.t. 428. 1805. *Xeranthemum bracteatum* Vent. Jard. Mal. 1: t. 2. 1803. *Helichrysum chrysanthium* Pers., Syn. 2: 414. 1807.

Herbs, somewhat branched, up to 1 m high; stems greenish or brownish, woody, striated, scabrous. Leaves lanceolate, base stem clasping, acute at apex, sometimes with a short mucro, entire, 1-6.5 x 0.2-0.9 cm, upper surface subscabrous, lower surface puberulous, 3-nerved, sessile. Heads forming terminal corymbs, ca 3 mm across; peduncle 0.5-5 cm long. Involucral bracts many, oblong; outer bracts charred brown, obtuse; inner sulphur yellow to white, longer than the outer. Ray florets with filiform corolla, ca 7 mm long, 4-5 toothed. Disc florets ca 4 mm long, 5-toothed. Achenes quadrangular, ca 2 mm long. Pappus hairs yellow-white, bristly.

KEY TO THE VARIETIES

- 1a. Stems brownish; involucral bracts charred brown-sulphur yellow; pappus hairs yellow **1.2. var. bracteatum**
 b. Stems greenish; involucral bracts white; pappus hairs white **1.1. var. albidum**

1.1. var. albidum DC., Prodr. 6: 189. 1838. *H. niveum* Grah. in Bot. Mag. t. 3857. 1841.

Distrib. India: Nilgiri hills. Tamil Nadu.

1.2. var. bracteatum

Fl. May - Dec. & *Fr.* June - Feb.

Distrib. India: Up to 2100 m. Tamil Nadu.

China, Indonesia, Panama, Australia and Europe.

Note. The yellow, shining papery bracts are quite attractive. Cultivated in most of the hill stations. This Taxon is reported to be abundantly growing in Kodaikanal with stray flowering round the year. It is a well known hardy, ornamental annual popularly known as "Everlasting Straw Flower".

2. *Helichrysum buddleioides* DC. in Wight, Contrib. Bot. Ind. 20. 1834; Hook.f., Fl. Brit. India 3: 290. 1881.

Shrubs or undershrubs, up to 4 m tall, sometimes scrambling; stems greyish white floccose tomentose. Leaves ovate-lanceolate or oblong-oblongeolate, base

subamplexicaul, acute-acuminate or obtuse and sometimes hooked at apex, margins recurved, 1-7 x 0.5-2 cm, upper surface glabrous or sparsely floccose hairy, lower surface with dense white or cinnamomeus-cottony tomentum, 3-7 nerved. Heads forming dense, terminal corymbs, in globose clusters, 2-2.5 mm across; peduncle very small, 0.2-1 mm long, densely woolly tomentose. Involucral bracts yellow-pale yellow, 4-many-seriate, enveloped in woolly tomentum; outer obovate, brown at base; inner oblanceolate, brown at basal end. Ray florets female, with filiform corolla, 1-2.5 mm long, obscurely or 4 toothed. Disc florets bisexual, with corolla 1-2 mm long, 5-toothed. Achenes ca 0.3 mm long. Pappus hairs white.

KEY TO THE VARIETIES

- 1a. Leaves ovate-lanceolate, thick, apex acuminate, hooked; nerves impressed
2.1. var. *buddleioides*
- b. Leaves oblong-oblanceolate, thin, apex obtuse-acute nerves not impressed
2.2. var. *hookerianum*

2.1. var. *buddleioides*

Fl. & Fr. Nov. - March.

Distrib. India: Deccan Plateau, up to 2500 m. Tamil Nadu and Karnataka.

Sri Lanka.

Notes. The stem is prominently ribbed and covered with thin, reddish brown bark which is visible by removing the appressed white tomentum.

2.2. var. *hookerianum* (Wight & Arn.) Hook.f., *Fl. Brit. India* 3: 291. 1881. *H. hookerianum* Wight & Arn. in DC., *Prodr.* 6: 201. 1838.

Fl. & Fr. July - March.

Distrib. India: Deccan Plateau, common in open grasslands, up to 1675 m. Madhya Pradesh, Tamil Nadu, West Bengal and Kerala.

Sri Lanka.

Notes. R.B. Ghosh and Bimal Mitra, in *Bull. Bot. Soc. Beng.* 36(42): 62. 1980, have treated this taxon as a distinct species.

3. *Helichrysum cutchicum* (C.B. Clarke) R. Rao et Desh. in Bull. Bot. Surv. Ind. 10(2): 227. 1968. *Anaphalis cutchica* C.B. Clarke, Comp. Ind. 3: 1876; Hook.f., Fl. Brit. India 3: 284. 1881. **Fig. 33.**

Herbs, diffused, up to 40 cm high, thinly clothed with grey-white cottony wool. Leaves linear or spatulate-linear, bases narrow, adhering to the stem, apices acute, mucronate, 2.5 x 1-10 cm, upper surface subglabrous or with lax cottony white hairs, lower surface white tomentose, 1-nerved, sessile. Heads terminal or very rarely axillary, sub corymbose. Involucral bracts many-seriate, covered with white, cottony wool on outer faces; outer ovate, irregularly toothed at tip; inner ovate-oblong, longer than the outer ones. Ray florets with filiform corolla, minutely toothed. Disc florets with 5-toothed corolla. Achenes oblong, verrucose. Pappus hairs uniseriate, barbellate, connate at base.

Fl. & Fr. Sept. - April.

Distrib. India: Indus Plain, confined to semi arid regions. Gujarat.

Endemic.

4. *Helichrysum perlanigerum* Gamble in Kew Bull. 1920: 341. 1920. **Fig. 34.**

Herbs to undershrubs, 1-1.5 m tall densely cinnamomeous woolly. Leaves 4-7 x 1-2.5 cm; basal in rosette; upper alternate, ovate, lanceolate, base broadly stem clasping, acute at apex, margins very slightly recurved, surfaces densely brownish yellow, woolly, 5-nerved, sessile. Heads, forming dense terminal corymbs, ca 3 mm across; peduncle ca 1 mm long, densely woolly tomentose. Involucral bracts pale yellow; up to 4-seriate; outermost oblong with expanded, ovate tip; inner narrowly oblong. Ray florets with filiform corolla, ca 2.3 mm long, 4-lobed. Disc florets ca 2.4 mm long, 5-toothed. Achenes ovoid, ca 0.8 mm long, scaly. Pappus hairs white, minutely bristly.

Fl. Feb. & *Fr.* Perhaps post winter.

Distrib. India: W. Ghats, reported to occur in high altitude grasslands, especially near streams, between 1900-2025 m. Tamil Nadu (Konalar-Thanakkamalai); rare.

Endemic.

Notes. A rare, endemic species recommended for conservation.

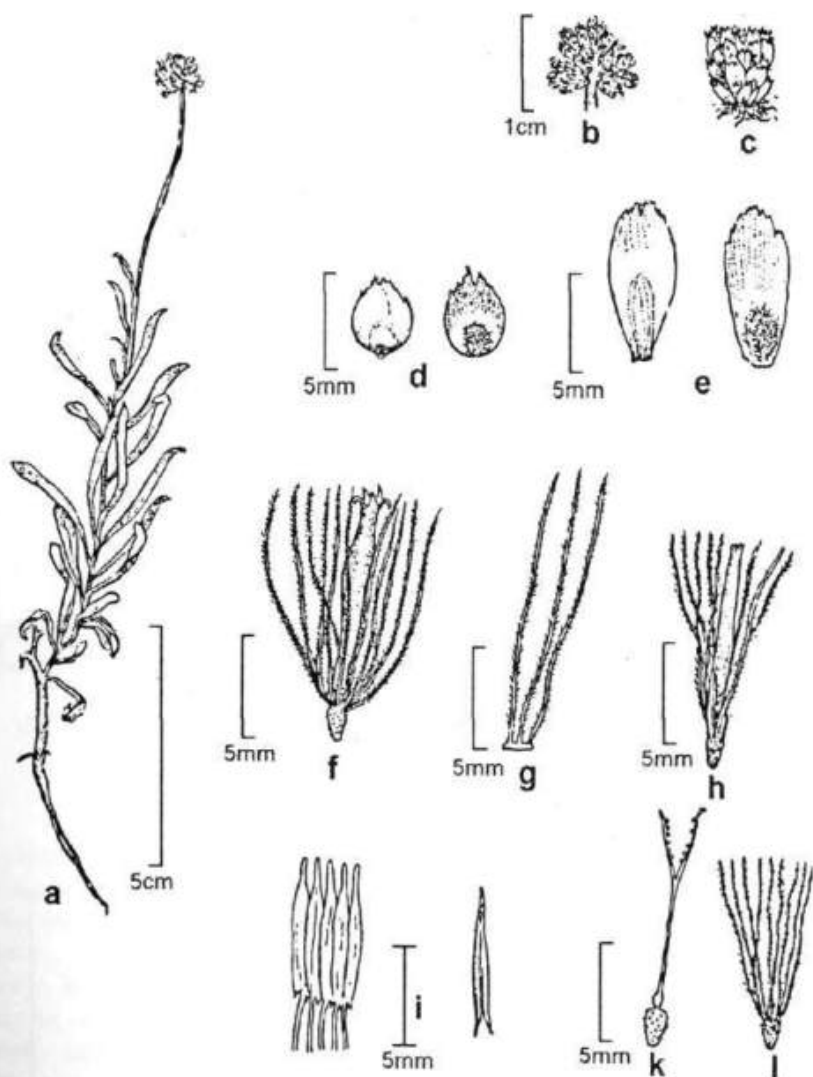


Fig. 33. *Helichrysum cutchicum* (C.B. Clarke) R. Rao et Desh. : **a**. Habit; **b**. Inflorescence with several heads; **c**. Single head with series of bracts; **d**. Outer bract (inside); Outer bract (outer side); **e**. Inner bract (inside); Inner bract (outside); **f**. Bisexual flower; **g**. A few hairs of pappus united at base; **h**. Female flower; **i**. Androecium; Anther with lower part caudate; **j**. Gynoecium; **k**. Achene.

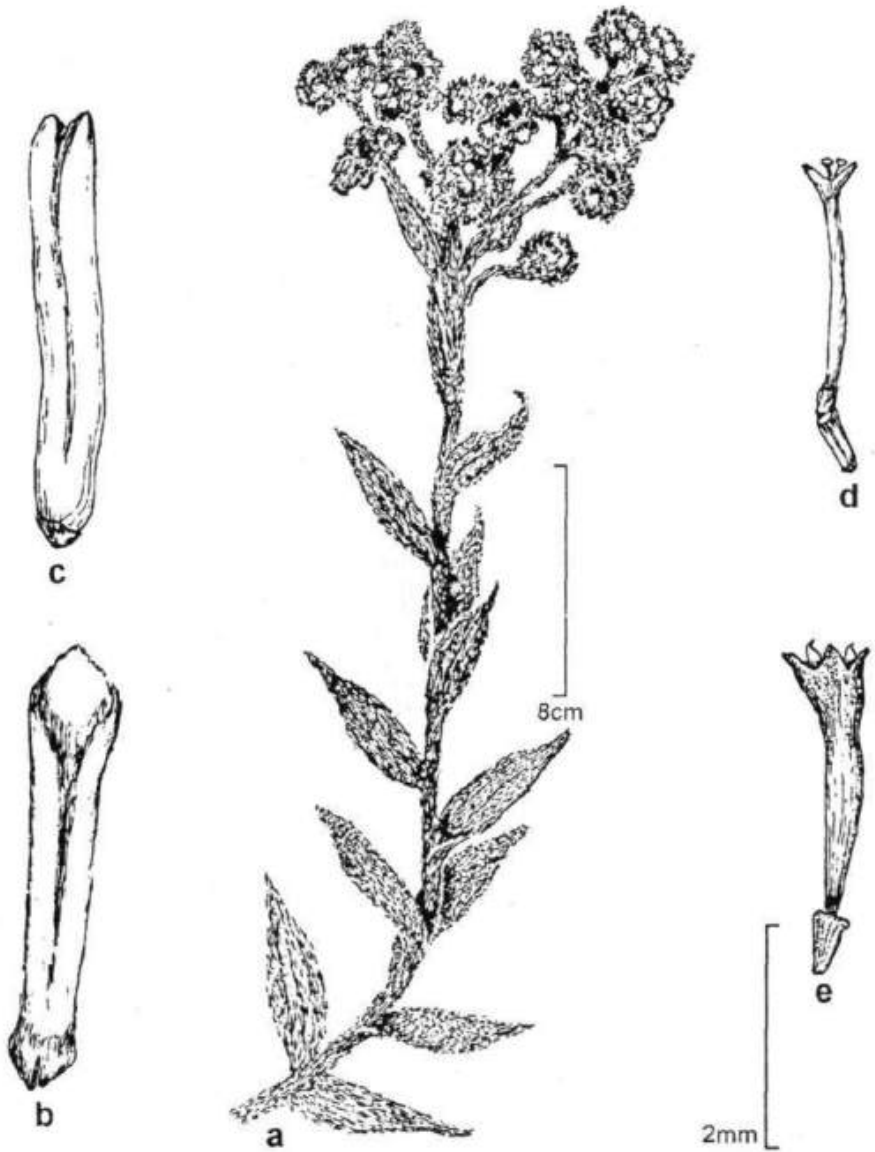


Fig. 34. *Helichrysum perlanigerum* Gamble : a. Habit; b. Outer involucre bract; c. Inner bract; d. Marginal female floret; e. Central bisexual floret.

5. *Helichrysum wightii* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 291. 1881.

Herbs, up to 30 cm high, usually branched; stems stout, covered with somewhat rusty brown-white, appressed, dense woolly pubescens. Leaves of flowerless branches clustered, linear-lanceolate, 3-6 x 0.3-0.7 cm; those of the flowering branches alternate, linear, base subamplexicaul, acute and slightly recurved at apex, margins recurved, 1.4-4 x 0.2-0.6 cm; thick, densely appressed cinnamomeous woolly on both surfaces; nerves 3-5, prominent, closely set, parallel raised on lower surface; sessile. Heads in subglobose, corymbose clusters, ca 2 mm across; peduncle ca 2 mm long, densely clothed with ferruginous woolly growth. Involucral bracts scarious, 3-4-seriate; of the outermost whorl elliptic, suffused with charred brown, specially towards the lower end, covered with dense woolly pubescens. Ray florets with filiform corolla, ca 1.8 mm long, minutely toothed. Disc florets with corolla ca 2 mm long, 4-5 toothed. Achenes ca 0.3 mm long, terete, subcompressed, papillose. Pappus hairs white, minutely bristly.

Fl. Nov. & *Fr.* Post winter.

Distrib. India: W. Ghats, 2500 m. Tamil Nadu. (Between Banga Taffar and Sispara).

Endemic.

4. *Leontopodium* (Pers.) R. Brown

Herbs, perennial, tufted, usually tomentose. Leaves in basal rosettes or clustered and spreading, alternate upwards, spatulate-linear, lanceolate or oblanceolate, entire. Heads dioecious or heterogamous, solitary or in involucral clusters, subsessile or peduncled. Involucral bracts many seriate, scarious, woolly. Receptacle convex or flat, naked. Ray florets female, filiform, fertile, truncate or minutely toothed. Disc florets bisexual, sterile, tubular; limb 4-5 lobed. Anther bases sagittate, auricled with slender tails or connate, caudate. Styles of bisexual florets entire or 2-fid. Achenes oblong, terete or subcompressed. Pappus hairs of female florets slender; those of bisexual florets crisped or thickened at tip.

In mountains of Europe, Asia and S. America; ca 30 species, 8 in India.

Literature. BEAUVERD, G. (1909). Contribution a L'etude Des composees Asiatiques *Bull. De La Soc. Bot. De Genev.* 1(5): 364-376. BEAUVERD, G. (1911). Sur La distribution

geographique des genres *Leontopodium* Cassini et *Cicerbita* Wallr. emend. Beauv. *Bull. Murith. Soc. Valais. Sci. Nat.* 36: 77-120. Refer also *Bot. Jahrb. Engl.* 46: 59-60. 1912. FRANCHET, H. (1927). Systematische Monographie der Gattung *Leontopodium* Beih. *Bot. Centralbl.* 44. 1-178. 1-2 Monographic. HANDEL-MAZZETTI, H. (1927). *Leontopodium* R. Br. *pflanzenr.* 1: 63-65. maps 51 a-54. Geographical distr. HARA et. al. (1982). *An enumeration of the flowering plants of Nepal* 3: 33-34.

Note. Heads in this genus have been described sessile (Hook.f., *Fl. Brit. India* 3: 278. 1881) but in most of the species they are shortly peduncled. Further the genus exhibits a wide range of variability and needs biosystematic and monographic approach for a correct assessment of the genus.

KEY TO THE SPECIES

- | | |
|---|---------------------------|
| 1a. Stems and leaves with stipitate glands | 8. <i>L. stracheyi</i> |
| b. Stems and leaves without such glands | 2 |
| 2a. Cushion forming; leaves densely imbricate, minute | 3. <i>L. haastioides</i> |
| b. Mat forming, tufted or caespitose; leaves in rosettes or scattered | 3 |
| 3a. Mat forming herbs with slender floriferous stalks; leaves covered with dense yellow-grey tomentum | 6. <i>L. monocephalum</i> |
| b. Tufted or caespitose herbs with thick floriferous stalks; leaves covered with ashy-white tomentum | 4 |
| 4a. Acaulescent herbs | 7. <i>L. nanum</i> |
| b. Stems prominent | 5 |
| 5a. Involucral bracts 3-5 cm long | 4. <i>L. himalayanum</i> |
| b. Involucral bracts 0.4-1.5 cm long | 6 |
| 6a. Stems with aerial stolons, involucral bracts triangular | 5. <i>L. jacotianum</i> |
| b. Stems without aerial stolons; involucral bracts not triangular | 7 |
| 7a. Indumentum crispate-lanate; foliaceous bracts ovate-lanceolate | 2. <i>L. brachyactis</i> |
| b. Indumentum non crispate; foliaceous bracts linear-oblong or spatulate | 1. <i>L. alpinum</i> |

1. *Leontopodium alpinum* Cass. in *Dict. Sci. Nat.* 25: 474. 1822; Hook.f., *Fl. Brit. India* 3: 279. 1881. p.p.

Herbs, erect, 4-30 cm high; stems laxly white tomentose. Leaves 0.5-7 x 0.2-0.5 cm; basal ones clustered, spatulate; cauline scattered, linear lanceolate-spathulate, narrowed at base or abruptly stem clasping, obtuse, upper surface arachnoid, lower surface with dense white tomentum. Heads unisexual or bisexual, solitary or clustered or in terminal corymbs, 5-8 mm across, subtended by linear-oblong or spatulate, densely tomentose foliaceous bracts; peduncle obscure or up to 5 mm long, densely hairy tomentose. Involucral bracts 3-4-seriate, white woolly; outer brown towards apex, pale yellow at basal end, lanceolate, margins erose; inner dark brown at apex, pale yellow at base, oblong. Ray florets female, few (in bisexual heads), with filiform corolla, 2-3 mm long, 4-toothed. Central bisexual florets with ca 3 mm long corolla, 5-

lobed, densely hairy outwards. Achenes oblong, ca 1 mm long, 3-4-ribbed, hairy. Pappus hairs white, thick, densely plumose at apex or thin.

KEY TO THE SUBSPECIES

- | | |
|---|----------------------------|
| 1a. Foliaceous bracts linear-oblong, longer than the capitula | 1.1. subsp. <i>alpinum</i> |
| b. Foliaceous bracts spatulate, equalling the capitula | 1.2. subsp. <i>nivale</i> |

1.1. subsp. *alpinum*

Fl. & Fr. July - Sept.

Distrib. India: Alpine Himalayas, commonly found in rocky crevices and slopes, 3500-6000 m. Jammu & Kashmir and Himachal Pradesh.

C. Asia and Europe.

1.2. subsp. *nivale* (Ten.) Tutin in Bot. J. Linn. Soc. 67: 283. 1973. *Gnaphalium nivale* Ten., Prodr. Fl. Nep. 48. 1831.

Fl. & Fr. April - June.

Distrib. India: Himalayas.

Yugoslavia, S.W. Bulgaria and Europe.

Note. In most Indian herbaria *L. alpinum* consists of a mixture of species of *Leontopodium*. Biosystematic approach is essential for critical delimitation of *Leontopodium alpinum* and its allies in Indian region.

2. *Leontopodium brachyactis* Gaud. in Bull. Soc. Bot. De France 46: 420. 1900. *L. alpinum* auct. non Cass. in Dict. Sc. nat. 25: 474. 1822., p.p.; Hook.f., Fl. Brit. India 3: 279. 1881. p.p.

Herbs, perennial, tomentose or glabrous; stems herbaceous or subliguous, at times stoloniferous. Leaves more or less linear; basal ones clustered, attenuate to petiole; cauline leaves nonsubulate, shortly mucronate, surfaces densely lanate-tomentose, 1-nerved. Inflorescence stalk single, dioecious, rarely mixed with few florets of another sex; capitulum laxly arranged, subtended by ovate-lanceolate, foliaceous bracts. Involucral bracts lanceolate, acuminate, aristate,

rusty brown at apex. Achenes of female florets longer than the sterile ones of hermaphrodite florets. Pappus 4.5-5 mm long.

Distrib. India: W. Himalayas, 2670 m. Jammu & Kashmir and Uttar Pradesh.

Afghanistan, Pakistan, Nepal, W. Tibet and China.

3. *Leontopodium haastioides* (Hand.-Mazz.) Hand.-Mazz. in Bull. Bot. Centralbl. 44(2): 84. Pl. 11, 7. 1928. *L. jamesonii* Hand.-Mazz. var. *haastioides* Hand.-Mazz. in Verh. Zool. Bot. Ges. Wien. 74: 24. 1924, *nom nud.* *Antennaria muscoides* Hook.f. & Thomson in Fl. Brit. India 3: 278. 1881.

Herbs, perennial, tufted, moss-like, woolly, tomentose, up to 5 cm long. Leaves spatulate, entire, 0.1-0.4 x 0.5-0.1 cm, membranous, closely imbricating, densely woolly tomentose. Heads dioecious, solitary, ca 0.3 cm across, sessile. Involucral bracts 2-3-seriate; outer linear-oblong, subacute, hyaline, clothed outwards with woolly growth; inner narrowly elliptic-linear, hyaline, clothed with woolly tomentum on outer faces. Female florets with filiform corolla, ca 3 mm long, 4-5 toothed. Achenes whitish brown, narrowly linear-oblong. Pappus hairs white, connate.

Fl. & Fr. July - Aug.

Distrib. India: E. Himalayas, 5000-6000 m. Sikkim.

Nepal, Bhutan and S. Tibet.

Notes. According to some authors only a part of *Antennaria muscoides* Hook.f. is synonymous to *Leontopodium haastioides* (Hand.-Mazz.) Hand.-Mazz. and the remaining part is treated under a separate species, *Leontopodium pusillum* (Beauv.) Hand.-Mazz. (in Verh. Zool. Bot. Ges. wein 74: 27. 1924).

4. *Leontopodium himalayanum* DC., Prodr. 6. 276. 1838. *L. alpinum* auct. non Cass. in Dict. Sc. Nat. 25: 474. 1822, p.p., Hook.f., Fl. Brit. India 3: 279. 1881. p.p. Fig. 35.

Herbs, perennial, erect, woolly, up to 25 cm high; stems ribbed and laxly white cottony, hairy. Leaves linear-lanceolate, base stem clasping, acute and shortly mucronate, margins flat, slightly recurved, 0.8-6 x 0.1-0.4 cm, upper surface laxly white woolly, lower surface densely grey-white woolly. Heads

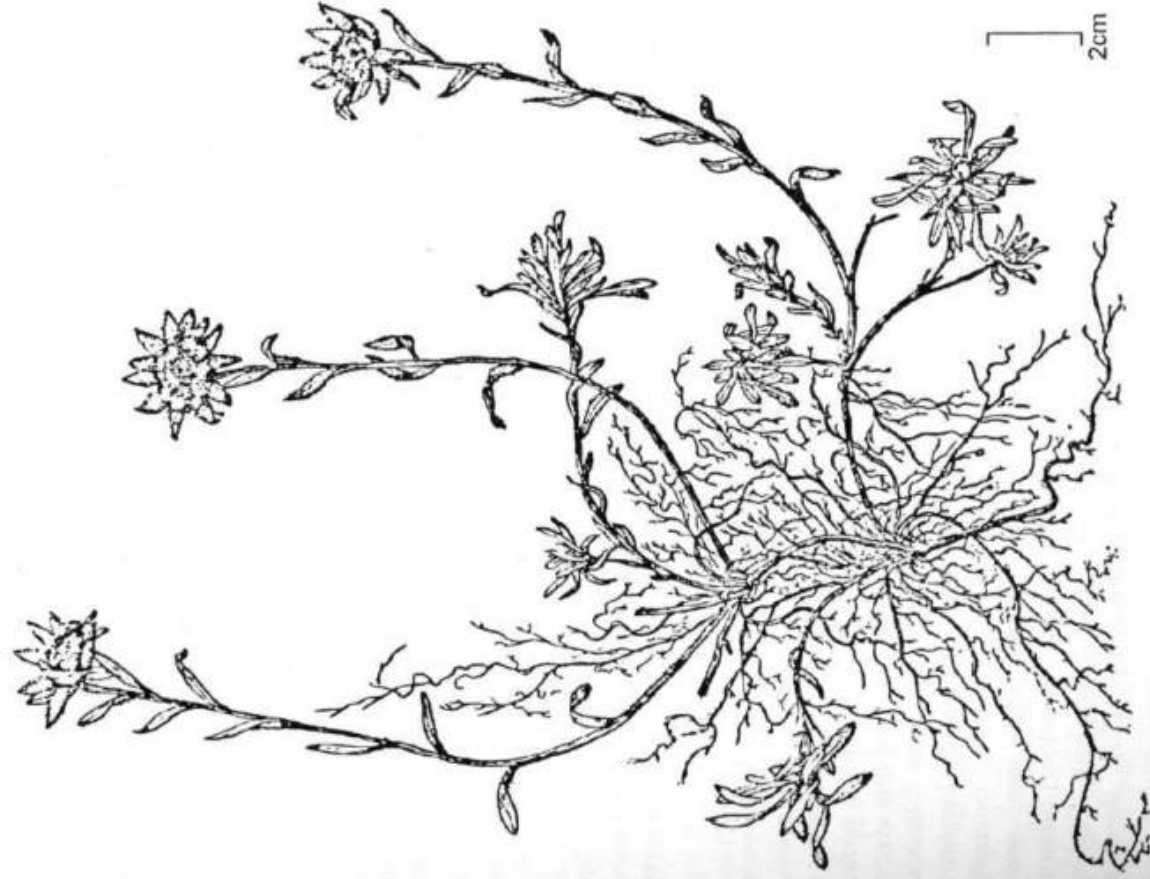


Fig. 35. *Leontopodium himalayanum* DC.

unisexual or bisexual, up to 9, in terminal umbels, 0.3-0.5 cm, across covered with lax, pale yellow wool and subtended by lanceolate to linear, radiating foliaceous, woolly bracts; peduncle up to 3 mm long, densely white woolly. Involucral bracts brown at margins and apex with a pale yellow band from centre to the base, 3-4-seriate, oblong to oblanceolate, hairy outwards. Ray florets female, ca 3.8 mm long. Corolla filiform, 3-lobed. Disc florets bisexual with corolla ca 3 mm long, 5-lobed. Achenes slightly quadrangular, ca 1 mm long, minutely hairy. Pappus hairs white, barbed.

Fl. & Fr. July - Oct.

Distrib. India: W. Himalayas, common on open moist alpine slopes and near snow line, 3000-5000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Nepal, Bhutan, Tibet and W. China.

5. *Leontopodium jacotianum* P. Beauv. in Bull. Soc. Bot. Geneve. Ser. 2, 1: 190-191. t. 4. 1909. *L. jacotianum* P. Beauv. var *paradoxum* (Drumm.) P. Beauv. in Bull. Soc. Bot. Genev. 11(4): 27. 1912. *L. paradoxum* Drumm. in Kew Bull. 1910 (3): 77. 1910.

Herbs, perennial, decumbent, stoloniferous, up to 25 cm high; stems filiform, laxly white woolly. Leaves 0.4-2 x 0.1-0.2 cm; basal in rosette, spatulate to linear lanceolate; cauline oblong-linear, base narrow, adhering to stem, acute with subulate mucro, upper surface laxly hairy, lower surface densely white woolly. Heads dioecious, in terminal clusters, 2-3 mm across, subtended by small, more or less triangular, densely tomentose foliaceous bracts; peduncle up to 0.8 mm, densely white woolly tomentose. Involucral bracts dark brown at apex, straw coloured at base; 2-3-seriate; outermost oblong-ovate, covered with white tomentum, margins erose; inner bracts narrow, linear or oblong. Female florets with corolla ca 3 mm long, filiform, minutely 3-toothed. Bisexual florets with corolla ca 2 mm long, 5-lobed. Achenes obovate, ca 1 mm long, 3-4 ribbed, hairy; those of disc florets ca 0.8 mm long. Pappus hairs white.

Fl. & Fr. Sept. - Oct.

Distrib. India: Himalayas, common in alpine meadows and open stony slopes, 3500-5000 m. Jammu & Kashmir, Uttar Pradesh and Sikkim.

Pakistan, Nepal, Bhutan, Myanmar, Tibet and S.W. China.

Notes. The subligneous stem emitting numerous aerial stolons, which give rise to sterile rosettes, is quite characteristic. Some workers have treated *L. paradoxum* as a distinct species while some treat it as a variety of *L. jacotianum*.

6. *Leontopodium monocephalum* Edgew. in Trans. Linn. Soc. 20: 73. 1846. *L. alpinum* auct. non Cass. in Dict. Sc. nat. 25. 474. 1822, *p.p.* *L. evax* P. Beauv. in Bull. De La Soc. Bot. De Genev. 1(5): 189. 1909. *L. fimbriigerum* Drumm. in Kew Bull. 1910(3): 76. 1910.

Herbs, prostrate, branched, forming dense matting; stems very slender, capillary hairy. Leaves 1-7 x 0.5-3 mm; basal ones clustered, spathulate; cauline scattered, oblanceolate or obovate, base narrowed, rounded at apex, surfaces with dense, pale yellow tomentum. Heads terminal, solitary, ca 3 mm across, subtended by pale yellow, densely woolly, involucral leaves; peduncle up to 1 mm long, tomentose. Involucral bracts 2-3-seriate with brown specks, margins lacerate, fimbriate at apex; outer covered with pale yellow hairs; inner oblanceolate. Ray florets female with filiform corolla, ca 3 mm long, 4-lobed. Disc florets bisexual, ca 3 mm long, 5-lobed. Achenes oblong, ca 1 mm long, pubescent-hairy. Pappus hairs white, plumose.

Fl. & Fr. Sept. - Oct.

Distrib. India: Himalayas, common on open moist boulders, 3350-5400 m. Jammu & Kashmir, Uttar Pradesh and Sikkim.

Pakistan and Nepal.

Note. In some specimens corolla of bisexual florets up to 7-lobed.

7. *Leontopodium nanum* (Hook.f. & Thomson ex C.B. Clarke) Hand.-Mazz. in Beih. Bot. Centralbl. 44(2): 111. pl. II, 11-17. 1928. *Antennaria nana* Hook.f. & Thomson ex C.B. Clarke., Comp. Ind. 100. 1876; Hook.f., Fl. Brit. India 3: 278. 1881.

Herbs, perennial, woolly, tufted, almost stemless. Leaves linear-spathulate or oblanceolate, narrowed at base, obtuse at apex, 0.3-1.5 x 0.1-0.4 cm, surfaces with greyish-white tomentum. Heads dioecious, solitary amongst the leaves, 0.3-1 cm across, sessile or peduncled; peduncle up to 1 cm, densely

woolly tomentose. Involucral bracts 2-3-seriate; outer dark brown, linear-lanceolate, margins erose, hyaline. Female florets with filiform corolla up to 5 mm long, 4-lobed. Achenes elliptic-oblong, ca 0.1 mm, puberulous. Pappus hairs white, minutely barbed.

Fl. & Fr. July - Oct.

Distrib. India: Himalayas, common on rocky, alpine slopes, meadows and along streams, 3000-4600 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal, Afghanistan, Pamir Hills, Tibet and China.

8. *Leontopodium stracheyi* (Hook.f.) C.B. Clarke ex Hemsley in J. Linn. Soc. Bot. 30: 136. 1894. *L. alpinum* var. *stracheyi* Hook.f., Fl. Brit. India 3: 279. 1881. *L. sinense* var. *stracheyi* (Hook.f.) Beauv. in Bull. De La Soc. Bot. De Genev. 1(5): 193. 1909.

Herbs, perennial, up to 45 cm high; stems with stipitate glandular hairs. Leaves lanceolate, auricled at base, cuspidate, undulate, 0.25-2.5 x 0.05-0.8 cm, viscidly glandular, arachnoid above, snow-white and densely woolly with prominent midrib beneath. Heads in clusters, ca 0.3 cm across; peduncle 0.2 cm long, tomentose. Involucral bracts dark brown, 2-3-seriate, ovate-oblong, densely woolly outwards, acute at apex, margins erose. Ray florets with filiform corolla, ca 2.5 mm long, minutely toothed. Disc florets with corolla ca 3.5 mm long, 5-toothed, usually sterile. Achenes elliptic oblong with angular faces, ca 1 mm long, hairy. Pappus hairs white, longer than the corolla tube; those of disc florets minutely barbed.

Fl. & Fr. Aug. - Oct.

Distrib. India: Restricted to Kumaon region of W. Himalayas, commonly found in meadows, 3835 m. Uttar Pradesh (Surajkund, Gori Valley, Kuthi, Nipchang Valley in Darma, Garbyang, Tola and Dhauli Valley of Pithoragarh District)

Nepal, Tibet and China.

EXCLUDED SPECIES

Leontopodium leontopodium (DC.) Hand.-Mazz. in Beih. Bot. Centralbl. 44(2): 118. 127. f. 4. 1927. *Antennaria leontopodina* DC., Prodr. 6: 269. 1838.

A Eurasiatic species of *Leontopodium* reported from Western Himalayas between 3000-5500 m. In the absence of any type material, it has not been possible to determine and establish the status of this species.

5. Phagnalon Cass.

Herbs or undershrubs, cottony woolly, rarely glabrous. Leaves alternate, entire or sinuate toothed. Heads yellow, heterogamous, disciform, solitary or fascicled. Involucre campanulate or ovoid; bracts many-seriate, dry, subulate or ovate-lanceolate, tips scarious; outer smaller. Receptacle flat, naked or pitted. Florets all fertile. Ray florets female, many-seriate, filiform, minutely 2-3 toothed; bisexual florets slender, tubular; limb obscurely dilated, 5-fid. Anther bases entire or sagittate, sometimes minutely tailed. Style arms of female florets slender, obtuse, truncate or subcapitate. Achenes small, not ribbed. Pappus hairs 1-seriate, slender, rigid, persistent.

Mediterranean, Canaries, C. and W. Asiatic regions; ca 40 species, 3 in India.

KEY TO THE SPECIES

- | | |
|--|-------------------------|
| 1a. Glabrous undershrubs | 2. <i>P. darvazicum</i> |
| b. Appressed softly hairy-woolly herbs-undershrubs | 2 |
| 2a. Stems with lax leaves; leaves 8-10 mm broad | 1. <i>P. acuminatum</i> |
| b. Stems with dense leaves; leaves ca 3 mm broad | 3. <i>P. niveum</i> |

1. *Phagnalon acuminatum* Boiss., Fl. Or. 3: 222. 1875.

Undershrubs; stems appressed hairy, 20-40 cm high. Cauline leaves lanceolate or oblanceolate, acuminate at apex, margins entire, rarely undulate or toothed, 3-4 x 0.8-1 cm white, surfaces finely hairy. Heads many-flowered. Involucre 7-9 mm long, many seriate; bracts linear-triangular. Corolla apex pale yellow.

Distrib. India: W. Himalayas. Jammu & Kashmir.

Afghanistan, Pakistan and Iran.

Notes. Included on the basis of Lack in Rechinger Fl. Iran. 145: 44-45. 1980.

2. *Phagnalon darvazicum* Krasch., Trudy Bot. Int. Akad. Nauk, URSS Ser. 1, 3: 343. 1936.

Undershrubs, whole plant without wool; stems erect, 5-30 cm high, simple or with few branches. Cauline leaves lanceolate, oblanceolate or spatulate, acute or cuspidate at apex, margins entire, rarely undulate or toothed, 1-3 x 0.2-0.7 cm, surfaces, shining green, glabrous, nerve impressed on upper side. Heads many-flowered. Involucre 6-9 mm long; bracts linear-triangular, inner 6-9 x 0.5 mm, acute, margins entire or ciliate. Corolla apex pale yellow or violet.

Distrib. India: W. Himalayas. Jammu & Kashmir.

Afghanistan, Pakistan, Tadjikistan and Iran.

Notes. Included on the basis of Lack in Rechinger Fl. Iran. 145: 42-43. 1980.

3. *Phagnalon niveum* Edgew. in Trans. Linn. Soc. 20: 68. 1846; Hook. f., Fl. Brit. India 3: 288. 1881. Fig. 36.

Herbs to undershrubs, tufted; rootstock thick, woolly; branches 5-25 cm long, slender, woody. Leaves obovate-elliptic-oblong, or linear-oblong, sometimes spatulate, acute or obtuse at apex, entire or sinuately toothed, 1-1.5 x 0.1-0.3 cm, dark above and densely white woolly beneath, sessile. Heads solitary or fascicled axillary, 3-6 mm across, peduncle 0.5-1.2 cm long, densely white woolly. Involucral bracts linear, subulate, with scarious tips and margins; outermost smaller, 0.5-2 mm, white woolly outside; inner 3-6 mm long. Ray florets female, filiform. Corolla pale yellow, slightly pinkish at mouth, 2-4 mm long, minutely 2-3 toothed. Style branches short. Disc florets bisexual, few, all fertile. Corolla ca 6 mm long, 5-fid, pinkish at the tip. Style branches short. Achenes conical, ca 1 mm long, minutely hairy; those of disc florets oblong, ca 0.5 mm long. Pappus hairs white, slender, barbed.

Fl. & Fr. June - Sept.

Distrib. India: W. Himalayas, eroded rock and rocks crevices, 1500-2500 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.



Fig. 36. *Phagnalon niveum* Edgew. : a. Habit; b. & c. Involucral bracts; d. Marginal female floret; e. Central bisexual floret.

Subtribe 6. PLUCHEINEAE Cass.

(S. Kumar)

Heads androgynous. Involucral bracts herbaceous or dry; the inner scarious. Receptacle naked. Anther bases tailed (except *Laggera* and *Blumeopsis*). Style arms of bisexual florets filiform, of sterile florets undivided.

8 genera and \pm 47 species in India.

KEY TO THE GENERA

- | | |
|--|------------------------|
| 1a. Shrubs or undershrubs; involucral bracts broad, scaly | 6. <i>Pluchea</i> |
| b. Herbs, rarely shrubs or undershrubs; involucral bracts narrow, not scaly | 2 |
| 2a. Bisexual florets two lipped | 5. <i>Nanothamnus</i> |
| b. Bisexual florets tubular | 3 |
| 3a. Heads compound, few flowered aggregated into globose or compact cylindrical mass | 4 |
| b. Heads solitary, many flowered, arranged in lax panicle or corymb | 5 |
| 4a. Pappus absent | 8. <i>Sphaeranthus</i> |
| b. Pappus present | 7. <i>Pterocaulon</i> |
| 5a. Pappus absent | 3. <i>Epaltes</i> |
| b. Pappus present | 6 |
| 6a. Leaves decurrent (except <i>B. venkataramanii</i>) | 4. <i>Laggera</i> |
| b. Leaves not decurrent | 7 |
| 7a. Anthers tailless | 2. <i>Blumeopsis</i> |
| b. Anthers tailed | 1. <i>Blumea</i> |

1. *Blumea* DC.

Herbs, undershrubs or shrubs, annual or perennial, usually aromatic; stems simple or branched, erect, sometimes procumbent, climbing or prostrate, glabrate or variously pubescent. Leaves alternate, simple, linear-lanceolate, oblong, ovate, obovate or oblanceolate, base decurrent, semi-amplexicaul or tapering, entire or pinnately or lyrate lobed, the apex usually apiculate, sometimes acute, the margins, serrate, dentate or denticulate, both surfaces generally pubescent, sessile or subsessile. Heads heterogamous, disciform, solitary axillary or terminal, arranged in lax to compact panicles or glomerulate, few or many, sessile or pedunculate. Involucral bracts multi-seriate; outer ones usually linear, sometimes oblong to ovate, herbaceous, smaller; the inner linear or linear oblong, hairy or pubescent on the dorsal surface, with scarious margins. Receptacles naked or epaleaceous, flat, convex or rarely slightly concave, areolate or alveolate, glabrous or pilose or densely pubescent. Florets numerous, multiseriate; the central ones usually bisexual, rarely neutral; the marginal ones female. Corolla of central florets mostly yellow, sometimes pinkish, or purple; tubular, 5-lobed; lobes angular, papillate, glabrous or

pubescent on lobes, rarely on tubes; corolla of female florets usually filiform, slender, 2-4 lobed, generally glabrous, sometimes pubescent. Anthers tailed. Achenes brown, oblong, angular or ribbed, glabrous or pubescent. Pappus white, yellowish or red, uniseriate, with numerous, slender, barbellate hairs.

Tropical and subtropical regions of S.E. Asia, Africa and Australia; ca 50 species, 29 in India.

Literature. DAKSHINI, K.M.M. & PRITHIPAL SINGH (1977). Numerical Taxonomy of the Genus *Blumea* in India. *Phytomorph.* 27: 247-260. K.M.M. DAKSHINI (1977). Chemotaxonomic studies on the genus *Blumea* DC. (Asteraceae - Inuleae) in India. *Acta. Bot. Ind.* 5(2): 143-159. 3. RANDERIA, A.J. (1960). The composite genus *Blumea*, a taxonomic revision. *Blumea* 10: 176-317.

KEY TO THE SPECIES

- | | | |
|---|------------------------------|----|
| 1a. Leaves decurrent, forming wings on stem | 28. <i>B. venkataramanii</i> | |
| b. Leaves not forming wings on stem | | 2 |
| 2a. Plants densely white-woolly all over | | 3 |
| b. Plants glabrate or variously pubescent but never woolly all over | | 7 |
| 3a. Leaves spiny toothed; corolla of bisexual florets hairy on tube and on lobes | | |
| | 17. <i>B. malcolmii</i> | |
| b. Leaves not spiny toothed; corolla of bisexual florets hairy only on lobes | | 4 |
| 4a. Outer involucre bracts oblong-lanceolate, acute | 11. <i>B. hieracifolia</i> | |
| b. Outer involucre bracts linear, tapering | | 5 |
| 5a. Heads 14-18 mm in diam. | 18. <i>B. martiniana</i> | |
| b. Heads 4-12 mm in diam. | | 6 |
| 6a. Heads peduncled; leaves membranous; oblong-lanceolate | 12. <i>B. hookeri</i> | |
| b. Heads sessile; leaves densely tomentose beneath, elliptic-lanceolate | 8. <i>B. densiflora</i> | |
| 7a. Outer involucre bracts oblong-ovate to oblong-lanceolate | | 8 |
| b. All involucre bracts linear or lanceolate | | 13 |
| 8a. Leaves glabrate on upper surface | | 9 |
| b. Leaves variously pubescent on upper surface | | 11 |
| 9a. Erect; leaves oblanceolate; receptacle fimbriate; corolla lobes of female florets glabrous or nearly so | 16. <i>B. lanceolaria</i> | |
| b. Scandent; leaves obovate-oblong or elliptic-oblong; receptacles densely pubescent; corolla lobes of female florets hairy | | 10 |
| 10a. Heads 8-13 mm across; panicles many headed | 25. <i>B. riparia</i> | |
| b. Heads 14-18 mm across; panicles few headed | 19. <i>B. megacephala</i> | |
| 11a. Heads in narrow, elongate, panicles | 7. <i>B. clarkei</i> | |
| b. Heads in large, spreading panicles | | 12 |
| 12a. Leaves 20-30 cm long, petiolate; branches glabrous; heads 1.5 cm across; corolla lobes of bisexual florets pubescent | 27. <i>B. sikkimensis</i> | |
| b. Leaves 10-18 cm long, sessile; branches villous or tomentose; heads 1-1.2 cm across; corolla lobes of bisexual florets hairy | 24. <i>B. procera</i> | |
| 13a. Receptacle fimbriate | 1. <i>B. aromatica</i> | |
| b. Receptacle glabrous or pilose | | 14 |

- 14a. Pappus reddish 15
 b. Pappus white 16
- 15a. Leaves pinnately lobed and coarsely dentate; corolla lobes of bisexual florets with
 colleters and multicellular hairs 13. *B. junghuhniana*
 b. Upper leaves unlobed, minutely serrate; corolla lobes of bisexual florets with
 colleters only 2. *B. balsamifera*
- 16a. Corolla lobes of bisexual florets with multicellular hairs in addition to colleters 17
 b. Corolla lobes of bisexual florets glabrous or with unicellular hairs in
 addition to colleters 18
- 17a. Leaves acute, remotely denticulate; involucrel bracts almost equal to the length of florets
 6. *B. bovei*
 b. Leaves apiculate, serrate-dentate; involucrel bracts longer than florets 22. *B. obliqua*
- 18a. Heads solitary axillary or terminal; the uppermost pair of leaves subopposite 5. *B. bifoliata*
 b. Heads glomerulate or variously paniculate, all leaves alternate 19
- 19a. Heads glomerulate; the clusters interruptly spicate 20
 b. Heads paniculate 21
- 20a. Receptacle glabrous; leaves lyrate-ly lobed; involucrel bracts acuminate 26. *B. sessiliflora*
 b. Receptacle pubescent; leaves not lobed; involucrel bracts acute 10. *B. fistulosa*
- 21a. Leaves spiny toothed; corolla hairy 22
 b. Leaves not spiny toothed; corolla of female florets glabrous 24
- 22a. Heads in sessile, axillary clusters; anthers well developed; achenes terete
 4. *B. belangeriana*
 b. Heads in pedunculate clusters; anthers abortive; achenes angled 23
- 23a. Prostrate herbs with branches radiating from the rootstock; corolla hairy on lobes;
 leaves irregularly dentate 23. *B. oxyodonta*
 b. Erect herbs; corolla lobes and tubes hairy all over-leaves alternately long and
 short toothed 9. *B. eriantha*
 15. *B. laciniata*
- 24a. Receptacle minutely pilose 25
 b. Receptacle glabrous 26
- 25a. Achenes subangular, terete, not ribbed 26
 b. Achenes ribbed 27
- 26a. Heads purple; leaves not lyrate-ly lobed 21. *B. mollis*
 b. Heads yellow; leaves lyrate-ly lobed 14. *B. lacera*
- 27a. Leaves white pubescent on the lower surface 3. *B. barbata*
 b. Leaves not white pubescent on the lower surface 28
- 28a. Plants glabrous 29. *B. virens*
 b. Plants pubescent or glandular 20. *B. membranacea*

1. *Blumea aromatica* DC., Prodr. 5: 446. 1836; Hook.f., Fl. Brit. India
 3: 270. 1881. Fig. 37.

Herbs or undershrubs; stems stout, branched, erect, tall, woody at base, viscid-tomentose with glands and hairs particularly on the inflorescence axis. Leaves obovate to elliptic-lanceolate, tapering at base, acute, dentate-serrate, 10-30 x 2.5-12 cm, membranous, pilose on the upper surface, loosely villous on the lower surface; petiole winged; upper leaves sessile. Heads in large terminal and axillary, lax panicles 1-1.5 cm in diam., sessile or pedunculate with long viscid peduncle. Involucrel bracts oblong-lanceolate, acuminate, up to 1 cm long,

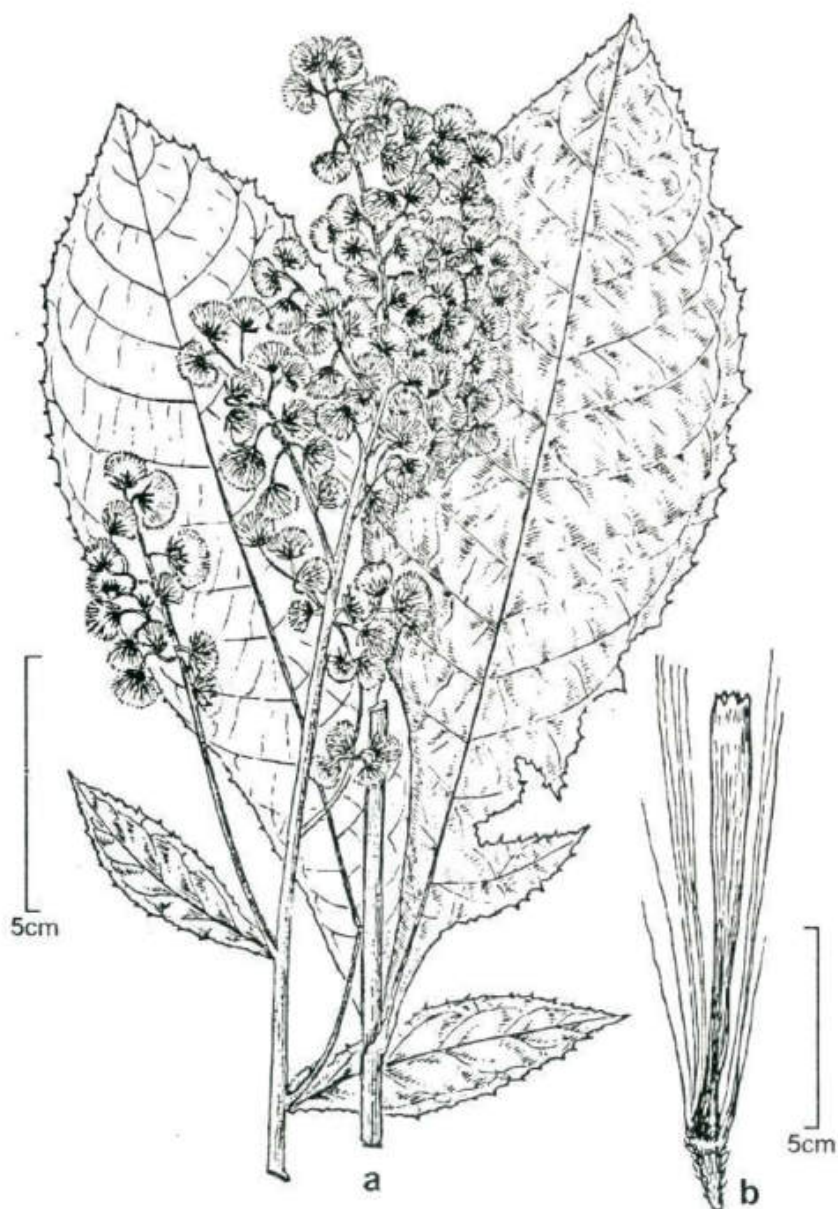


Fig. 37. *Blumea aromatica* DC. : a. Habit; b. Achene with floret.

membranous, puberulous, almost equal to florets. Receptacle flat, alveolate, minutely fimbriate. Corolla of bisexual florets yellow; tubular, 6-7 mm long, 5-lobed; lobes pubescent; corolla of female florets filiform, 5-6.5 mm long, 2-3 lobed, glabrous. Achenes pale brown, oblong, 10-ribbed, hairy. Pappus pale red, hairy, up to 6 mm.

Fl. & Fr. Nov. - May.

Distrib. India: Himalayas, on edges of rain forests, fields and meadows. Uttar Pradesh, Sikkim, W. Bengal and Assam.

Myanmar, Nepal, Bhutan, China, Vietnam, Thailand and Campuchea.

2. *Blumea balsamifera* (L.) DC., Prodr. 5: 447. 1836; Hook.f., Fl. Brit. India 3: 270. 1881. *Conyza balsamifera* L. Sp. Pl. ed. 2: 1208. 1753.

Shrubs or undershrubs, perennial, evergreen; stems woody with greyish brown bark, 0.5-4.0 m simple at base, corymbosely branched above, densely woolly with yellowish white hairs. Leaves appendiculate, lamina variable, usually narrowly oblong-lanceolate or oblong-obovate, ovate, with tapering bases, acute to apiculate, entire or pinnately lobed, serrate-serrulate, usually with upcurved teeth; petiole up to 3 cm. 6-30 x 1-12 cm, coriaceous, upper surface rugose and pilose, lower densely silky-woolly. Heads 6-9 mm in diam., in axillary and terminal, lax panicles, peduncle 3-10 mm long. Involucral bracts sometimes larger than florets, linear, acute, 1-9 mm, densely woolly on dorsal surface, herbaceous. Receptacle 2-4 mm in diam., slightly convex, alveolate, glabrous. Corolla of bisexual florets yellow, tubular, 4-7 mm long, 5-lobed; lobes acute, papillate, pubescent; corolla of female florets filiform, 6 mm long, 2-4 lobed, glabrous. Achenes brown, oblong, 10-ribbed, silky. Pappus 4-6 mm long.

Fl. & Fr. Throughout the year.

Distrib. India: E. Himalaya, in dry fields and grasslands, on mountain slopes and along river banks, ascending up to 1200 m. W. Bengal, Sikkim, Assam and Andaman & Nicobar Islands.

Bangladesh, Nepal, Pakistan, China, S.E. Asia and Philippines.

Notes. The most arboraceous of all species of the genus with strong smell of camphor. *Blumea balsamifera* DC. is the type species of the genus *Blumea*.

Uses. The distillate of leaves is used medicinally to cure throat and chest ailments, dropsy and high fever. Camphor is commercially extracted in China and Myanmar for export.

3. *Blumea barbata* DC. in Wight, *Contrib. Bot. Ind.* 14. 1834; Hook.f., *Fl. Brit. India* 3: 262. 1881.

Herbs; stems reddish brown, erect, subsimple, slender, 10-50 cm high, strigose or pilose with spreading hairs, particularly in younger parts. Leaves elliptic-oblong to obovate-oblong, apiculate, margins serrate or coarsely toothed, 2-10 x 0.8-3 cm, strigose on the upper surface with subglandular hairs, densely velutinous-woolly on the lower, membranous, base narrowed to a petiole. Heads in terminal and axillary, small, lax, corymbose panicles; 4-6 mm in diam., peduncle upto 15 mm long, pilose. Involucral bracts linear, reflexed at maturity, 1-6 mm long, glandular, pubescent on dorsal surface; the inner with scarious margins. Receptacle convex, alveolate, glabrous. Corollas of bi-sexual florets yellow, tubular, 3-4 mm long, 5-lobed; lobes pubescent; corolla of female florets filiform, up to 3.5 mm, 2-3 lobed, glabrous. Achenes brown, oblong, minute, ribbed, hairy above. Pappus white, up to 4 mm long.

Fl. & Fr. Dec. - Feb.

Distrib. India: W. and E. Ghats, in evergreen forests up to 1500 m. Karnataka, Tamil Nadu and Kerala.

Sri Lanka.

4. *Blumea belangeriana* DC., *Prodr.* 5: 555. 1836; Hook.f., *Fl. Brit. India* 3: 266. 1881.

Herbs, erect; stems reddish-brown, dichotomously branched, 20-30 cm high, glabrate at base, densely pilose with long white hairs and stalked glands at apex. Leaves obovate, abruptly tapering at base, apiculate, margins serrate-dentate, 1.5-15 x 1-8 cm, the upper surface strigose, darker, subsessile or sessile. Heads in dense axillary and terminal leafy clusters, 5-7 mm in diam., sessile. Involucral bracts lanceolate, 2-8 mm long, acute, purple tipped, reflexed at maturity, more or less scarious, hairy on dorsal surface, ciliate on the margins. Receptacle convex, glabrous, alveolate. Corolla of bisexual florets yellow, tubular, 4-5 mm long, 5-lobed; lobes pubescent; female florets few in number. Corolla of female florets filiform, 3-3.5 mm long, 2-3 lobed lobes pubescent. Achenes pale brown, oblong, terete, pubescent. Pappus white, 3-4 mm long.

Fl. & Fr. Nov. - April.

Distrib. India: In shady places along stream beds, road sides and forest margins up to 600 m. W. Ghats, Karnataka, Maharashtra and Nagaland.

Endemic.

5. *Blumea bifoliata* (L.) DC. in Wight, *Contrib. Bot. Ind.* 14. 1834. Hook. f., *Fl. Brit. India* 3: 261. 1881. *Conyza bifoliata* L., *Sp. Pl.* ed. 2: 1207. 1753.

Herbs, viscid, pubescent; stems branched from base, ascending, up to 3 m tall, villous, terete. Leaves oblong-spathulate, 2-7 x 1.5-3 cm, membranous, softly pubescent above and below, glandular; glands stalked, lower leaves cuneate, decurrent to petiole, upper ones truncate, acute, dentate, subsessile, uppermost opposite. Heads yellow, terminal and axillary, 1 or 2, up to 7 mm in diam., pedunculate. Outer involucral bracts lanceolate, acuminate, 4 x 0.3 mm, densely strigose, curved; inner ones linear-lanceolate, acuminate 6 x 0.2 mm, scarious, sparsely strigose hairy, glandular. Corolla of bisexual florets tubular, 2.5-4 mm long, 5-lobed; lobes hairy; corolla of female florets filiform, 3.5-4 mm, 2-3-lobed, glabrous. Achenes narrowly oblong with 4-5 hairy angles. Pappus white, 2.5-4.5 mm long.

Fl. & Fr. Dec. - April.

Distrib. India: In forests, grasslands, dry fields and along road sides in plains up to 600 m. Uttar Pradesh, Assam, W. Bengal, Orissa, Madhya Pradesh, Maharashtra, Karnataka and Tamil Nadu.

Pakistan, Myanmar and Sri Lanka.

6. *Blumea bovei* (DC.) Vatke in *Linnaea* 39: 485. 1875; Raghavan, Wadhwa & Ansari in *Rec. Bot. Surv. Ind.* 21 (2): 43. 1981. *Conyza bovei* DC. in *Ann. Sci. Nat. Bot.* 261. 1834.

Herbs, perennial; stems branched from base 20-30 (-40) cm high, glabrous or sparsely pubescent. Basal leaves absent at flowering time; cauline leaves linear-oblong, auriculate at base, acute, distantly denticulate, 1.5-4(8) x 0.3-0.8 cm, glabrous or sparsely pubescent on both surfaces, sessile. Heads axillary or terminal. Involucral bracts 3-4 seriate, herbaceous, solitary or 2-3, 5-7.5 mm in diam., linear-lanceolate, acuminate; 4-6 mm long, outer ones pubescent; inner

ones hair-like at apex. Receptacle flat, areolate, 2-4 mm in diam., glabrous. Corollas of bisexual florets yellow, tubular, ca 4 mm long, 5-lobed; lobes pubescent; corolla of female florets filiform, ca 3 mm long, 2-3-lobed, glabrous. Achenes brown, oblong, 0.5-0.7 mm long, pubescent. Pappus white, ca 3.5 mm long.

Fl. & Fr. Feb. - March.

Distrib. India: Gujarat.

N.E. Africa, Somalia, Eritrea and Sinai.

7. *Blumea clarkei* Hook.f., Fl. Brit. Ind. 3: 267. 1881. *B. malabarica* Hook.f., in fl. Brit. India 3: 267. 1881.

Herbs, perennial with a fibrous rootstock; stems unbranched, 0.6-2 m, tall, erect or climbing, velutinous especially in younger parts. Leaves obovate or oblanceolate to oblong-linear, base acute or apiculate, serrate or dentate with mucronate teeth, 4-15 x 0.7-6.0 cm, glabrate on the upper surface or velutinous on both the surfaces. Heads arranged in narrow, terminal, compact panicles, 8-12 mm in diam., subsessile with velutinous peduncle (up to 5 mm) in dense clusters. Involucral bracts 1.5-10 mm long, the outer lanceolate, inner linear-lanceolate, acute, more or less scarious with ciliate apices and margins, hairy on dorsal surface. Receptacle 4-5 mm in diam., densely pilose, alveolate. Corolla of bisexual forets yellow, tubular, 5-6.5 mm long, 5-lobed; lobes papillate, acute, pubescent; corolla of female florets filiform, 5-6 mm long, 2-3-lobed, glabrous. Achenes pale brown, oblong, ribbed, sparsely pubescent. Pappus pure white, 5-6 mm long, hairy.

Fl. & Fr. Sept. - May.

Distrib. India: E. Himalayas up to 1000 m. Sikkim, Assam, Maharashtra, Karnataka and Andaman & Nicobar Islands.

Myanmar, China, Philippines and S.E. Asia.

Notes. *B. clarkei* is related to *B. riparia* and *B. hieracifolia*, but differs from the former in the nature of pubescence, leaf margins and involucral bracts, and from the latter in having petiolate leaves and densely pilose non silky woolly receptacles.

B. clarkei shows great variation in leaf forms which appears to be linked with its geographical distribution.

8. *Blumea densiflora* DC., Prodr. 5: 446. 1836; Hook.f., Fl. Brit. India 3: 269. 1881. *B. densiflora* var. *excisa* C.B. Clarke, Comp. Ind. 89. 1876.

Herbs or undershrubs; stems up to 1.8 m tall branched, densely woolly, particularly in younger parts and on inflorescence. Leaves elliptic-oblong to lanceolate-oblong, apiculate, entire or pinnately lobed, coarsely dentate, 7-40 x 2-10 cm, tomentose on the upper surface, densely lanuginose on the lower, base narrowed into a long winged sometimes appendaged petiole. Heads yellow, in large terminal, compact, leafy panicles, clustered at the ends of branches, 5-7.5 mm in diam., sessile or with a very small peduncle (only up to 5 mm). Involucral bracts longer than florets, linear, tapering, 1-7 mm long, scarious, pubescent on dorsal surface. Receptacle flat, alveolate, 1.5-2.0 mm in diam., glabrous. Corolla of bisexual florets yellow, tubular, 3.5-4.5 mm long, 5-lobed; lobes broadly triangular, papillate, pubescent with colletters and multicellular hairs. Corolla of female florets filiform, 3.5-4.5 mm long, 3 to 4-lobed, glabrous. Achenes broadly oblong, ribbed, pubescent. Pappus reddish, up to 4 mm long, copious.

Fl. & Fr. Nov. - April.

Distrib. India: Himalayas, up to 1500 m. Himachal Pradesh, Sikkim and Assam.

Bangladesh, Myanmar, Malaya, Campuchea and Fiji Islands.

Notes. *B. densiflora* is closely related to *B. aromatica* and *B. junghuhniana*. However, it differs from both in having woolly indumentum and smaller heads, and corolla lobes of bisexual florets with multicellular hairs. Perhaps it could be a natural hybrid between *B. aromatica* and *B. junghuhniana* as several intermediate forms have been reported.

9. *Blumea eriantha* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook.f., Fl. Brit. India 3: 266. 1881. Fig. 38.

Mar.: Nimurdi.

Herbs, perennial with fibrous roots; stems reddish-yellow, dichotomously branched, erect, 0.1-1 m high, clothed with long, white, silky hairs and stalked

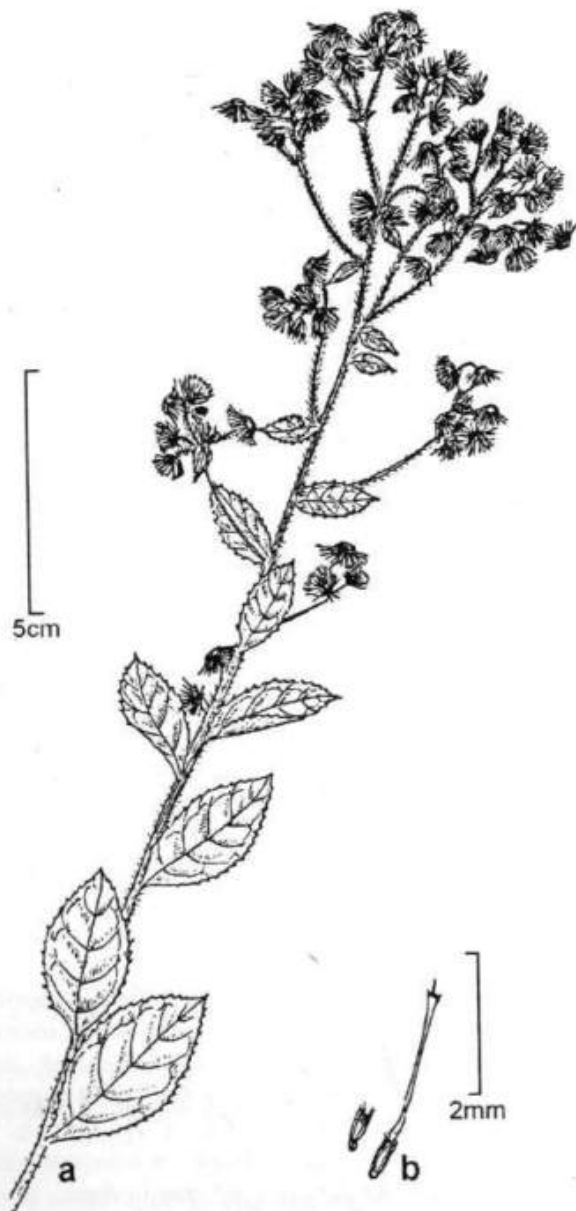


Fig. 38. *Blumea eriantha* DC. : a. Habit; b. Achene and achene with floret.

glands. Lower leaves obovate, base tapering, apiculate or obtuse, margins irregularly spinulose-serrate, 2-15 x 0.5-5.0 cm, subsessile; upper leaves elliptic ovate to oblanceolate, cordate, clasping at the base, margins spinulose serrate, densely pilose on both surfaces when young, scabrid with the age, sessile. Heads axillary or terminal, solitary or few, clustered, 5-6 mm in diam. Involucral bracts linear, acute, 1-7 mm long, herbaceous, slightly longer than florets, completely reflexed at maturity, pubescent with glands and hairs on dorsal surface, margins scarious, ciliate. Florets numerous with usually abortive anthers in central florets, marginal florets female. Corollas of central florets yellow, tubular, 3-4 mm long, 5-lobed, pubescent on lobes and tube with white hairs; corolla of marginal female florets 3-3.5 mm long, 2-3-lobed, pubescent. Achenes brown, minute, obscurely angled, sparsely pilose, shining. Pappus white, up to 3.5 mm long.

Fl. & Fr. Nov. - April.

Distrib. India: in open forests and fields. Uttar Pradesh, Bihar, Orissa, Madhya Pradesh, Rajasthan, Maharashtra and Goa.

Endemic.

Notes. The plants yield an essential oil with a smell of camphor. The juice of the plant is carminative. Its warm and cold infusions are also used as medicine.

10. *Blumea fistulosa* (Roxb.) Kurz in J. Asiat. Soc. Bengal 46(2): 187. 1877. *Conyza fistulosa* Roxb., Fl. Ind. 3: 429. 1832. *B. glomerata* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook.f., Fl. Brit. India 3: 262. 1881.

Herbs, erect; stem, 0.8-1.5 m tall, glabrate at base, puberulous to densely velutinous above. Leaves sinuately incised; lower leaves obovate with a long tapering base, serrate or lyrate-pinnatifid, shortly petioled; the upper leaves smaller, oblong-lanceolate to broadly oblanceolate, acute to apiculate, coarsely serrate-dentate with mucronate teeth; 3-16 x 0.5-6.5 cm, tomentose to puberulous on both surfaces, sessile. Heads in compact globose clusters, arranged in interrupted spicate panicles; 4-5 mm in diam., sessile. Involucral bracts bright purple or purple-tipped, slightly longer than the florets, 1-5 mm long; inner linear with scarious margins, acute, minutely pubescent on dorsal surface with hairs and stalked glands. Receptacle flat or slightly concave in the centre, alveolate, pubescent. Corolla of bisexual florets yellow, tubular, 3-4 mm long, 5-lobed with papillate pubescent lobes; corolla of female florets filiform,

up to 3.5 mm long, 2 to 3-lobed, glabrous. Achenes brown, oblong, quadrangular, puberulous. Pappus white, up to 4 mm long, hairy.

Fl. & Fr. Dec. - May.

Distrib. India: Throughout tropical Himalayas, in open grasslands and forest margins, generally in dry localities, up to 1450 m. Uttar Pradesh, Bihar, W. Bengal, Sikkim, Assam, Orissa, Madhya Pradesh, Gujarat, Maharashtra, Goa and Tamil Nadu.

Nepal, Bhutan, Myanmar, China, Philippines and S.E. Asia.

11. *Blumea hieracifolia* (D. Don) DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook.f., Fl. Brit. *Erigeron hieracifolium* D. Don, Prodr. Fl. Nepal. 172. 1825. *B. sericans* Hook.f., Fl. Ind. 3: 263. 1881. Brit. India 3: 262. 1881.

Herbs, erect, silky villous; stems unbranched or sometimes branched at apex, 10-150 cm tall, densely silky sericeous to woolly tomentose. Lower larger and crowded at the base, obovate-spathulate, elliptic or oblong, acute or obtuse, margins irregularly obscurely dentate or serrate-dentate with blackish indurated teeth, 2-20 x 0.3-0.6 cm, velutinous on the upper surface, densely sericeous to woolly on the lower surface. Heads globose, in axillary and terminal sessile or pedunculate clusters forming a dense panicle or interrupted-spicate inflorescence sessile, 6-10 mm in diam. Involucral bracts straw coloured or distinctly purple tipped, oblong-lanceolate to oblanceolate, 1-10 x 0.5-0.75 mm, acute to acuminate, reflexed at maturity, woolly to glabrate outside. Receptacle slightly convex, alveolate, 2-4 mm in diam., glabrous. Corolla of bisexual florets tubular, 4-4.5 mm long, 5-lobed; lobes triangular, pubescent, corolla of female florets filiform, 4-5 mm long, 3 to 4-lobed, glabrous. Achenes brown, oblong, ribbed, sparsely pubescent. Pappus white, 3-4.5 mm long.

Notes. *Blumea hieracifolia* (D. Don) DC. is a very variable species with 4 clearly distinguished varieties as follows.

KEY TO THE VARIETIES

- 1a. Plants white woolly; involucral bracts usually straw coloured; leaves usually radical, obscurely dentate 11.2. var. *hamiltoni*
- b. Plants silky-sericeous; involucral bracts usually purple-tipped; leaves mostly cauline, distinctly irregularly serrate dentate 2

Nepal, Myanmar, China, Campuchea, Philippines and Malaya.

12. *Blumea hookeri* C.B. Clarke ex Hook.f. in Fl. Brit. India 3: 269. 1881.

Herbs, erect, stout; stems green, herbaceous, puberulous. Leaves oblong-lanceolate, acuminate, pinnatifid, 20-45 x 6-18 cm, pinnatifid, glabrous, narrowed to a winged petiole; lobes upcurved, acuminate, or lacerate, membranous. Heads numerous in large, branched, pubescent, panicle, up to 6 mm in diam., pedunculate. Involucral bracts narrow, rigid, puberulous. Receptacles pubescent, narrow. Corolla lobes of bisexual florets hispid. Achenes oblong, pubescent, ribbed. Pappus 4 mm long.

Fl. & Fr. Nov. - April.

Distrib. India: Sikkim, Meghalaya and Andaman & Nicobar Islands.

13. *Blumea junghuhniana* (Miq.) Boerl., Hand. Fl. Med. Ind. 2(1): 239. 1891; Balak. in Bull. Bot. Surv. Ind. 24: 63. 1982. *Conyza junghuhniana* Miq. in Pl. Jungh. 449. 1855.

Undershrubs or shrubs; stems erect, branched, densely greyish silky tomentose. Leaves oblong-obovate to oblong-lanceolate, margins coarsely dentate with spreading teeth, 4-30 x 1-11 cm, pinnatifid-lobed, densely silky-velutinous beneath, narrowed at base, usually appendiculate with linear-oblong lobes, subsessile. Heads in large terminal panicles, 8-11 m in diam., pedunculate. Involucral bracts longer than florets, linear, tapering, with scarious margins, densely pubescent on dorsal surface. Receptacle flat, 1.5-3.0 mm in diam., alveolate, glabrous. Corolla of bisexual florets yellow, tubular, 5-6.5 mm long, yellow, 5-lobed; lobes pubescent; corolla of female florets 5-6 mm long, filiform, 2 to 3-lobed, glabrous. Achenes pale brown, columnar, 10-ribbed, pubescent. Pappus red 5-5.5 mm long.

Fl. & Fr. Throughout the year.

Distrib. India: In forest clearings. Andaman & Nicobar Islands.

Indonesia, Malaya, Philippines and New Guinea.

Notes. The species is closely related to *B. balsamifera* and both are known by the same vernacular name.

14. *Blumea lacera* (Burm.f.) DC. in Wight, Contrib. Bot. Ind. 14. 1834; Hook.f., Fl. Brit. India 3: 263. 1881. *Conyza lacera* Burm.f., Fl. Ind 180. t. 59. f. 1. 1768. *B. subcapitata* DC., Prodr 5: 439. 1836. *B. lacera* DC. var. *cinerascens* Hook.f. in Fl. Brit. India 3: 263. *B. lacera* DC. 1881. var. *glandulosa* Hook.f. in Fl. Brit. India 3: 263. 1881.

Herbs, erect, aromatic, with many stems arising from the woody base; stems branched, up to 100 cm high, densely long villous, glandular. Leaves obovate, oblong or elliptic-oblong, lyrate lobed, acute or obtuse, entire or coarsely dentate, 2-6 x 1-2 cm, glandular and densely hairy on both surfaces, narrowed to a short petiole. Heads in axillary panicles, 5-7 mm in diam., on 5-15 mm long peduncle. Involucral bracts slightly longer than florets, linear, acute, 2-5 (-7) mm long, glandular hairy; inner bracts with scarious margins. Receptacles 2-3 mm in diam., alveolate, glabrous. Corolla of bisexual florets yellow, tubular up to 6 mm long, 5-lobed; lobes triangular, pubescent with colletters and unicellular hairs; corolla of female florets 3-4 mm long, 2-3-lobed, glabrous. Achenes brown, oblong, angular, terete, 0.5mm, sparsely hairy. Pappus white, 4 mm long.

Fl. & Fr. March - June (Throughout the year).

Distrib. India: Plains of India, ascending up to 600 m in the Himalayas. Uttar Pradesh, Assam, W. Bengal, Bihar, Madhya Pradesh, Orissa, Tamil nadu, Karnataka, Maharashtra and Andaman & Nicobar Islands.

Nepal, Bhutan, China, S.E. Asia, Sri Lanaka, New Guinea, Australia and Tropical Africa.

Notes. *B. lacera* is the most widespread and the most variable species of the genus. Many varieties were recognised by earlier workers but with overlapping characters. The species is very closely related with *B. mollis* and *B. hieracifolia* in many characters.

The plant is used medicinally as diuretic, anthelmintic, stimulant and febrifuge. It yields an essential oil.

15. *Blumea laciniata* (Roxb.) DC., Prodr. 5: 436. 1836. Hook.f. in Fl. Brit. India 3: 264. 1881. *Conyza laciniata* Roxb., Fl. Ind. 3: 428. 1832.

Fig. 39.

Herbs, erect, aromatic; stems with many branches arising from a woody base, 0.2-1.8 (-2.3) m tall, short hairy with stalked glands. Lower leaves

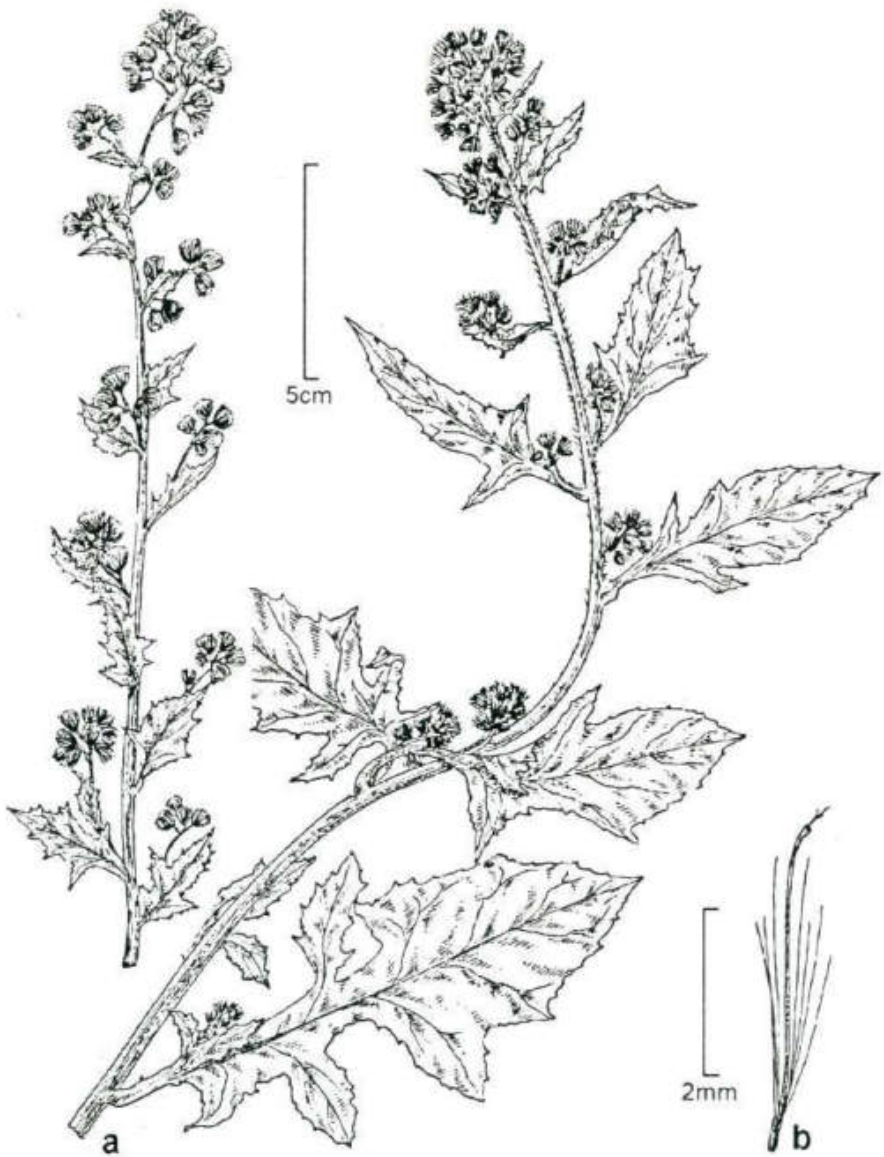


Fig. 39. *Blumea laciniata* (Roxb.) DC. : a. Habit; b. Achene with floret.

lyrately lobed, petioled, upper ones obovate, base tapering, apiculate, entire to coarsely dentate, 5-35 x 1-20, cm pilose on both surfaces, sessile. Heads yellow, combined into a large, lax terminal panicle, 0.5-0.7 cm across. Peduncle 1-1.5 cm, glandular, pubescent. Receptacles short. Involucral bracts linear-lanceolate, reflexed, white hairy with prominent midrib. Outer bracts acicular, 1.5 mm long, glandular, hairy on dorsal surface; the middle 2-2.5 mm long; the inner lanceolate, acuminate, 4-4.5 mm long. Corolla of bisexual florets yellow, tubular, 4-5 mm long, 5-lobed; lobes triangular, papillate, pubescent; corolla of female florets filiform, 3-4.5 mm long, 2-3-lobed, glabrous. Achenes brown, ribbed, 1 mm long, sparsely pubescent. Pappus white, up to 4 mm long.

Fl. & Fr. Throughout the year; more more during Feb. - April.

Distrib. India: Throughout in forest clearing, along road sides and waste places ascending to 1200 m.

China, Bangla Desh, Myanmar, Sri Lanka, Thailand, Indonesia, Philippines, Egypt and Africa.

16. *Blumea lanceolaria* (Roxb.) Druce, Rep. Bot. Exch. Club Brit. Isles 4: 609. 1917. *Conyza lanceolaria* Roxb., Fl. Ind. 3: 432. 1832; *B. myriocephala* DC., Prodr. 5: 445. 1836; Hook.f. Fl. Brit. India 3: 269. 1881.

Fig. 40.

Undershrubs or shrubs; stems tall, hollow, branched above; branches stout, glabrous or puberulous. Leaves oblanceolate, or narrowly oblong-lanceolate, shortly acuminate, minutely serrate dentate, 5-35 x 0.8-8 cm, recurved, upper surface rugose, glabrous, the lower surface glabrous or puberulous, many nerved, narrowed into an appendaged petiole. Heads clustered on large terminal, pyramidal panicles, 0.6-1.1 cm in diam., pedunculate subsessile. Involucral bracts green to purplish, longer than florets, recurved and spreading, 1-9 mm long; the outer ones ovate-lanceolate, the inner narrowly lanceolate with scarious margins, all pubescent on the back, with ciliate margins and apices. Receptacle flat, alveolate, 2-3 mm in diam., pilose, rarely glabrate. Corolla of bisexual florets tubular, 5-6 mm long, 5-lobed; lobes acute, papillate, pubescent with colleters, of female florets filiform, 5-6 mm long, 2-3 lobed, glabrous. Achenes straw-coloured, oblong, ribbed, pubescent. Pappus yellowish white, up to 5 mm long.



Fig. 40. *Blumea lanceolaria* (Roxb.) Druce : a. Habit; b. Achene with floret.

Fl. & Fr. Feb. - April.

Notes. Extremely variable species with two clearly distinguished varieties.

KEY TO THE VARIETIES

- 1a. Heads 6-8 mm across, subsessile; leaves broadly oblanceolate, minutely serrate 16.1. var. *lanceolaria*
 b. Heads 9-11 mm across; distinctly pedunculate; leaves narrowly oblong-lanceolate, coarsely serrate 16.2. var. *spectabilis*

16.1. var. *lanceolaria*

Fl. & Fr. Feb. - April.

Distrib. India: Uttar Pradesh, W. Bengal, Sikkim, Assam, Madhya Pradesh, Tamil Nadu, Kerala and Andaman & Nicobar Islands.

Bangla Desh, Myanmar, China, Sri Lanka, S.E. Asia and Philippines.

16.2. var. *spectabilis* (DC.) Randeria in *Blumea* 10: 220. 1960. *B. spectabilis* DC., *Prodr.* 5: 445. 1836. Hook.f., *Fl. Brit. India* 3: 269. 1881. *B. spectabilis* DC. var. *longifolia* Hook.f. *Fl. Brit. India* 3: 269. 1881.

Fl. & Fr. Feb. - April.

Distrib. India: Maharashtra, Karnataka and Kerala.

Sri Lanka, China, Taiwan and Philippines.

17. *Blumea malcolmii* (C.B. Clarke) Hook.f., *Fl. Brit. India* 3: 266. 1881. *Pluchea malcolmii* C.B. Clarke, *Comp. Ind.* 95. 1876.

Herbs, stout, strongly aromatic, woolly, with fibrous roots; stems many branched from base, erect or ascending, 10-60 cm high, densely woolly with silky white hairs. Leaves obovate to oblanceolate, obtuse, margins closely irregularly spinulose-serrate, 1.5-12.5 x 0.7-4.5 cm, densely white woolly on both surfaces, sessile. Heads terminal, fascicled, clustered at the ends of branches, 7-18 mm across; peduncle up to 20 mm long, densely woolly.

Involucral bracts linear, acute, 2-8 mm long, reflexed at maturity, densely woolly on dorsal surface. Receptacle convex, alveolate, glabrous. Corolla of bisexual florets tubular, 4-5 mm long, 5-lobed; lobes and tubes pubescent with white hairs; corolla of the female florets filiform, 3.5-4.0 mm long, 2-3 lobed, densely pubescent. Achenes brown, obscurely angled, silky, shining. Pappus white, up to 4 mm long.

Fl. & Fr. Nov. - April.

Distrib. India: on hill slopes, up to 1350 m. Madhya Pradesh, Maharashtra, Nagar haveli and Karnataka.

Endemic.

18. *Blumea martiniana* Vaniot in Bull. Acad. Bot. 12: 26. 1903. *B. henryi* Duna. in J. Linn. Soc. 35: 503. 1903; Deb & Dutta in J. Bombay Nat. Hist. soc. 70: 92. 1973.

Shrubs; stems woody, 1.5-2.5 m tall, branched; branches densely tomentose woolly with long white hairs. Leaves oblanceolate to oblong-lanceolate, base tapering, shortly acuminate, margins distantly denticulate, pilose on the upper surface, densely woolly on the lower surface, sessile. Heads in axillary clusters of 2-4, arranged in large panicles, 14-18 mm in diam.; peduncle white-woolly. Involucral bracts slightly longer than florets, linear, acute; the outer bracts densely woolly on dorsal surface; inner gradually scarious. Receptacle flat, alveolate, 4-6 mm in diam., glabrous. Corolla of bisexual florets reddish yellow, tubular, 6-7 mm long, 5-lobed; lobes acute, papillate, pubescent with long multicellular hairs and colleters; corolla of female florets filiform, upto 6 mm long, 2-3-lobed, glabrous. Achenes brown, oblong, finely 10-ribbed, densely pubescent. Pappus yellowish white, 5-7 mm long.

Fl. & Fr. Dec. - May.

Distrib. India: E. Himalayas, in evergreen forests at higher elevations. Arunachal Pradesh.

China and Vietnam.

19. *Blumea megacephala* (Randeria) Chang et Tseng in Acta Phyto. Sin. 12(3): 310. 1974. *B. riparia* (Blume) DC. var. *megacephala* Randeria in *Blumea*

10: 215. 1960. *B. chinensis* DC., Prodr. 5: 444. 1836 *p.p.* (non *Conyza chinensis* L.); Hook.f., Fl. Brit. India 3: 268. 1881.

Scandent shrubs or undershrubs; stems 1-2.5 m tall, branched, woody at base, glabrate or sparsely puberulous in younger parts. Leaves obovate-oblong to elliptic-oblong, rounded at base, shortly acuminate, margins denticulate with rigid teeth, 2-12 x 1-5 cm, glabrate on both surfaces, shortly petioled. Heads in terminal or axillary panicles on long peduncle, 1.4-1.8 cm in diam. Involucral bracts almost equalling the florets, 1-10 mm long; outer bracts distinctly oblong-ovate, hairy on back; inner ones linear-oblong, scarious, sparsely hairy. Receptacle flat, 2-5 mm in diam., hairy, corolla of bisexual florets yellow, tubular, 5-6 mm long, 5-lobed; lobes hairy; corolla of female florets filiform, 4.5-5.5 mm long, 2-4-lobed, occasionally pubescent on the lobes. Achenes pale brown, oblong, ribbed, pubescent, Pappus white, 4-6 mm long, copious.

Fl. & Fr. Throughout the year.

Distrib. India: Nagaland.

China and Indochina.

20. *Blumea membranacea* DC., Prodr. 5: 44C. 1836; Hook.f., Fl. Brit. India 3: 265. 1881.

Herbs, annual; stems simple or branched from base, erect, 0.15-1.5 m tall, pilose particularly in the younger parts. Leaves ovate-lanceolate or obovate, base tapering, acute, margins serrate-dentate, 4-18 x 1-6 cm, the upper entire, the lower lyrate-lyobed, all hairy on both surfaces. Heads in terminal lax panicles, clustered at the ends of branches, 5-8 mm in diam., peduncle hairy, glandular, up to 3 cm long. Involucral bracts purplish-tinged, slightly longer than florets, linear, 1-9 mm, pubescent, reflexed, inner with scarious margins. Receptacle flat or slightly convex, alveolate, glabrous. Corolla of bisexual florets yellow, tubular, 4-6 mm long, 5-lobed; lobes acute, pubescent; corollas of female florets filiform, 4-5 mm long, 2-3-lobed, glabrous. Achenes brown, oblong, ribbed, pubescent. Pappus white, up to 5 mm long.

Notes. *Blumea membranacea* DC. is a very variable species. Hooker (1881) segregates this under 6 varieties. Randeria (1960), however, merged all these varieties under *Blumea membranacea* DC. Further *B. jacquemontii* of Hook.f. has been reduced to a variety of *B. membranacea*. Randeria's treatment is followed here.



Fig. 41. *Blumea mollis* (D. Don) Merr.

purple or lilac, sometime white at base; tubular, 2.5-4.5 mm long, 5-lobed with rounded or acute papillate lobes, pubescent with colletters; corolla of female florets filiform, 2-4 mm long, 2 to 4-lobed, glabrous. Achenes brown, oblong, subangular, shining, pubescent. Pappus 2-4 mm long.

Fl. & Fr. Jan. - Nov.

Distrib. India: In dry open fallows, grasslands, on hill slopes and along roadsides, 1500 m. Almost throughout.

Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, China, Sri Lanka, S.E. Asia, Africa and Australia.

Notes. *B. mollis* is very closely related with *B. lacera* and it poses difficulty in segregating these from herbarium specimens.

22. *Blumea obliqua* (L.) Druce, Rep. Bot. Exch. Club Brit. Isles 4: 609, 1916. *Erigeron obliquum* L., Mant. Pl. 2: 573. 1771. *Blumea amplexens* DC. in Wight, Contrib. Bot. Ind. 13. 1834. et Prodr. 5. 483. 1836; Hook.f., Fl. Brit. India 3: 260. 1881. *Blumea pubiflora* DC., Prodr. 5: 434. 1836.

Fig. 42.

Herbs, erect, dichotomously branched; stems branched, yellowish, 5-50 cm high, puberulous. Leaves elliptic oblong to lanceolate, apiculate, margins serrate dentate, base half amplexicaul to obtuse, 0.5-5 x 0.2-2 cm, scabrid to velutinous on both surfaces. Heads solitary, terminal and axillary, 6-10 mm in diam., long pedunculate. Involucral bracts linear-lanceolate, 1-8 mm long, hairy on dorsal surface, reflexed at maturity; outer ones apiculate; inner acuminate, often tinged with purple, margins scarious. Receptacle slightly convex, areolate, glabrous. Corolla of bisexual florets yellow, tubular, 4-5 mm long, 5-lobed; lobes acute, papillate, pubescent; corolla of female florets filiform, 3-4 mm long, 2-3-lobed, glabrous. Achenes dark brown, oblong, not ribbed, pubescent. Pappus yellowish white, 3-4 mm long.

Fl. & Fr. July - March.

Distrib. India: Punjab, Uttar Pradesh, W. Bengal, Assam, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, Goa, Karnataka, Tamil Nadu and Andaman & Nicobar Islands.

Pakistan, Sri Lanka and Myanmar.

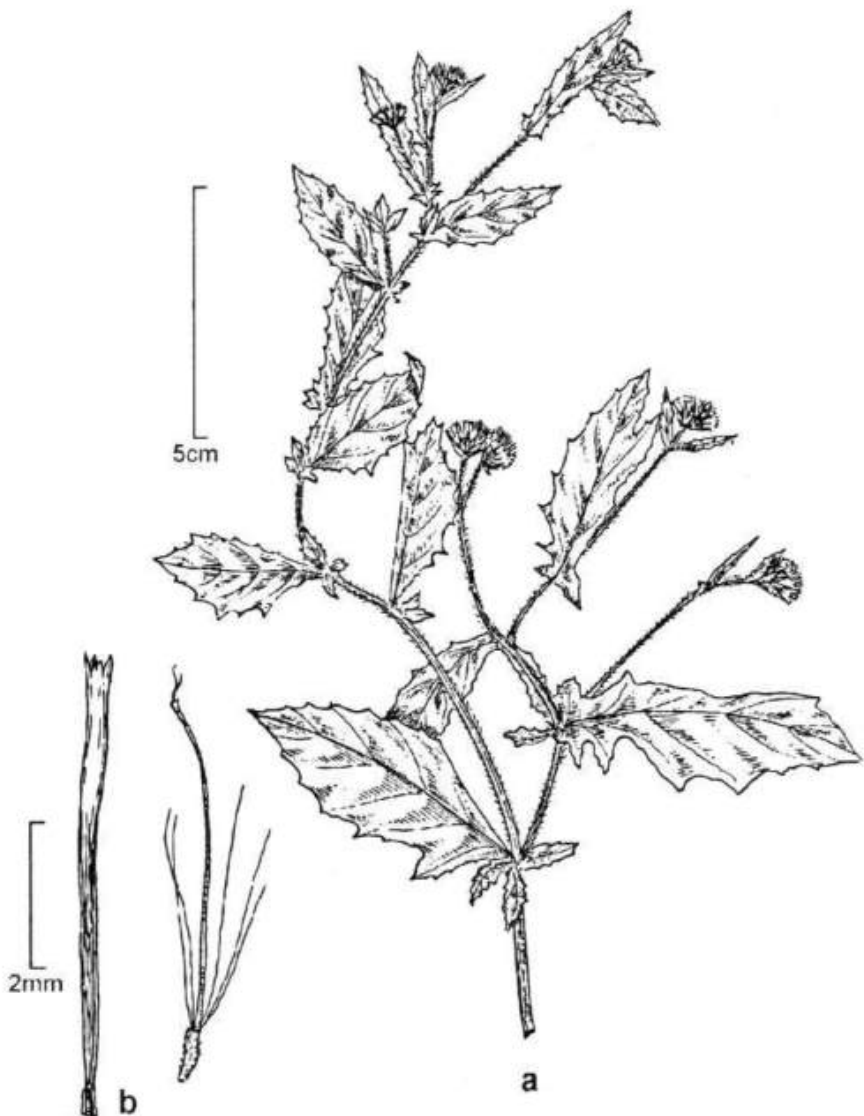


Fig. 42. *Blumea obliqua* (L.) Druce : a. Habit; b. Floret.

23. *Blumea oxyodonta* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook.f., Fl. Brit. India 3: 266. 1881. Fig. 43.

Herbs, small, procumbent; stems 5-40 cm high; branches many arising from base, villous with long, whitish, silky hairs, sometimes woolly at the base. Leaves often crowded at the base, apex spinulose-acute or apiculate, margins serrate-dentate with hard spinulose teeth, villous with long, white, silky hairs and stalked glands on both surfaces; the lower ones obovate to obovate-oblong, 3-7 x 1-3 cm, narrowed to a small petiole; upper elliptic or narrowly obovate, rounded or briefly tapering at base, 0.7-3 x 0.3-1.5 cm. Heads in terminal and axillary compact or lax, few headed corymbose panicles, 6-9 mm in diam., subsessile or pedunculate. Involucral bracts linear, acute, 1-6 mm long with narrow, scarious margins, reflexed at maturity, densely villous on dorsal surface. Receptacle flat or slightly convex, alveolate, glabrous. Florets numerous, multiseriate, the central florets with mostly abortive anthers, the marginal female. Corollas of central florets yellow, tubular, 3-4.5 mm long, 5-lobed; lobes pubescent, corolla of female florets 2.5-4.0 mm long, 2-3-lobed; lobes pubescent. Anthers oblong, not ribbed, pubescent. Pappus white, 3-4 mm long, deciduous.

Fl. & Fr. Oct. - May.

Distrib. India: A weed of moist places, along stream beds, river banks, paddy fields and along road sides up to 1500 m. Uttar Pradesh, Bihar, W. Bengal, Assam, Orissa, Madhya Pradesh, Rajasthan, Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala.

Nepal, Pakistan, Myanmar, China, Vietnam and Philippines.

24. *Blumea procera* DC., Prodr. 5: 445. 1836; Hook.f., Fl. Brit. India. 3: 268. 1881.

Herbs or undershrubs; stems erect or straggling, branched, terete, 1-3.5 m, tall, sparsely pubescent at base, densely velutinous-villous in younger parts. Leaves oblong-oblong to elliptic-oblong, base tapering, sometimes more or less semiamplexicaul, shortly acuminate, double dentate-serrate, 6-18.5 x 2.5-8.0 cm, upper surface scabrous to tomentose, densely velutino-villous on the lower, subsessile. Heads in large, terminal, divaricate panicles, aggregated in compound clusters on woolly branches, 5-7 (-12) mm in diam., more or less sessile. Involucral bracts slightly longer than florets; outer oblong-ovate, acute, 1-7 mm long, coriaceous; inner linear-oblong, with scarious margins, all densely

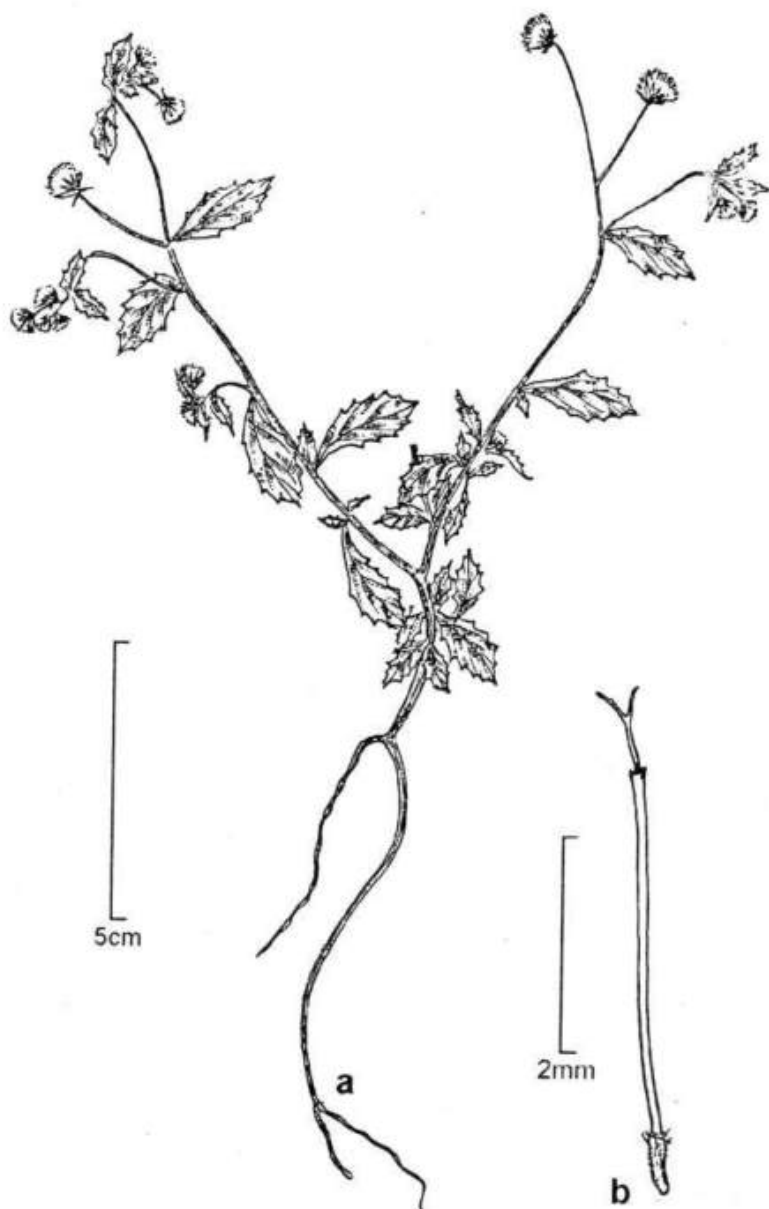


Fig. 43. *Blumea oxyodonta* DC. : a. Habit; b. Achene with floret.

pubescent. Receptacle flat alveolate, 1.5-2.5 mm in diam., pubescent. Corolla of bisexual florets yellow, tubular, 4.5-6 mm long, with 5 triangular, papillate lobes with pubescence of colleters and few to many multicellular hairs; corolla of female florets filiform, 4-5 mm long, 2-4-lobed with occasional pubescence. Achenes pale brown, pubescent, ribbed. Pappus white, up to 5 mm long, copious.

Fl. & Fr. Jan. - May.

Distrib. India: Tropical evergreen forests, ca 1000-1500 m. Assam, Sikkim and Andaman & Nicobar Islands.

Bangladesh, Myanmar, China, Nepal and Indochina.

25. *Blumea riparia* (Blume) DC., Prodr. 5: 444. 1836. *Conyza riparia* Blume, Bijdr 899. 1826 (non H.B.K.); Hook.f. in Fl. Brit. India 3: 268. 1881.

Scandent undershrubs or shrubs. Stem woody at base, 0.50-2.5 m tall branched, branches terete, grooved, glabrate or sparsely puberulous in younger parts particularly inflorescence axis. Leaves obovate-oblong to elliptic-oblong, base rounded, shortly acuminate, margins mucronulate-denticulate with rigid teeth, 2.5-13.0 x 1.3-5 cm, both surfaces glabrous or only sparsely hairy, subsessile. Heads 8-13 mm in diam., in terminal or axillary, lax paniculate racemes, on 2-2.5 cm long peduncle. Involucral bracts almost equal to florets, 1-10 mm long, outer ones distinctly oblong-ovate, up to 1.5 mm broad, hairy on the back, inner ones linear-oblong, scarious, sparsely hairy. Receptacles flat, 2-5 mm in diam., densely hairy. Corolla of bisexual florets yellow, tubular 5-6 mm long with 5, triangular, papillate, hairy lobes; that of female florets filiform, 4-5.5 mm long, 2-4-lobed, occasionally pubescent on lobes. Pappus white, 4-6 mm long, copious. Achenes pale brown, oblong, ribbed, pubescent.

Fl. & Fr. Throughout the year.

Distrib. India: E. Himalayas, growing in thickets on open grassy plains, in clearings along streams and river banks, ascending up to 1500 m. Sikkim, Assam and Andaman & Nicobar Islands.

Myanmar, Malaya, China, Indochina, Philippines, Indonesia, New Guinea and Solomon Islands.

26. *Blumea sessiliflora* Decne., Nouv. Ann. Mus. Par. 3: 140. 1834; *Randeria* in *Blumea* 10: 257. 1960.

Herbs, erect; stems simple or branched, up to 1 m high, glabrate at the base, tomentose above. Leaves sessile, oblanceolate, base tapering; the lower usually lyrate-lyobed; the upper entire, serrate-dentate, 5-15 x 1.2-6 cm, velutinous-pilose on both the surfaces. Heads in clusters of 3-5, arranged in interrupted spicate panicle, 5-6 mm, sessile or pedunculate. Involucral bracts slightly longer than florets, lanceolate, shortly acuminate, 1.5-6.5 mm long, herbaceous, densely pilose on dorsal surface, margins scarios. Receptacle slightly convex, alveolate, glabrous. Corolla of bisexual florets yellow, tubular, 4-5 mm long, 5-lobed; lobes papillate, pubescent; corolla of female florets filiform, 3.5-4.0 mm long, 2-3-lobed, glabrous. Achenes brown, oblong, ribbed, puberulous. Pappus white, 3-4 mm long.

Fl. & Fr. Sept. - April.

Distrib. India: In moist shady places in plains up to 700 m. Orissa, Karnataka and Andaman & Nicobar Islands.

Myanmar, China and S.E. Asia.

27. *Blumea sikkimensis* Hook.f. Fl. Brit. India 3: 268. 1881.

Herbs, climbing; stem stout, branched, glabrous; branches grooved. Leaves elliptic-lanceolate, acuminate, obscurely serrate, 20-30 x 4-10 cm, membranous, glabrous. Heads loosely clustered at the ends of branches, in large panicles, 10-15 cm, pedunculate; peduncle slender, pubescent. Involucral bracts narrow, linear-lanceolate, reflexed at maturity, puberulous on dorsal surface, margins of inner bracts scarios. Receptacle broad, glabrous. Corolla of bisexual florets yellow, tubular, 5-lobed; lobes pubescent; corolla of female florets pubescent, 2-3-lobed, glabrous. Achenes ribbed, silky. Pappus dirty white, up to 4 mm long.

Fl. & Fr. May - Sept.

Distrib. India: Sikkim.

Endemic.

28. *Blumea venkataramanii* R. Rao et Hemadri in Curr. Sci. 42(19): 693-694. 1973.

Herbs, erect, annual, aromatic; stems 0.2-1 m high, striate, clothed by simple or glandular hairs. Lower most leaves spatulate, elliptic-obovate or oblanceolate, narrowed at base, margin, irregularly dentate or serrate with pointed apices; upto 20 x 5 cm, decurrent, forming a false prominently winged stem, hairy on both surfaces; hairs tubercle-based; upper surface scabrid at maturity; uppermost leaves smaller, oblong-lanceolate or spatulate with decurrent base. Inflorescence terminal and lateral, pedunculate, solitary or in clustered heads. Heads 6-12 mm long, *ca* 10 mm across. Involucral bracts 3 to 4-seriate; outer 2 whorls green, 2-4 mm long; inner ones tinged with purple at apex, all linear, scarious, 4-6 mm long, outer surface glandular hairy. Receptacle hemispheric, glabrous. Outer florets, yellow, *ca* 3 mm long, 3-lobed female. Pappus white.

Distrib. India: Maharashtra.

Endemic.

29. *Blumea virens* DC. in Wight, Contrib. Bot. Ind. 14. 1834; Hook.f., Fl. Brit. India 3: 264. 1881. *B. virens* var. *minor* Hook.f., Fl. Brit. India 3: 264. 1881. Fig. 44.

Herbs, erect with fibrous root stocks; stems simple or branched, 0.1-1.8 cm tall, glabrous, grooved. Leaves glabrate, membranous the lower ones oblanceolate, lyrate-lobed, oblanceolate, petioled, the upper ones obovate to oblanceolate, irregularly sinuate toothed, 3-22 x 0.5-1.0 cm. Heads usually in large spreading, lax, terminal leafy panicles, 5-7 mm in diam.; peduncle up to 30 mm long, bracteate, glabrous. Involucral bracts linear, mucronate 1-7 mm herbaceous, reflexed at maturity, sparsely pilose on dorsal surface, ciliate, the inner bracts with scarious margins. Receptacle convex, alveolate, glabrous. Corolla of bisexual florets yellow, tubular, 4.5-5 mm long. 5-lobed; lobes pubescent, glandular; corolla of female florets filiform, 4-4.5 mm, 2-3-lobed, glabrous. Acenes oblong-columnar, 8-10-ribbed, sparsely hairy. Pappus white, up to 4 mm long.

Fl. & Fr. Oct. - June.

Distrib. India: W. Bengal, Assam, Orissa, Madhya Pradesh, Maharashtra, Karnataka, Kerala and Andaman & Nicobar islands.

Bhutan, Myanmar, Pakistan, China and Philippines.

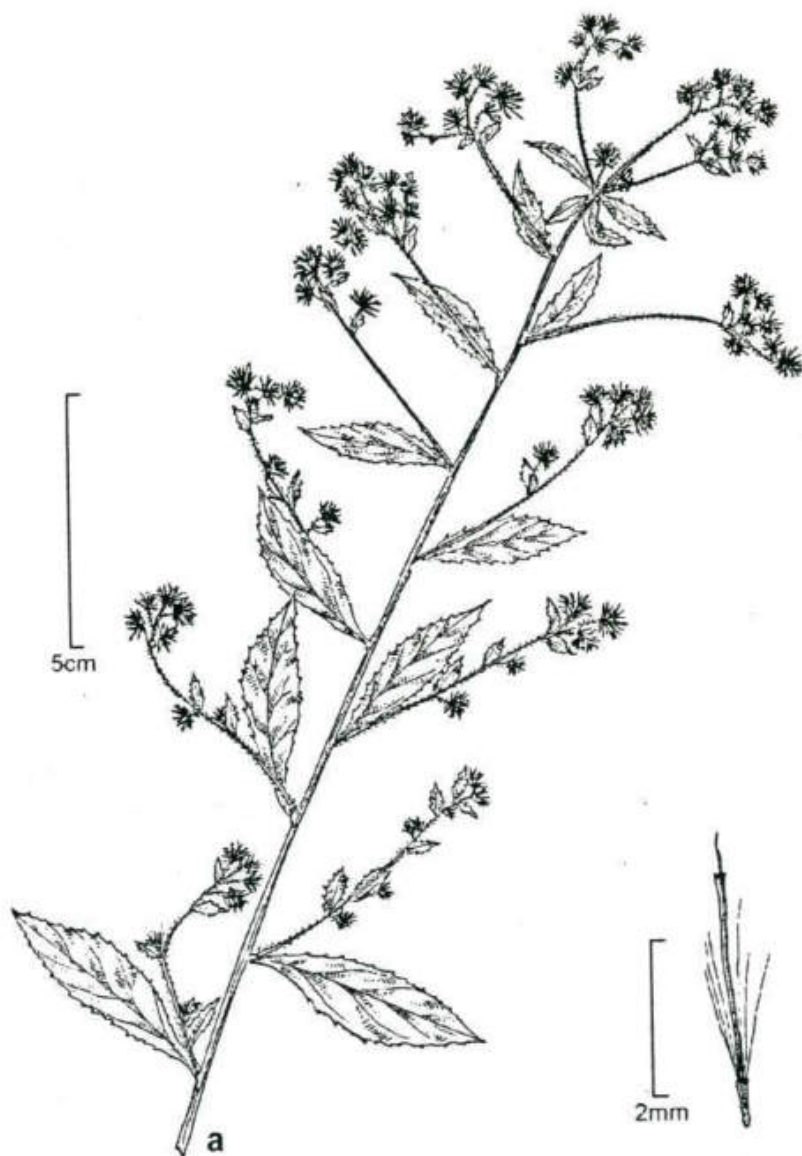


Fig. 44. *Blumea virens* DC. : a. Habit; b. Achene with floret.

Notes. Hooker (1881) mentioned a variety, viz. var. *minor*, being very small with simple stem, long petioles and elliptic ovate or lanceolate leaves which are relatively more membranous. In the present treatment this variety is merged in the species proper.

2. *Blumeopsis* Gagnep.

Herbs, erect, weak; stems simple, glabrous or short hairy, not winged. Leaves mostly in rosettes at base, obovate, rounded, spinulose-dentate, subsessile or narrowed into a short petiole. Heads golden yellow, in compound panicle, pedunculate. Involucral bracts ovate-lanceolate, acuminate glabrous. Achenes very small, glabrous. Pappus hairy, white.

Monotypic; South and S.E. Asia, including India.

Blumeopsis flava (DC.) Gagnep. in Bull. Mus. Hist. Nat. Paris 26: 76. 1920. *Blumea flava* DC., Prodr. 6: 439. 1836. *Laggera flava* (DC.) Benth. in Gen. Pl. 2: 290. 1873; Hook.f., Fl. Brit. India 3: 270. 1881. **Fig. 45.**

Herbs, erect, weak; stems simple, 0.15-1 m high, glabrous or short hairy, not winged. Leaves mostly in rosettes at base, obovate, rounded, spinulose dentate, 1.5-8 x 0.5-4 cm, narrowed to a short petiole; upper ones lax, lanceolate-oblong with an amplexicaul base, glabrate or thinly hairy. Heads golden yellow. Involucral bracts ovate-lanceolate, acuminate, 0.1-0.4 cm long, glabrous. Corolla of disc florets 0.3-0.35 cm long; lobes hairy; corolla of marginal florets 0.2-0.25 cm long. Achenes very small, glabrous. Pappus white, 0.25-0.3 cm long.

Fl. & Fr. Throughout the year.

Distrib. India: Major part of India in plains up to 1800 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Bihar, Karnataka and Andaman & Nicobar Island. 5

Bangladesh, Myanmar, Malaya, Sumatra and Hainan.

3. *Epaltes* Cass.

Herbs, erect or diffuse; stems winged. Leaves alternate, elliptic or oblong, usually decurrent, toothed. Heads heterogamous, disciform, solitary or corymbose, peduncled. Outer florets female, multiseriate, fertile; inner florets

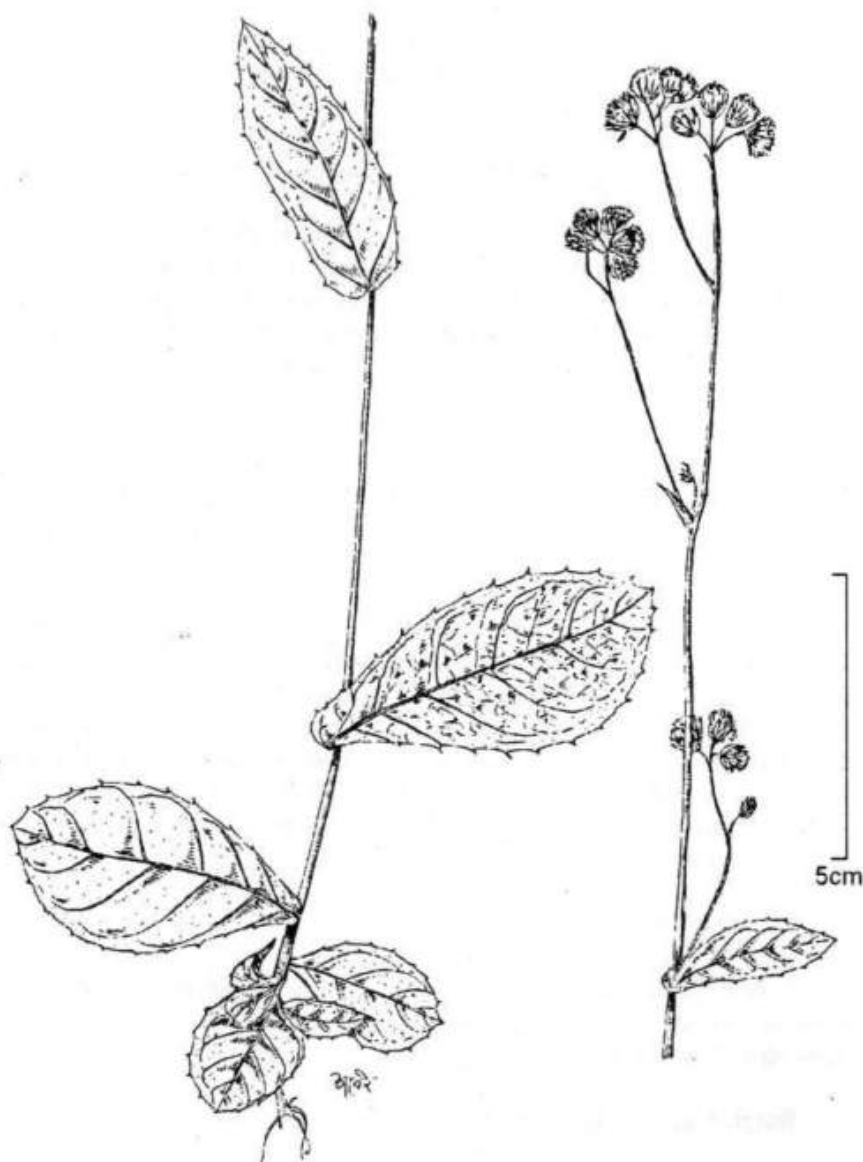


Fig. 45. *Blumeopsis flava* (DC.) Gagnep.

bisexual, usually sterile. Involucre hemispheric or broadly campanulate; bracts multiseriate, dry, rigid. Receptacle naked, flat or convex, pitted or not. Corolla of female florets filiform, limb, minutely 2-3-lobed. Anther base sagittate, shortly tailed. Achenes of female florets smooth or ribbed; those of bisexual abortive. Pappus absent or sometimes of 2-3 caducous hairs in bisexual florets.

Tropical Asia, Africa and America; ca 9 species, 2 in India.

KEY TO THE SPECIES

- 1a. Heads 0.3-0.4 cm across; involucre hemispherical; receptacle naked; achenes ellipsoid, 0.4-0.5 mm long 2. *E. pygmaea*
 b. Heads 0.7 cm across; involucre broadly campanulate; receptacle; pitted achenes oblong, 0.7-0.9 mm long 1. *E. divaricata*

1. *Epaltes divaricata* (L.) Cass., Bull. Sci. Soc. Philom. Paris 1818: Hook.f., Fl. Brit. India 3: 274. 1881. 139. 1818. *Ethulia divaricata* L., Mant. Pl. 1: 110. 1767.

Herbs, erect, up to 30 (50) cm high; branchlets winged; wings entire. Leaves alternate, lanceolate to oblong, base cuneate, decurrent, acute, margins sparsely dentate, 3-7 x 0.7-1 cm, thick distantly penninerved. Heads pink or purple, heterogamous, disciform, 1-3 together, terminal, 0.7 cm across. Involucre broadly campanulate; involucre bracts multiseriate, curved, scarious, acuminate, 3 mm long; outer narrowly lanceolate; middle ones broader, obovate; inner lanceolate. Receptacle flat, pitted. Ray florets female, multiseriate. Disc bisexual; corolla of bisexual florets tubular, campanulate, 0.7 mm across; tube 2.2 mm long, 5-lobed; corolla of female florets 0.15 mm across, filiform, minutely 4-toothed. Achenes oblong, 0.7-0.9 mm long, ribbed. Pappus 0.

Fl. & Fr. Dec. - April.

Distrib. India: Orissa, Karnataka and Tamil Nadu.

Myanmar, China, Indonesia and Sri Lanka.

2. *Epaltes pygmaea* DC., Prodr. 5: 461. 1836; Hook.f., Fl. Brit. India 3: 274. 1881.

Herbs, erect, annual; stems up to 10 cm high, winged; wings entire. Leaves linear-elliptic, obtuse, sparsely dentate 1-2 x 0.3-0.5 cm, membranous; midrib

prominent. Heads violet, solitary or few, terminal, 0.3-0.4 cm across, peduncled. Involucre hemispherical; involucre bracts multiseriate, broad, obtuse or acute, dry, rigid. Receptacle naked, flat. Ray florets multiseriate, female, fertile; corolla filiform, 2-3 toothed, much shorter than style. Disc florets bisexual, tubular, usually sterile; corolla 3-5-fid. Achenes black, ellipsoid, obscurely ribbed, 0.4-0.5 mm long.

Fl. & Fr. Dec. - April.

Distrib. India: Tamil Nadu and Karnataka.

Endemic.

4. *Laggera* Sch.-Bip. ex Koch

Herbs, erect, aromatic; branches winged or not. Leaves alternate, simple, base often decurrent below into winged sheath, margins dentate, sessile. Heads usually yellow, heterogamous, disciform in racemose panicles, stalked, Receptacle flat, faintly pitted. Involucre campanulate; bracts multiseriate, linear-lanceolate; outer smaller, herbaceous, inner ones longer, scarious. Outer florets female, multiseriate; inner few, bisexual. Corolla tubular, campanulate or filiform in female florets, glandular without. Anther base sagittate or obtuse. Achenes hardly enlarged, ribbed or angled. Pappus uniseriate, filiform, as long as the corolla.

Tropical Asia and Africa; *ca* 10 species, 3 in India.

KEY TO THE SPECIES

- | | |
|--|-----------------------|
| 1a. Stems not winged; corolla of bisexual florets pink; achenes subcompressed | 2. <i>L. aurita</i> |
| b. Stems winged; corolla of bisexual florets bluish purple; achenes faintly ribbed | 2 |
| 2a. Wings broad, entire and continuous; pappus 6-7 mm long | 1. <i>L. alata</i> |
| b. Wings narrow, toothed and interrupted; pappus 4-5 mm long | 3. <i>L. crispata</i> |

1. *Laggera alata* (D. Don) Sch.-Bip. ex Oliver in Trans. Linn. soc. 29: 94. 1873. *Erigeron alatum* D. Don, Prodr. Fl. Nepal. 171. 1825. *Blumea alata* (D. Don) DC., Prodr. 5: 448. 1836; Hook.f., Fl. Brit. India 3: 271. 1881.

Fig. 46.

Herbs, erect, stout, leafy, glandular, pubescent; stems up to 75 cm high, winged with continuous broad entire wings. Leaves oblong-lanceolate, base decurrent, acute at apex, margins denticulate, 2-10 x 0.7-1 cm, thick,



Fig. 46. *Laggera alata* (D. Don) Sch.-Bip. ex Oliver

chartaceous, lower surface woolly, sessile. Heads arranged in leafy racemes, 1 cm across. Involucral bracts 3-4 seriate; outer lanceolate, 5 x 1 mm, herbaceous, pubescent, often recurved; inner ones linear, 9 x 1 mm. Corolla of bisexual florets purplish, 1 mm across, tubular; tube ca 7 mm, 5-lobed. Anther base sagittate. Corolla of female florets filiform, 0.15 mm across, ca 6 mm long, minutely toothed above. Achenes dark brown, oblong, 1-1.2 mm, puberulous, faintly ribbed, appressed hairy, villous. Pappus white, ca 7 mm long.

Fl. & Fr. Throughout the year.

Distrib. India: Major part of India, ascending up to 1500 m. Himachal Pradesh, Uttar Pradesh, Bihar, Sikkim, Assam, Manipur, Orissa, Madhya Pradesh, Karnataka and Tamil Nadu.

Bangla Desh, Sri Lanka, Myanmar, China, Thailand, Indonesia, Philippines, Egypt and Africa.

Note. The tender leaves of this plant yield an ethereal oil. Plant is used as disinfectant in Malagasy.

2. *Laggera aurita* L.f., Suppl. 367. 1781; Hook.f., Fl. Brit. India 3: 271. 1881.

Herbs, perennial, erect, aromatic; stems up to 90 cm, not winged; branches many, ascending from a woody rootstock, hairy. Leaves obovate or oblanceolate, base sometimes auricled, toothed, lobed or pinnatifid, decurrent, 4-9 x 0.5-1.0 cm, membranous, viscid pubescent; upper leaves much smaller, often bract like, sessile or subsessile. Heads in corymbose or diffused panicle. Involucral bracts multiseriate, linear, acute; outer green, very short, silky hairy; inner bracts much longer, scarious. Receptacle flat, naked. Florets pink. Ray florets multiseriate, female, fertile; corolla of female florets filiform, minutely toothed. Disc florets bisexual, fertile; corolla tubular, 5-fid. Anther base sagittate. Achenes dark red, small, subcompressed, obscurely ribbed, thinly hairy. Pappus white, 4-4.5 mm long.

Fl. & Fr. March - April.

Distrib. India: Delhi, Uttar Pradesh, Bihar, Madhya Pradesh and Karnataka.

Bangladesh, Pakistan, Myanmar and Africa.

Note. Strongly scented herbs with the odour of turpentine. Crushed leaves are used as haemostatic by some tribes.

3. *Laggera crispata* (Vahl) Hepper & Wood in Kew Bull. 38: 83. 1983. *Conyza crispata* Vahl, Symb. Bot. 1: 71. 1790. *Laggera pterodonta* (DC.) Sch.-Bip. ex Oliver in Trans. Linn Soc. 29: 94. 1873; Hook.f., Fl. Brit. India 3: 271. 1881. Fig. 47.

Herbs, annual or perennial, erect, much branched, strongly aromatic, viscid pubescent; stems tall, narrowly winged by the decurrent leaf bases, glandular hairy or densely pubescent; wings interrupted, oblong, dentate to pinnatifid. Leaves oblanceolate, obovate or oblong, shortly auriculate, apiculate, serrate-dentate, 2-15 x 0.3-5 cm, glandular, puberulous hairy; the upper ones sessile. Heads purplish, in terminal leafy corymbiform panicles, many on long peduncle, 0.5-0.7 cm. Involucre campanulate; involucre bracts 3-4-seriate, linear; outer oblong-spathulate, acuminate 3.5 x 0.7 mm, glandular hairy; inner ones oblong-lanceolate, acute, 7 x 0.7 mm, scarious, puberulous. Corolla of bisexual florets tubular, 5-8 mm long, 5-lobed; lobes bluish-purple, oblong. Anther base obtuse. Corolla of female florets 4.5-7 mm long, 0.2 mm across, minutely toothed. Achenes 0.8-0.1 cm long, faintly ribbed, hairy. Pappus white, 4-5 mm long.

Fl. & Fr. Jan. - April.

Distrib. India: ascending up to 1200 m. Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh, Assam, W. Bengal, Orissa, Madhya Pradesh, Karnataka and Tamil Nadu.

Sri Lanka, China, Myanmar and Africa.

5. *Nanothamnus* Thomson

Herbs, rigid, woolly, decumbent stems branched with many branches arising from the rootstock. Leaves alternate, acutely serrate dentate, woolly, turning glabrous with the age. Heads heterogamous, disciform, subsessile, small, subterminal and axillary. Involucre ovoid; bracts multiseriate, lanceolate, imbricate, dry; outer smaller and hispid on back; inner subscarious. Receptacle flat, naked. Outer florets few or absent, female, fertile; corolla filiform, 2-3-toothed. Disc florets few, fertile; corolla tubular; limb campanulate, 2-lipped with 4-lobed outer lip; the inner lip free to the base of limb. Achenes obovoid, ribbed, with rounded apex. Pappus absent.



Fig. 47. *Laggera crispata* (Vahl) Hepper & Wood

Only one species, narrowly endemic to India.

Nanothamnus sericeus Thomson in J. Linn. Soc. 9: 342.t. 3. 1867; Hook.f., Fl. Brit. India 3: 273. 1881.

Herbs, erect, branched, cottony woolly, 15-20 cm high; stems much branched, branches arising from a woody rootstock. Leaves alternate, rigid, acutely serrate 1-5, cm long, woolly on both surfaces, conspicuously nerved, subsessile. Heads subterminal or axillary in dense clusters, 2-5 mm across, subsessile. Involucral bracts multiseriate; outer lanceolate, 6 x 1.5 mm, scaly, glandular hairy; inner 4 x 1 mm, hairy at apex, outer surface hyaline, irregular. Receptacle flat, naked. Marginal florets 3.8-4 x 1 mm, glandular hairy at apex and base, inner; florets 3 x 0.4 mm. Achenes oblong, ca 0.8 mm long, 5-8-ribbed; ribs slender.

Fl. & Fr. Feb. - April.

Distrib. India: Maharashtra and Karnataka.

Endemic.

Notes. Plants strongly aromatic and rich in essential oils.

6. *Pluchea* Cass.

Shrubs or undershrubs, rarely herbs, often aromatic, glabrous or pubescent, sometimes glandular. Leaves alternate, simple, entire or toothed, sometimes auricled or decurrent on the stem mostly with a prominent midvein, sessile or petiolate. Heads white, yellow or purple, heterogamous, disciform, few or many in terminal, leafless corymbs or subsolitary, small. Involucre ovoid or broadly campanulate; involucral bracts in few unequal series, ovate or obtuse, often with scarious margins. Receptacle flat, naked. Ray florets numerous; corolla often purplish upwards, slender, apically 2-3-toothed. Disc florets few or many; corolla tubular, campanulate; limb 5-lobed. Achenes cylindrical, prominently 3-6-ribbed, strigose, often glandular. Pappus of strigose, basally united bristles, in one series.

Tropical and subtropical countries; ca 30 species, 6 in India.

Literature. GILLIS, W.T. (1977). *Pluchea* revisited. *Taxon* 26: 587-591. GODFRAY, R.K. (1962). *Pluchea* section *Stylimnus* in North America. *J. Elisha Mitch. Sci. Soc.* 68: 238-271. pl. 20-

23. ROBINSON, J. & J. CUATRECASAS (1973). The generic limits of *Pluchea* and *Tessaria* (Inulaceae, Asteraceae). *Phytologia* 27: 277-285.

KEY TO THE SPECIES

- | | |
|---|---------------------------|
| 1a. Heads subsolitary | 1. <i>P. arguta</i> |
| b. Heads in compound corymbs | 2 |
| 2a. Leaves 10-20 cm long, linear, margins recurved; annual herbs | 4. <i>P. linearifolia</i> |
| b. Leaves not more than 8 cm long, oblong, obovate or lanceolate, margins not recurved; shrubs or undershrubs | 3 |
| 3a. Leaves subsessile, gland-dotted; stems nearly glabrous | 2. <i>P. indica</i> |
| b. Leaves sessile, not gland dotted; stems pubescent or hairy | 4 |
| 4a. Outer involucre bracts oblong, obtuse | 3. <i>P. lanceolata</i> |
| b. Outer involucre bracts ovate, acute | 5 |
| 5a. Leaves sharply serrate-dentate; achenes glabrous | 5. <i>P. tomentosa</i> |
| b. Leaves entire or obscurely dentate; achenes with few bristles | 6. <i>P. wallichiana</i> |

1. *Pluchea arguta* Boiss., *Diagn. ser.* 2. 3: 5. 1856; Hook.f., *Fl. Brit. India* 3: 273. 1881.

Shrubs, stout, branched, succulent, glandular pubescent; stems up to 1 m high. Leaves oblanceolate or obovate, narrowed at base, pungently serrate or lobulate, 2.5-4 x 0.4-1.8 cm. Heads solitary or few, purple 0.8-1.2 cm across, peduncled. Involucre bracts multiseriate, subulate-lanceolate, rigid; outer very small, pubescent, ciliate; inner elongate, linear, acute, pubescent ciliate at tip. Receptacle naked. Achenes cylindrical, slightly ribbed, appressed hairy. Pappus hairs slender, shortly barbellate.

Distrib. India: Gujarat.

Pakistan.

2. *Pluchea indica* (L.) Less. in *Linnaea* 6: 150. 1831; Hook.f., *Fl. Brit. India* 3: 272. 1881. *Baccharis indica* L., *Sp. Pl.* 861. 1753.

Shrubs, small, nearly glabrous; stems up to 60 cm. Leaves obovate or oblanceolate, acute, apiculate or obtuse, minutely serrate, 2-5 cm long, gland dotted, narrowed into a small petiole. Heads in compound terminal corymb, 0.6 cm in diam., pubescent. Outer involucre bracts broad with rounded tips. Disc florets bisexual, 3. Ray florets numerous, female. Achenes minute, ribbed, nearly glabrous. Pappus white, scanty, spreading.

Distrib. India: W. Bengal and Andaman & Nicobar Islands.

Bangla Desh, Myanmar, China, Philippines, Malaysia, Tropical Asia and Australia.

3. *Pluchea lanceolata* (DC.) C.B. Clarke, Comp. Ind. 94. 1876. *Berthelotia lanceolata* DC., Prodr. 5: 376. 1836; Hook.f. in Fl. Brit. India 3: 272. 1881. Fig. 48.

Bhoj.: *Baisurai*; Guj., Hindi, Mar.: *Rasana, Rashana*; Punj.: *Sarmei, reshami*; Raj.: *Chotakalia*.

Undershrubs, erect, up to 1.2 m tall; stems and branches terete, obscurely striate, slender, softly adpressed pubescent. Leaves oblong or oblanceolate, narrowed at base, obtuse, apiculate, margins obscurely dentate at apex, 2-6 x 0.4-1.0 cm, coriaceous, finely silky pubescent on both surfaces; main nerves prominent. Heads pink, ovoid or campanulate, in compound pubescent corymbs, much broader, 6-7 mm. Outer involucrel bracts tinged with purple at apex; 2-3-seriate, obtuse, 2.5-4 x 2 mm, silky pubescent, inner scales linear, scarious, subacute, slightly narrower, longer than the outer. Receptacle flat, naked. Pappus hairs distinctly connate at base.

Fl. & Fr. March - Aug.

Distrib. India: Uttar Pradesh, Haryana, Rajasthan, Maharashtra and W. Bengal.

Pakistan, Afghanistan and Africa.

4. *Pluchea linearifolia* C.B. Clarke, Comp. Ind. 95. 1876; Hook.f., Fl. Brit. India 3: 273. 1881.

Herbs, annual, erect scaberulous, stems up to 1 m high, simple below, corymbosely branched above, slender or stout. Leaves linear, with a broad base, rigid, coriaceous with recurved, toothed margins, 10-20 x 0.6-0.8 cm; midrib prominent; sessile. Heads corymbose, clustered at the end of long branches, corymbose, 0.6 cm in diam., scabrid. Involucrel bracts scaberulous; outer rounded.

Distrib. India: Assam and Arunachal Pradesh; rare.

Endemic.

5. *Pluchea tomentosa* DC. in Wight, Contrib. Bot. Ind. 16. 1834; Hook.f., Fl. Brit. India 3: 272. 1881.



Fig. 48. *Pluchea lanceolata* (DC.) C.B. Clarke

Shrubs; stems 1-3 m tall, branched, striate, more or less pubescent below, glandular pubescent in upper part. Leaves obovate, semi amplexicaul, often auricled at base, obtuse or subacute, acutely serrate, dentate, 2-8 x 1.5-3.5 cm, more or less pilose above, softly pubescent beneath. Heads in compound corymb, 0.6-2 cm in diam. Involucre campanulate; outer involucral bracts short, ovate, acute, slightly pubescent; inner linear, oblong, acute, ciliate near apex. Receptacle glabrous. Achenes obscurely angled, glabrous. Pappus reddish, minutely barbellate.

Fl. & Fr. Dec. - Feb.

Distrib. India: Himachal Pradesh, Uttar Pradesh, W. Bengal, Madhya Pradesh, Maharashtra, Karnataka and Kerala.

Pakistan.

6. *Pluchea wallichiana* DC., Prodr. 5: 451. 1836; Hook.f., Fl. Brit. India 3: 272. 1881.

Shrubs, tall, erect, glutinous, much branched; stems 1-2 m tall, branches terete, striate, glandular pubescent, young ones densely pubescent. Leaves alternate, broadly elliptic or ovate-oblong, half amplexicaul, obtuse or subacute, often apiculate, margins obscurely dentate or almost entire, 3-6 x 1.5-3 cm, somewhat coriaceous, pubescent, veins prominent on both surfaces. Heads in terminal, compound corymb, 6 x 3-4 mm (spreading up to 1 cm on drying). Involucral bracts multiseriate, greenish ciliolate, persistent; outer bracts much shorter than inner, ovate-lanceolate, acute, glandular hairy; inner narrower, acute with peniculate tip. Florets white with pinkish tips, all tubular; bisexual florets few, ca 6 mm long with long tailed purplish anthers; female florets numerous. Achenes brown, ca 1 mm long, angled; usually with few fine bristles along angles. Pappus dirty white, uniseriate, antrorsely barbellate.

Fl. & Fr. Nov. - March.

Distrib. India: Punjab, Rajasthan, Gujarat and Tamil Nadu.

Pakistan.

7. *Pterocaulon* Elliot

Herbs with stout roots; stems winged. Leaves linear to elliptic or obovate, margins entire or crenate, tomentose beneath, glabrate above. Inflorescence

single, dense or interrupted terminal spike or clustered heads. Heads white or yellow, disciform. Involucral bracts multiseriate, acute, pubescent, with prominent midrib. Ray florets numerous, female; corolla capillary. Disc florets several, bisexual; corolla tubular, 5-lobed. Achenes dark, plump, conspicuously ribbed. Pappus uniseriate, of fine bristles, united at base.

Tropical regions of the world; ca 13 species, 1 in India.

Pterocaulon redolens (Forst. f. ex Willd.) F. Vill., Novis. App. Blanco Fl. Filip. ex. 3, 4(3): 116. 1880. *Conyza redolens* Forst f. ex Willd., Sp. Pl. 3: 1751. 1803. *Pterocaulon cylindrostachyum* C.B. Clarke, Comp. Ind. 98. 1876; Hook. f., Fl. Brit. India. 3: 275. 1881.

Herbs, erect, robust, tomentose, up to 1 m high; branches densely woolly. Leaves alternate, decurrent, obovate-oblong, obtuse or rounded at apex, serrate, 1-5.5 x 0.5-2 cm, rugose, white beneath. Heads yellow, heterogamous, disciform, ellipsoid-oblong or globose, collected in terminal clusters forming glomerules, 0.3 cm across. Involucre campanulate, 5 mm long; bracts 4-seriate, shining; outer shorter, narrowly spatulate, inner linear-lanceolate, acuminate, deciduous. Receptacle naked, small; hirsute. Ray florets female, many-seriate, fertile, ca 3 mm long; corolla 3 mm long, 2-3-toothed, filiform. Disc floret 1, bisexual, usually sterile; corolla tubular, 5-toothed. Anther base sagittate. Achenes dark brown, 0.75 mm long, sparsely shortly pilose. Pappus 2.5 mm long. Achenes of ray florets dark brown, 0.75 mm long, sparsely shortly pilose those of disc florets 0.5 mm long, empty. Pappus 2.5 mm long.

Fl. & Fr. March - April.

Distrib. India: Orissa.

Myanmar, Thailand, Laos, Vietnam, Malayasia, Philippines, New guinea, Australia, New Caledonia and New Herbrides.

8. *Sphaeranthus* L.

Herbs, annual with divaricate branches; stems winged or not, hairy or glabrous. Leaves alternate, serrate-dentate, decurrent on the stem, hairy or pubescent, sometimes punctate. Heads heterogamous, disciform terminal or axillary, solitary or in globose clusters, subsessile or stalked. Receptacle small, naked. The outer florets female, fertile. Disc florets bisexual, solitary or few, fertile or sterile; corolla tube thickened; limb 4-5 toothed. Involucre narrow;

involucral bracts acute, unequal, sometimes reflexed, acuminate. Anther base sagittate. Style arms of bisexual florets filiform or connate. Achenes oblong, subcompressed, angled, glabrous or villous, often glandular. Pappus absent.

Tropical Asia, Africa, and Australia; ca 8 species, 4 in India.

Literature. ROBYNS, W. (1924). Revision of the genus *Sphaeranthus*. Kew Bull. Misc. Inf. 177-199. fig. 1-4. ROSS-CRAIG, S. (1955). A revision of the genus *Sphaeranthus*. Hook. Ic. Pl. 6: 1-90. t. 3501-3525.

KEY TO THE SPECIES

- 1a. Stems not winged or rarely narrowly winged; glomeruli conical, sessile, brownish; outer florets not more than 4 2. *S. amaranthoides*
- b. Stems winged; glomeruli spherical or ovoid, pedunculate, white, purple or violet; outer florets more than 4 2
- 2a. Wings entire; glomeruli not more than 1 cm across; peduncles glabrous; involucral bracts not ciliate at apex 1. *S. africanus*
- b. Wings toothed; glomeruli up to 2.5 cm across; peduncles pubescent; involucral bracts ciliate at apex 3
- 3a. Leaves double-dentate and with stalked glands 3. *S. indicus*
- b. Leaves single-dentate and with sessile glands 4. *S. senegalensis*

1. *Sphaeranthus africanus* L., Sp. Pl. ed. 2, 1314. 1763; Hook.f., Fl. Brit. India 3: 275. 1881.

Mal.: *Adakkamaniyan, Velutha*; Sans.: *Sveta hapusa*.

Herbs, erect, stout, aromatic, glabrous; stems up to 75 cm high, winged; wings entire, branches many, divaricate. Leaves narrowly obovate or elliptic, narrowed to the base, obtuse to subacute, sometimes acute, decurrent, forming the wings, subentire to minutely dentate, finely toothed, 1.5-10 x 0.5-3.0 cm, pubescent, glandular. Heads purple or white, globose, on long winged peduncle, 0.5-1.0 cm across. Receptacle orbicular to oblong. Involucral bracts linear to lanceolate, obovate, spatulate; upper ones rounded at apex; lower ones acute to acuminate, 0.3-0.4 cm long. Outer female florets 15-40, 0.2-0.3 cm long; corolla broadly cylindrical, obovoid or ovoid. Bisexual florets 1-3, 0.25-0.3 cm long; corolla infundibuliform with a constriction in the middle. Achenes angled, up to 1.2 mm long, glandular.

Fl. & Fr. Jan. - March.

Distrib. India: W. Bengal, Goa, Kerala and Andaman & Nicobar Islands.

Bangladesh, Sri Lanka, China, Iran, Philippines, Myanmar, Malaysia, Vietnam and Australia.

Notes. It is used as an emollient and resolvent. Leaf juice used for gargling. The herbs form a good cattle fodder.

2. *Sphaeranthus amaranthoides* Burm.f., Fl. Ind. 186. 1768; Hook.f., Fl. Brit. India 3: 274. 1881.

Herbs, erect, aromatic; stems up to 40 cm high, glabrous, not winged. Leaves linear, oblong, narrowed at base and decurrent, obtuse, distantly minutely serrulate, 2-8 x 0.6-1.5 cm, thin, glabrous, punctate on both surfaces. Heads brownish, cone-shaped, 1.0-2.5 cm, glabrous subsessile. Receptacle narrowly lanceolate or linear. Involucral bracts multiseriate, ovate, acuminate, 0.5-0.7 cm, glabrous, reflexed. Outer florets 3-4, female, 0.3 cm long, stipitate; corolla narrowly cylindrical. Bisexual floret one, 0.4-0.5 cm long; corolla curved, tubular, slightly widened at base and apex; lobes small, erect. Achenes of female florets stalked, up to 1.5 mm long, villous, those of bisexual florets sessile up to 1.25 mm long, glabrous, sterile.

Fl. & Fr. Jan. - April.

Distrib. India: Peninsular India, 1200-1800 m. Karnataka, Kerala.

Sri Lanka.

3. *Sphaeranthus indicus* L., Sp. Pl. 927. 1753; Hook.f., Fl. Brit. India 3: 275. 1881, p.p. **Fig. 49.**

Beng., Guj., Hindi, Mar.: *Mundi, Gorakhmundi*; Mal. *Mirangani, Adakkamaniyan; Mundari-Mundi*; Oriya: *Murisa, Buikadamba, Bokashungi*; Punj.: *Khamadress, Ghundi*; Sans.: *Mahamundi, Mundi, Hapusa Santal; Belaunja*; Tam.: *Kotta karanthai*; Tel.: *Boddatarupu, Boddasoram.*

Herbs with several ascending branches; up to 50 cm high; wings on stem dentate. Leaves alternate, obovate-oblong, spatulate, decurrent at base, obtuse, margins coarsely double dentate, 1.5-6 x 0.5-2.5 cm, chartaceous, densely hirsute, glandular on both the surfaces, subsessile. Heads pink to purple, heterogamous, disciform, few flowered, terminal on branches, subtended by a few lanceolate bracts, aggregated on elongated receptacle forming ovoid, globose glomerule, 1-1.5 cm across, sessile; peduncle stout. Bracts few, linear-

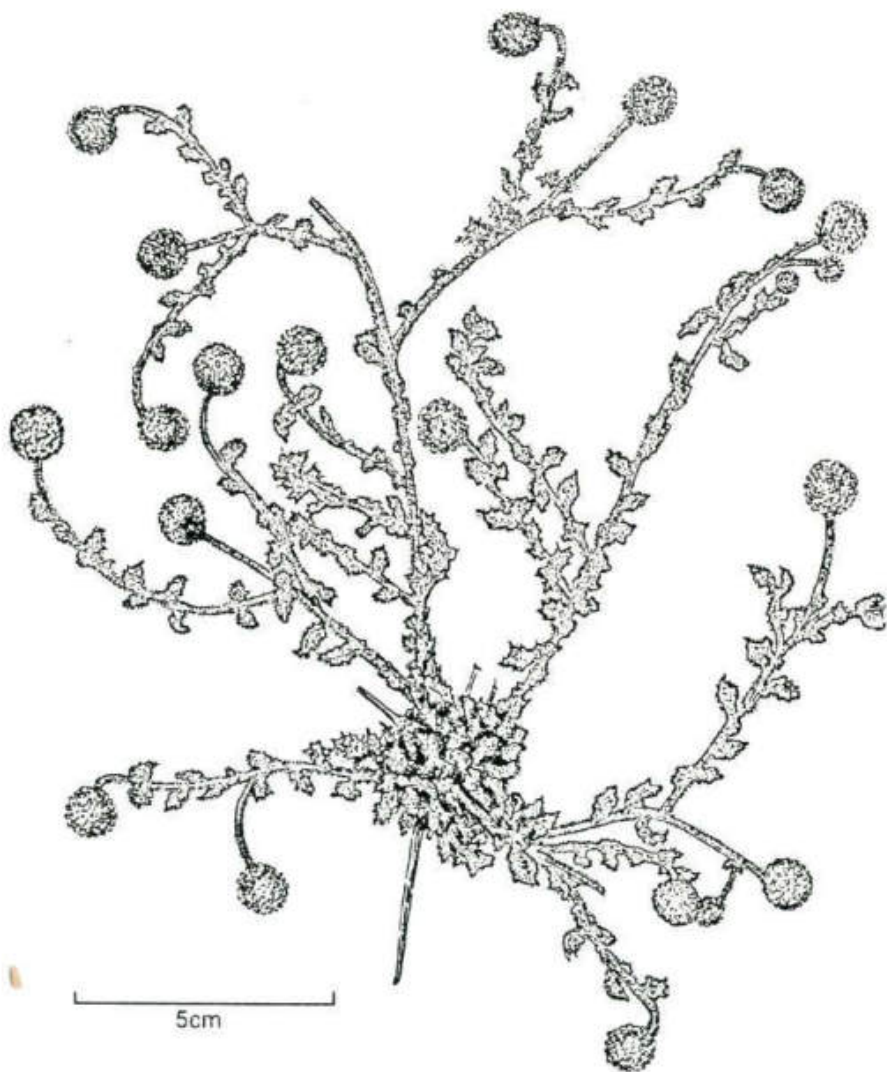


Fig. 49. *Sphaeranthus indicus* L.

lanceolate, 4 x 0.2-0.5 mm, narrowed below, ciliate; outer herbaceous; inner scarious. Outer florets female, corolla of female florets 0.2 mm across; tube 2.5 mm long inner bisexual; corolla of bisexual florets 1.2 mm across, tubular, campanulate, glandular without, 5-lobed, ovate, acute. Achenes smooth or angled, 1.5 mm long, glabrous or villous. Achenes angled, up to 1 mm long, minutely puberulous on ribs, those of bisexual florets 1.5 mm long, smooth or angled, glabrous or villous.

Fl. & Fr. Jan. - April.

Distrib. India: Uttar Pradesh, Sikkim, Assam, Orissa, Madhya Pradesh, Bihar, Rajasthan, Maharashtra, Karnataka, Tamil Nadu, Kerala and Andaman & Nicobar Islands.

Bangladesh, Myanmar, Sri Lanka, Singapore, Malaysia, Australia and Africa.

Notes. The plant has multipurpose value in gastric disorders. Powdered seeds and roots are used as anthelmintic and decoction of the roots is considered useful in chest pains, cough and bowel complaints. Flowers and flower buds are used as tonic and depurative. Leaves eaten as a pot herb, and also used as fish poison. This herb yields an essential oil and fatty oil. The paste made with oil is applied to skin in removing itch. The ground bark mixed with whey is said to be useful in piles.

4. *Sphaeranthus senegalensis* DC., Prodr. 5: 370. 1836. *S. indicus* auct. non L. sensu Hook.f., Fl. Brit. India 3: 275. 1881. p.p.

Herbs, prostrate or decumbent with several ascending branches; stems winged, up to 60-70 cm high, densely hirsute or tomentose. Leaves oblong, linear-oblong or oblanceolate, with a semi-amplexicaul base, dentate with spinescent denticulation, 3-10 x 1-3.5 cm, simple, densely soft lanate glandular, villous. Heads reddish-violet, globose or ellipsoid, terminal, 1 cm across, softly lanate, on 1-6 cm long peduncle. Involucral bracts oblanceolate, spathulate, 0.3-0.35 cm; outer green; inner green in upper parts, often with purple tinged tips scarious below, apiculate, ciliate, hairy in upper part. Receptacle orbicular or sub orbicular, oval to lanceolate. Outer female florets 7-10; corolla 0.2-0.3 cm long, filiform; ovary clothed with forked hairs. Bisexual florets 2-4, infundibuliform; 0.25-0.35 cm long, corolla purple or violet, swollen in the lower half. Achenes glabrous, glandular.

Fl. & Fr. Jan. - April.

Distrib. India: Uttar Pradesh, Sikkim, Assam, Orissa, Madhya Pradesh, Bihar, Rajasthan, Maharashtra, Karnataka, Tamil Nadu, Kerala and Andaman & Nicobar Islands.

Bangladesh, China, Myanmar, Sri Lanka, Singapore, Malaysia, Australia and Africa.

Notes. Very similar to *S. indicus*.

Tribe 9. MUTISIEAE Cass.

(R.R. Rao)

Herbs, shrubs or trees. Leaves alternate or in a basal rosette, entire or toothed. Inflorescence a solitary head or heads, paniculate or corymbose. Heads heterogamous (outer florets female and disc florets bisexual or mixed with functionally male) or sometimes homogamous (florets all bisexual and corolla bilabiate), rarely completely unisexual (dioecious). Involucral bracts imbricate, in 2 or more series. Receptacle naked, flat or convex. Outer florets ligulate, 3-lobed; inner tubular, 5-lobed. Anther bases tailed or sagittate. Style branches rounded or truncate without a ring of hairs below the point of bifurcation. Achenes columnar or fusiform, ribbed. Pappus abundant, setose or plumose.

The Mutisieae is a tropical or neotropical tribe with a great concentration of genera and species in mountainous and arid regions. The tribe is of recent evolution, although there is no clear idea about the origin of the tribe. The tribe is thought to have been derived from Cynareae or Heliantheae or even from Senecioneae. A polyphyletic origin of the tribe is also possible.

S. America, Africa, Asia; ca 55 genera and over 500 species, 9 genera and 15 species in India.

Literature. HANSEN, H.V. (1985). A taxonomic revision of the genus *Gerbera* (Compositae, Mutisieae) sections *Gerbera*, *Parva*, *Piloselloides* (in Africa) and *Lastopus*. *Opera Bot.* 78: 1-36. HANSEN, H.V. (1988). A taxonomic revision of the genera *Gerbera* sect. *Isanthus*, *Leibnitzia* (in Asia) and *Uechritzia* (Compositae, Mutisieae). *Nord. J. Bot.* 8: 61-76. JEFFREY C. (1967). Notes on Compositae. II. The Mutisieae of East Tropical Africa. *Kew Bull.* 21: 177-223. POBEDIMOVA, Y.G. (1963). Mutisieae - In Brobov, E.G., S.K. Cherepanov, & V.L. Komarov. (ed.) *Flora USSR* 28: 588-598, Moscow.

KEY TO THE GENERA

- 1a. Scapigerous or subscapigerous herbs 2
 b. Not scapigerous 6
 2a. Heads subracemose, homogamous; corolla all tubular; pappus hairs feathery 1. *Ainsliaea*
 b. Heads solitary, scapose, usually heterogamous; corolla 2-lipped or ligulate; pappus hairs simple 3
 3a. Ray florets little exceeding the involucre; hairs on achenes inflated, apiculate; scape widened below the heads 8. *Piloselloides*
 b. Ray florets (when present) exceeding the involucre; achenes glabrous or with fine, pointed hairs; scape more or less slender throughout 4
 4a. Plants with two generations of heads, a vernal, radiate and an autumnal non radiate, cleistogamous heads; staminodes present in ray florets 6. *Leibnitzia*
 b. Plants with one generation of heads; staminodes present, or anthers not or only slightly reduced (but non functional) 5
 5a. Heads hemispherical; alveoles of receptacles fimbriate-ciliate; achenes hardly tapering, densely silky with long, pointed sericeous hairs 9. *Uechtrizia*
 b. Heads campanulate; alveoles of receptacle with entire margins; achenes tapering, hairy or subglabrous with short, tapering, non sericeous hairs 4. *Gerbera*
 6a. Heads few flowered; flowers all ligulate 2. *Catamixis*
 b. Heads many flowered; flowers all tubular 7
 7a. Heads solitary; pappus of 10 spreading bristly scales 5. *Hochstetteria*
 b. Heads corymbose or subsessile on branches; pappus hairy 8
 8a. Herbs; involucre bracts spinescent; pappus hairs feathery 3. *Dicoma*
 b. Shrubs or small trees; involucre bracts not spinescent; pappus hairs simple 7. *Leucomeris*

1. *Ainsliaea* DC.

Herbs, perennial, subscapigerous; rootstock thick, erect, crown silky. Leaves radical, some alternate. Heads solitary or 2-3-fascicled on the erect scape, homogamous, discoid, small, sessile or very shortly peduncled. Flowers hermaphrodite, all fertile. Corolla 5-partite. Involucral bracts many-seriate, rigid, often pungent, imbricate; outer ones shorter. Anther bases sagittate, rounded at tips, hairy. Achenes oblanceolate, somewhat compressed, ribbed or not. Pappus uniseriate, feathery.

China and Japan; ca 10 species, 3 in India, in the Himalayan region.

KEY TO THE SPECIES

- 1a. Petiole distinctly winged; achenes 10-ribbed 3. *A. latifolia*
 b. Petiole not winged; achenes indistinctly or distinctly ribbed 2
 2a. Leaves orbicular-cordate or triangular, sinuate-lobed 2. *A. aptera*
 b. Leaves oblanceolate 1. *A. angustifolia*

1. *Ainsliaea angustifolia* Hook.f. & Thomson ex C.B. Clarke in J. Linn. Soc. 14: 412. 1875; Hook.f., Fl. Brit. India 2: 388. 1881.

Herbs, sparsely hairy; branches delicate, herbaceous. Leaves oblanceolate, acute, indistinctly toothed or crenate; gradually narrowed at base into a long petiole; cauline leaves when present 2-3 cm long, sparsely hairy or subglabrous, sessile. Heads ca 0.5-0.6 cm across, racemed on the short branches of long, slender panicle; peduncle and pedicels slender. Involucre narrow. Achenes ca 3-4 mm long, obscurely ribbed, silky. Pappus brownish, as long as the achenes, feathery.

Fl. & Fr. May (?)

Distrib. India: In tropical to temperate forests of Khasi hills 1000-1700 m. Meghalaya; rare.

Endemic.

Notes. Extremely rare, no collections of this are seen by the author.

2. *Ainsliaea aptera* DC., Prodr. 7: 15. 1838; Hook.f., Fl. Brit. India. 3: 388. 1881. Fig. 50.

Herbs, perennial; rootstock thick, woody, elongated, with several long thick roots; crown silky as are the young leaves and petioles, or sometimes glabrous. Leaves triangular or orbicular cordate, acute, sinuate lobed or toothed, each tooth ending in mucro like projection, 6-18 x 5-15 cm, sparsely hairy to densely silky villous, palmately nerved; petiole 3-10 cm long; cauline leaves very short, alternate, lanceolate. Scapes reddish brown, erect, stout, 30-60 cm long, hairy or glabrous. Heads solitary or 1-2 together, arranged on the long flowering stem, sessile or shortly peduncled, 1.5-2 cm long. Involucral bracts in many series, imbricating; outer shorter, 2-3 mm long; inner ovate or ovate-lanceolate, 10-12 mm long, acute, margins thin, somewhat hyaline. Corolla dull white, exceeding the involucre, 10-13 mm long, 5-lobed. Anthers 3-4 mm long. Style thick, 5-6 mm long; style arms stout, recurved. Achenes black, oblanceolate or somewhat turbinate, 6-7 mm long, subcompressed, distinctly hairy. Pappus reddish black dotted at base, 9-10 mm long, long feathery.

Fl. & Fr. April - May; Sept. - Oct.

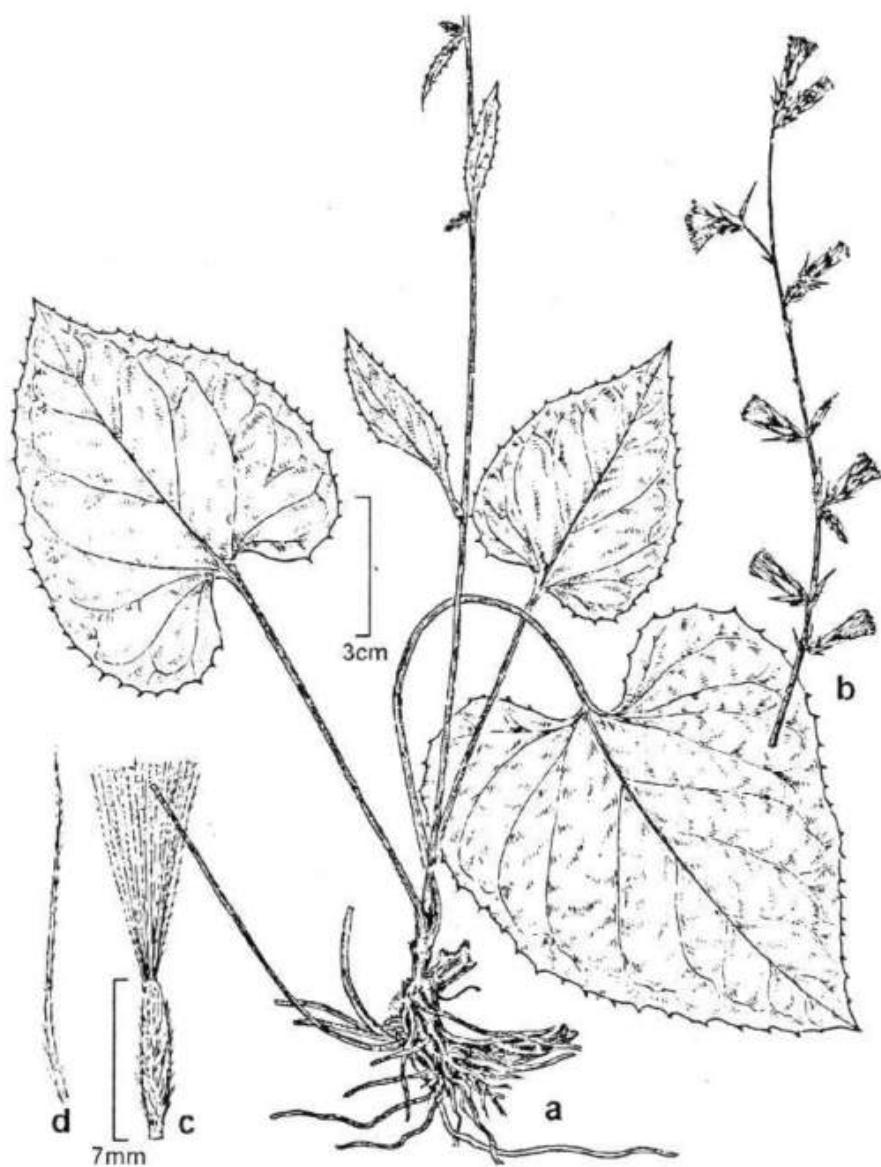


Fig. 50. *Ainsliaea aptera* DC. : a. Habit; b. Inflorescence; c. Achene; d. Pappus hair.

Distrib. India: Temperate Himalayas, as undergrowth in *Pinus* and *Cedrus* forests, and on moist, shady slopes, 2500-4000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and Meghalaya.

Bhutan and Nepal.

Notes. There appear to be two distinct forms under this species. One with densely hairy/silky leaves and petiole and the other glabrous or sparsely pubescent. Similarly the achenes are distinctly 10-ribbed in some plants while in others the ribs are inconspicuous.

3. *Ainsliaea latifolia* (D. Don) Sch.-Bip. in *Pollichia* 18, 19: 190. 1861. *Liatris latifolia* D. Don, *Prodr.*, Fl. Nepal. 189. 1825. *Ainsliaea pteropoda* DC., *Prodr.* 7: 14. 1838; Hook.f., *Fl. Brit. India* 3: 388. 1881. **Fig. 51.**

Herbs, perennial; rootstock spreading; roots thick, 1-1.5 mm in thickness. Leaves chiefly radical, ovate-cordate, acute at apex, base cordate, indistinctly crenate with minute mucro like projections on the margins, abruptly narrowed to a winged petiole; wing gradually narrowed to base; midrib and nerves conspicuous beneath. Scape solitary, erect, 30-40 cm long, hairy. Heads solitary or 1-2 together in the axils of alternate bracts on the scape, 3-flowered. Involucral bracts in 2-3-series; outer ones shorter, 3-4-nerved, margins hyaline; inner ones lanceolate, rigid, somewhat spine pointed in mature heads. Corolla white or bluish white, 8-10 mm long. Anthers sagittate at base, long tailed. Achenes oblanceolate, 4-5 mm long, 8-10-ribbed, silky hairy. Pappus pale brown, ca 8-9 mm long, feathery.

Fl. & Fr. April - June

Distrib. India: Temperate Himalayas, in moist places in *Quercus-Rhododendron* forests, 2000-3000 m. Uttar Pradesh, Himachal Pradesh, Sikkim, Meghalaya and Arunachal Pradesh.

Pakistan, Bhutan, Nepal, Myanmar and China.

2. *Catamixis* Thomson

Shrubs or undershrubs, erect. Leaves alternate. Heads homogamous, small, in terminal corymbose panicles. Florets all bisexual, ligulate, fertile.

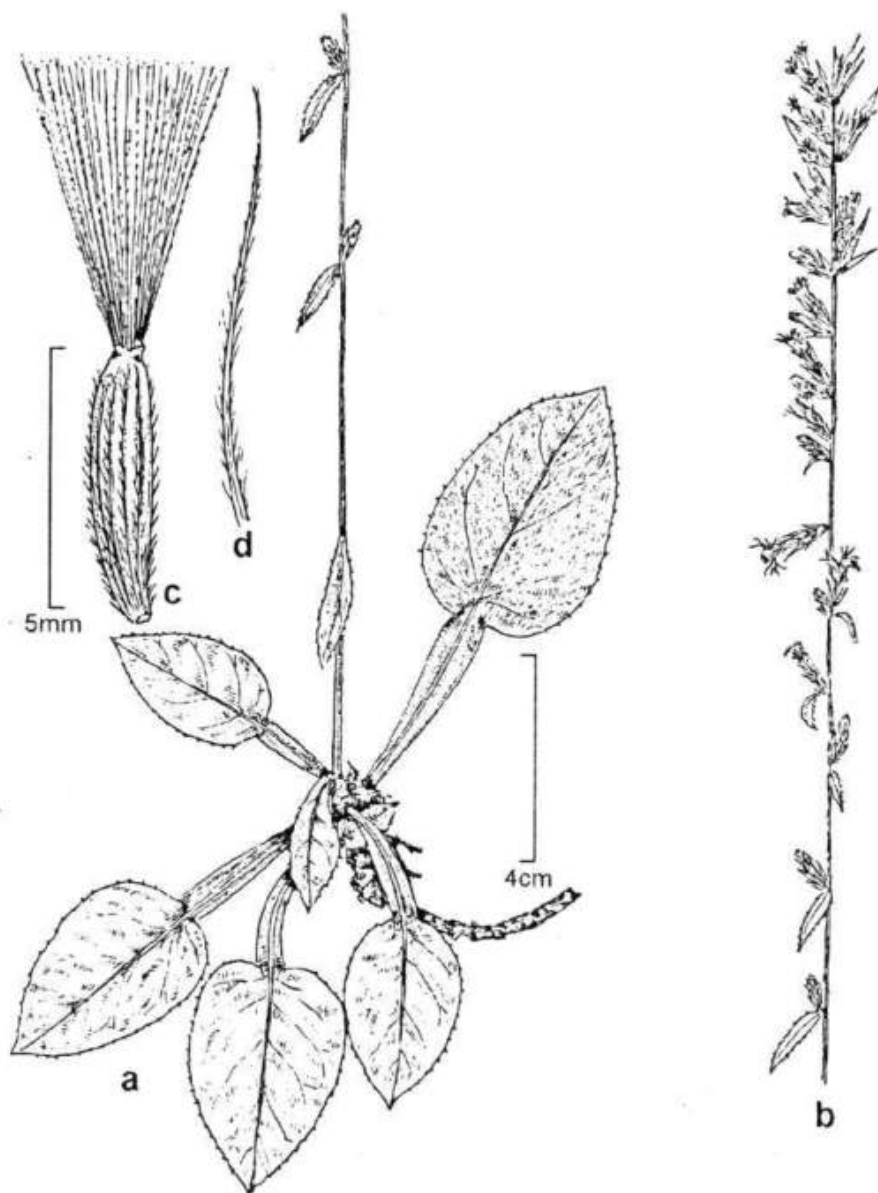


Fig. 51. *Ainsliaea latifolia* (D. Don) Sch.-Bip. : a. Habit; b. Inflorescence; c. Achene; d. Pappus hair.

Involucre oblong; involucre bracts 3-4-seriate; outer shorter. Receptacle naked. Anther bases sagittate, long tailed, barbellate. Style branches short, erect. Achenes somewhat turbinate, silky hairy. Pappus 2-seriate, scabrid.

A monotypic genus having isolated distribution in Garhwal Himalayas (Uttar Pradesh) and Nepal.

Literature. NAYAR, M.P. & AHMEDULLAH, M. (1985) *Catamixis baccharoides* Thomson - An endemic chasmophyte of the W. Himalaya under threat. Bull. Bot. Surv. India 27: 248-250.

Catamixis baccharoides Thomson in J. Linn. Soc. Bot. 9: 343. t. 4. 1867; Hook.f., Fl. Brit. India 3: 389. 1881. **Fig. 52.**

Shrubs, erect, ca 1.2 m high; branches pubescent, marked by the scars of fallen leaves. Leaves obovate or oblong, obtusely dentate, 4-8 x 2-3.5 cm, coriaceous, pubescent or glabrescent at length, prominently nerved, narrowed to a 0.5-1 cm long petiole. Heads narrow, 0.5-1 cm long, in dichotomously branched, terminal corymb; panicle branches puberulous. Florets all ligulate, creamy white, spreading, ca 6 mm long, 5-fid. Involucre bracts lanceolate or ovate-lanceolate, acute, 5-6 mm long, margins hyaline; outer ones smaller. Style ca 5 mm long. Achenes ca 2 mm long, turbinate, long, erect, densely hairy. Pappus white, ca 5 mm long, barbellate.

Fl. & Fr. Jan. - March.

Distrib. India: Garhwal Himalayas, on steep rock crevices, eroded sandy rock faces, 500-1000 m. Uttar Pradesh; threatened.

Nepal.

3. *Dicoma* Cass.

Herbs or undershrubs. Leaves alternate, entire. Heads homogamous with all florets bisexual or heterogamous with outer florets female, all fertile or central florets sterile, subsessile, axillary or leaf opposed. Involucre subcampanulate; involucre bracts many-seriate, imbricate, spinescent. Receptacle flat, naked. Corolla of bisexual flowers tubular, 5-lobed. Anther bases long tailed, bearded. Style arms short, obtuse. Achenes densely silky hairy, ribbed. Pappus feathery, copious.

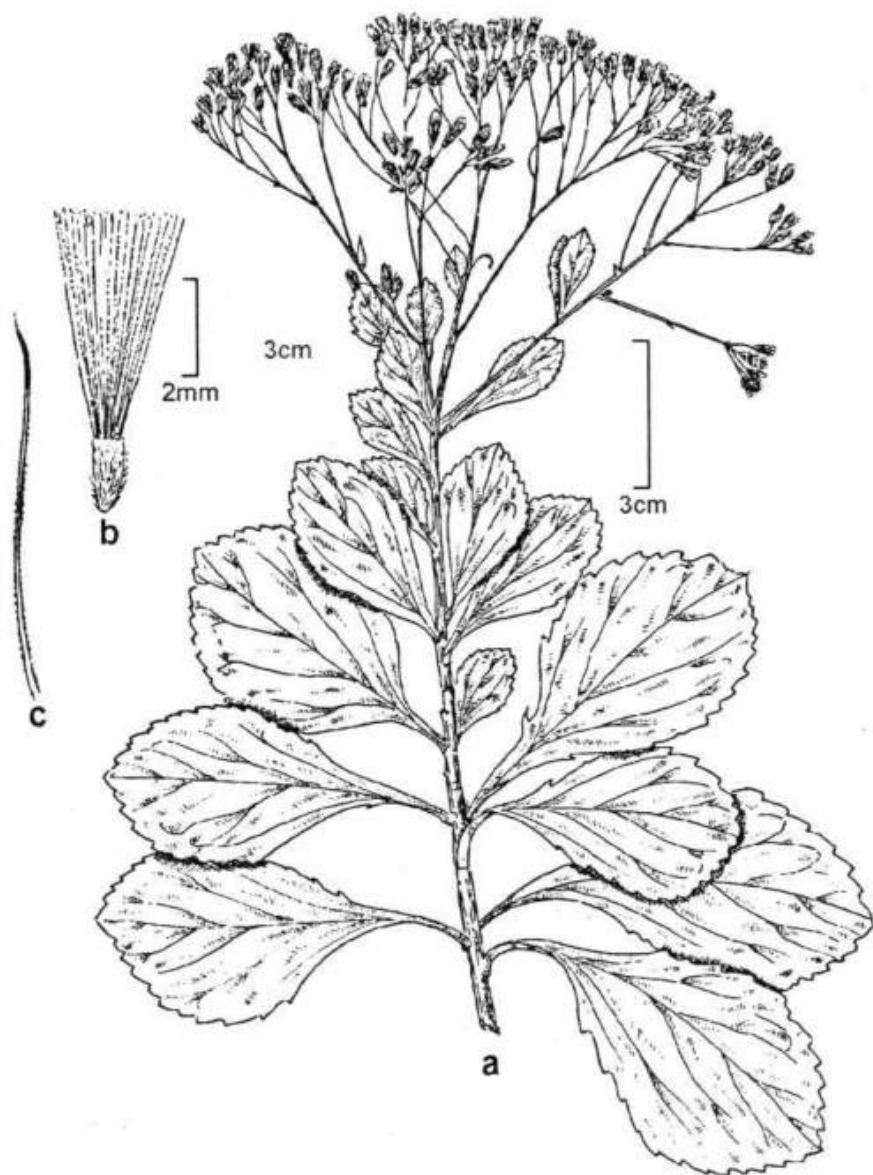


Fig. 52. *Catamixis baccharoides* Thomson : a. A portion of the twig; b. Achene; c. Pappus hair.

Tropical and S. Africa, Madagascar and tropical Asia; ca 30 species, one in India.

Dicoma tomentosa Cass. in Bull. Soc. Philom. 47. 1818; Hook.f., Fl. Brit. India 3: 387. 1881. **Fig. 53.**

Guj.: *Choloharnacharo*; Kan.: *Sannegida*; Mar.: *Navananjichapala*.

Herbs, erect, branched, 12-40 cm high; stems purplish, woody, terete, densely clothed with white cottony hairs. Leaves linear or linear-obovate, obtuse, apiculate, entire, 2.5-6 x 0.5-1 cm, clothed on both surfaces by cottony wool (more so on the lower surface), sessile. Heads solitary, axillary or leaf opposed, 1-1.5 cm across, shortly peduncled. Involucre campanulate; involucre bracts linear-lanceolate, 1.2-1.8 cm long, ending in a spine point, membranous, glabrous. Corolla of bisexual florets white or pale yellow, tubular, 0.6-0.8 cm long, deeply 5-lobed. Stamens 5, exserted; connectives acute. Achenes turbinate, ca 2.8 mm, densely brown villous. Pappus larger than the achenes, in 2 or 3 series, feathery; inner ones longer, lanceolate-subulate, paleaceous, strongly nerved; outer of barbellate setae, 2-3 times longer than the achenes.

Fl. & Fr. Oct. - May

Distrib. India: Fairly widespread in all dry habitats, ascending up to 800 m, in most states.

A native of Tropical Africa.

4. *Gerbera* Cass. nom. cons.

Herbs, perennial, scapigerous, villose, hairs decaying with age. Leaves radical, membranous to subcoriaceous. Scape naked or scaly, generally pilose villose, sometimes cobwebby. Heads yellow or white, heterogamous, radiate or homogamous, discoid, solitary. Involucre turbinate or broadly campanulate; involucre bracts usually lanceolate, acute; outer ones shorter. Ray florets exceeding the involucre, mostly 1-seriate, female, fertile, rarely absent. Disc florets bisexual, fertile. Anther bases sagittate, long tailed, ciliate. Style branches short, rounded, hairy. Achenes elliptic, 5-10-ribbed, papillose. Pappus whitish or whitish tawny, copious.

Himalayas, S.W. China, Bhutan, Nepal; 6 species, 3 in India.

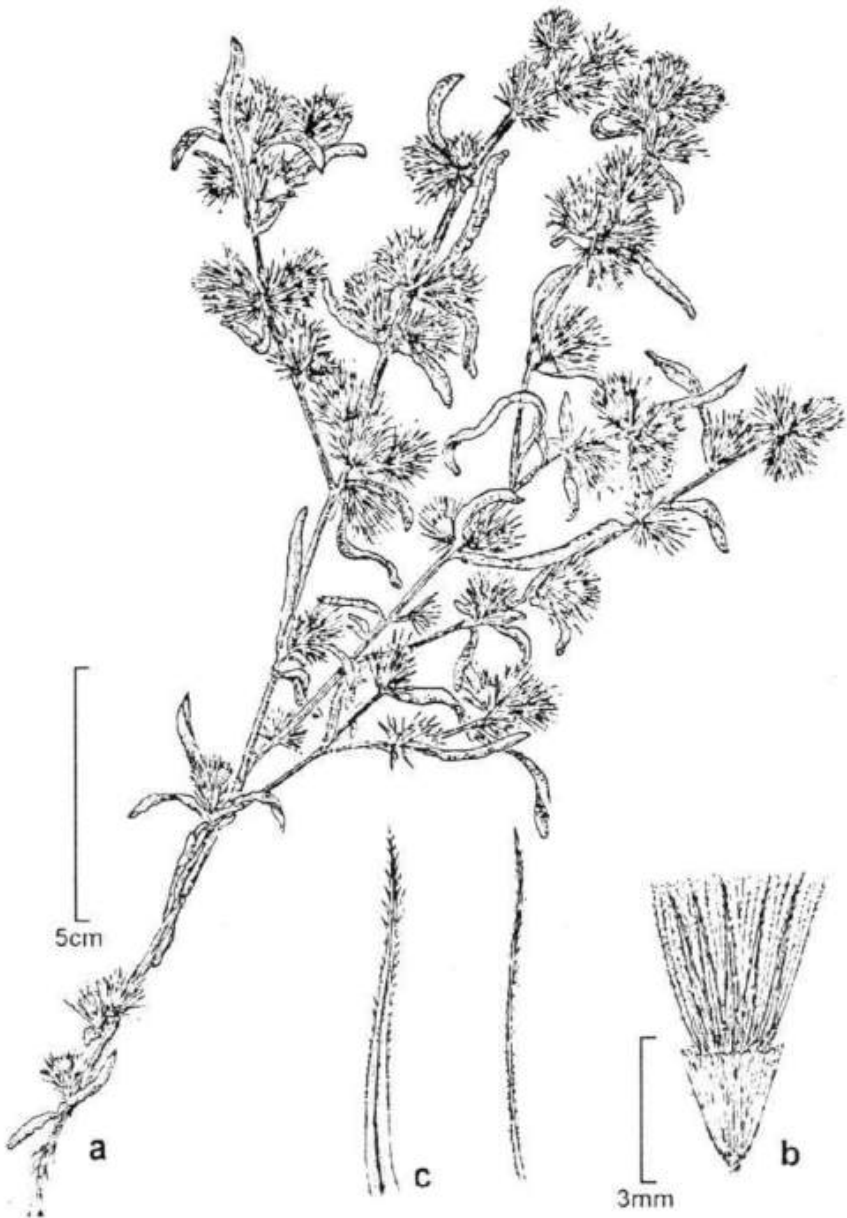


Fig. 53. *Dicoma tomentosa* Cass. : a. Habit; b. Achene; c. Pappus hairs.

KEY TO THE SPECIES

- | | |
|---|------------------------|
| 1a. Ray florets absent; corolla tube with a constriction | 2. <i>G. maxima</i> |
| b. Ray florets present; corolla tube without a constriction | 2 |
| 2a. Lamina membranous; involucrel bracts glabrous; ray florets often yellow | 3. <i>G. nivea</i> |
| b. Lamina rigid; involucrel bracts pilose; ray florets never yellow | 1. <i>G. gossypina</i> |

1. *Gerbera gossypina* (Royle) P. Beauv. in Bull. Soc. Bot. Geneve ser. 2, 2: 40. 1910. *Chaptalia gossypina* Royle, Ill Bot. Himal. 251. t. 59. f. 2. 1835. *Gerbera lanuginosa* (DC.) Sch.-Bip. in Flora (Regensb.) 27: 780. 1844; Hook.f., Fl. Brit. India 3: 390. 1881. Fig. 54.

Garh.: *Gauni, Jhula, Kopas*; Kum.: *Kapasi, Karki, Kaffii*; Pun.: *Patpatula, Kho, Kapasi*.

Herbs, perennial, white hairy; rootstock elongated, thick, ca 2.5 cm across, covered with persistent leaf bases, crown silky woolly. Leaves elliptic-oblong or lanceolate-oblong, lyrate to sublyrate, pinnatifid or subspathulate; terminal lobe (when present) large, elliptic-oblong and 1-4 pairs of smaller irregular or sinuate-rounded lateral lobes; dark green and glabrous or sparsely pilose above, persistently softly greyish felted tomentose beneath, 3-30 x 1-8 cm, nerves not prominent, acute to almost mucronate at apex, base cuneate or decurrent into a wing, margins remotely indistinctly crenate; petiole 1-12 cm long, somewhat winged. Scapes 1-3, up to 35 cm long, light brownish floccose, bracteate with few subulate bracts. Heads 2-3.5 cm across. Involucrel bracts linear-lanceolate, up to 20 x 2.5 mm, tapering, densely pilose. Ray florets white, pink or white tinged pink, female, 2-lipped; tube 7-9 mm long; lower limb 10-19 mm long; upper limb 3-6 mm long. Disc florets bisexual with 7-10 mm long tubes. Style branches short. Achenes 6-5 mm long, 5-9-ribbed, pilose or glabrous. Pappus whitish, flattened, 1-1.5 cm long, in 2 rows, barbellate.

Fl. & Fr. March - Sept.

Distrib. India: N.W. Himalayas, in dry rocky places on hills and in sandy soil. Jammu & Kashmir and Uttar Pradesh.

Pakistan and Nepal.

Notes. Leaves attain large size after flowering. The subsurface tomentum is used as cotton for cloth. The variety *pusilla* (DC.) Hook.f., listed under this species (in *Fl. Brit. India*. 3: 390), cannot be maintained as this is only an ecological variant of the species.

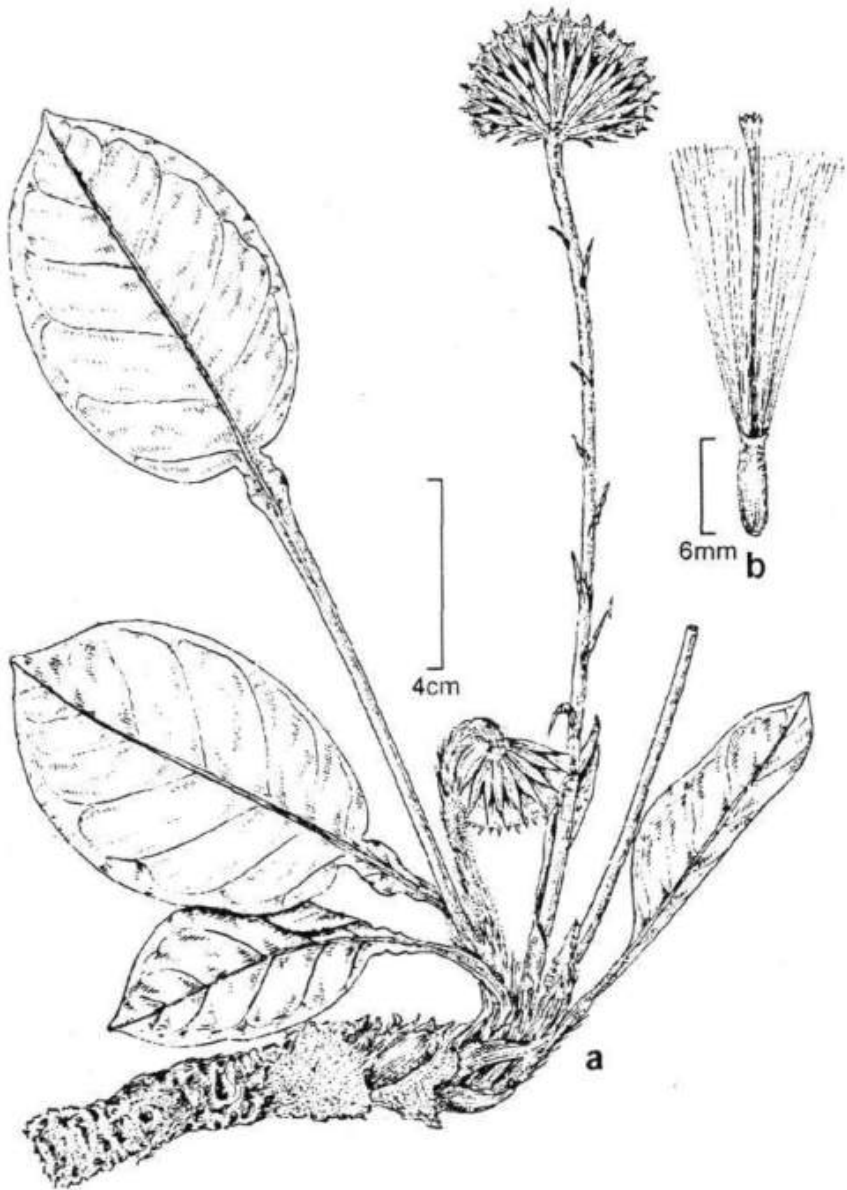


Fig. 54. *Gerbera gossypina* (Royle) P. Beauv. : a. Habit; b. Achene.

2. *Gerbera maxima* (D. Don) P. Beauv. in Bull. Soc. Bot. Geneve ser. 2, 2: 44. 1910. *Chaptalia maxima* D. Don., Prodr. Fl. Nepal. 166. 1825. *Gerbera macrophylla* Benth. in Benth. & Hook.f., Gen. Pl. 2: 497. 1873. *G. maxima* var. *glabrata* (Hook.f.) Kitam. in Fauna & Fl. Nepal. Himal. 259. 1955. *G. macrophylla* Benth. var. *glabrata* Hook.f., Fl. Brit. India 3: 391. 1881.

Fig. 55.

Perennials, stout; crown of rootstock and young leaves woolly; roots fleshy, 2-3.5 mm in diam. Leaves broadly elliptic-oblong, sagittate with broad lobes, apex broadly tapering, base sagittate, rarely subcordate or truncate, remotely denticulate 15-50 x 5-18 cm, dull green above, yellowish brown felted tomentose beneath, nerves distinct; petiole up to 35 cm long, basally widened, floccose to whitish grey felted tomentose or villose. Scape 1-4, up to 65 cm long, grey felted tomentose, finely striate, ebracteate or rarely with subulate bracts. Heads homogamous, 2.5-3 cm across, rayless. Involucral bracts brownish or sometimes tinged reddish, lanceolate, ca 18-22 mm long, distinctly imbricate, glabrous or the outer ones sparsely hairy. Outer florets whitish or creamy tinged pinkish, sterile, basal part of the corolla tube narrowed or constricted; lobes widening to 2-2.5 mm above. Achenes 5.5-7.5 mm long, pilose, strongly 10-ribbed. Pappus whitish tawny or reddish, in 2 rows, equalling the length of the involucral bracts, barbellate.

Fl. & Fr. Aug. - Dec.

Distrib. India: Himalayas, in open forests, hill slopes, grassy areas and dry rocky situations, 1200-2800 m. Uttar Pradesh (Kumaon Himalaya), Sikkim, Meghalaya and Nagaland.

Nepal, Bhutan and S.E. Tibet.

Notes. A very distinct species on account of large sagittate leaves and the fragrant heads.

3. *Gerbera nivea* (DC.) Sch.-Bip. in Flora (Regensb.) 27: 780. 1844, non sensu C.B. Clarke 1876; Hook.f., Fl. Brit. India 3: 390. 1881. *Oreoseris nivea* Wallich ex DC., Prodr. 7: 18. 1838.

Herbs, perennial; rootstock elongate; stems erect, 30-50 cm high, whitish grey pubescent. Leaves lanceolate to oblanceolate, elliptic, oblong, obovate or pinnatifid lyrate; terminal lobe large, sinuate; lateral lobes 2-3, rounded; glabrous or sparsely hairy above, persistently softly woolly beneath, gradually

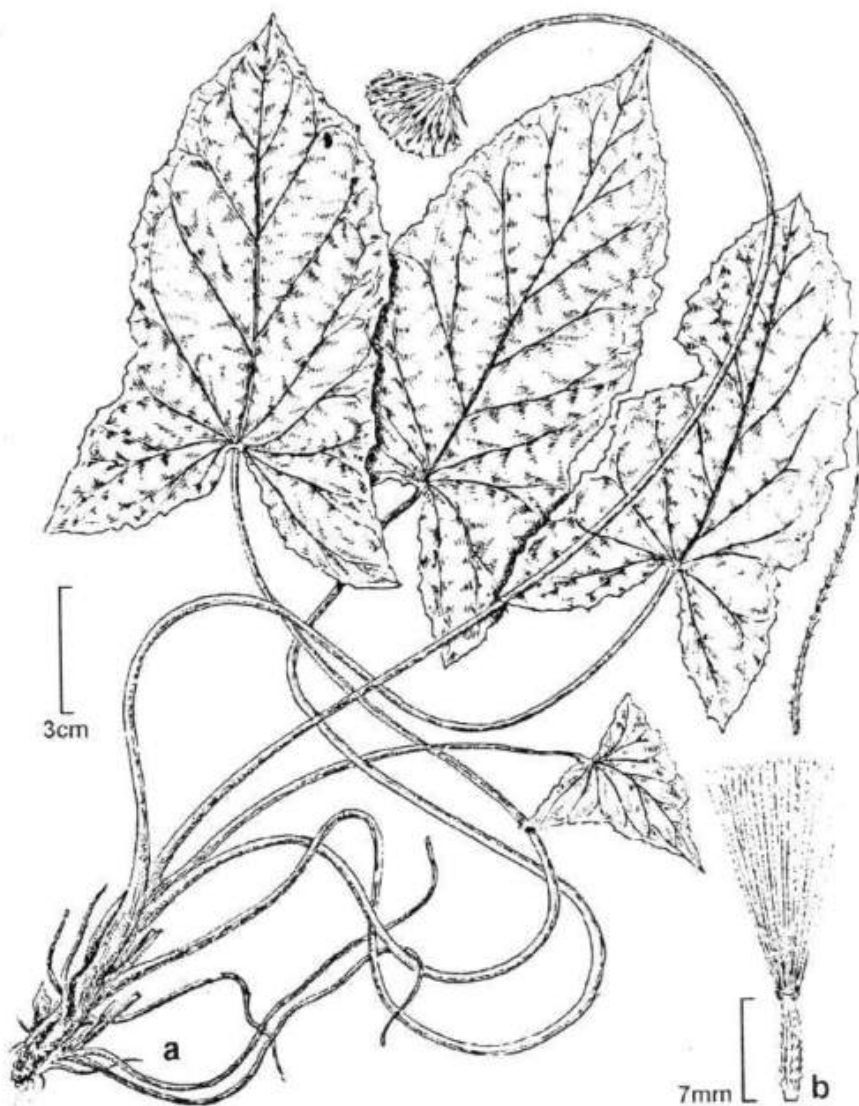


Fig. 55. *Gerbera maxima* (D. Don) P. Beauv. : a. Habit; b. Achene.

narrowed to a petiole; petiole widened at base, often indistinctly winged. Scape solitary, 4-25 cm long. Heads ca 15-30 mm across, fragrant, somewhat drooping. Involucral bracts brown with rose purple tinge, linear-lanceolate to ovate-elliptic, ca 25 x 2.5-6 mm, long tapering, glabrous or sparsely pilose. Ray florets variable in colour, yellow, cream, rose lilac, pink, white or white rose above and purplish below; tube ca 3-6 mm long. Style 5-9 mm long. Disc florets also vary in colour; tube ca 6-8 mm long. Anthers white, creamy, crimson or reddish purple. Achenes 5-6.5 mm long, 7-ribbed, glabrous. Pappus whitish to tawny white.

Fl. & Fr. July - Oct.

Distrib. India: Himalayas, in open forests and in *Rhododendron*-Pine forests, grassy alpine slopes, 3300-5000 m. Uttar Pradesh (Kumaon Himalaya), Sikkim and Arunachal Pradesh.

Nepal, Bhutan, Tibet and China.

Notes. A very slender species of *Gerbera* growing at higher elevations than all other species of the genus. Heads nodding and fragrant.

5. *Hochstetteria* DC.

Herbs, perennial; branches rigid. Leaves alternate. Heads homogamous, solitary, terminal, subglobose in fruit, pedunculate. Florets yellow, all hermaphrodite, tubular; limb 5-partite. Involucre hemispheric; bracts many-seriate, foliaceous. Receptacle pitted. Anther bases sagittate, long tailed. Style arms obtuse. Achenes turbinate. Pappus of uniseriate, 10 long setae, dilated at base.

Tropical Africa, Arabia, Pakistan, India; a monotypic genus.

Hochstetteria schimperi DC., Prodr. 7: 287. 1838; Hook.f., Fl. Brit. India 3: 388. 1881. Fig. 56.

Herbs, perennial, glabrous, rigid, up to 60 cm high; branches angled, erect or ascending, glabrous or pubescent. Leaves ovate or elliptic, acute, indistinctly crenate or serrulate, ca 4-6 mm long, pubescent on both surfaces, shortly petioled. Heads 1-1.8 cm across, subtended by 1-2 foliaceous bracts at base. Involucral bracts narrowly lanceolate, acute, pungent, scarious on margins, ciliolate, straight, rigid, 1-nerved, pubescent. Receptacle convex, deeply pitted.



Fig. 56. *Hochstetteria schimperi* DC. : a. A portion of the twig; b. Achene.

Corolla yellow, ca 5-8 mm long. Style branches linear. Achenes turbinate, 12.5 mm long, 10-12-ridged, densely clothed with long and straight brown hairs, particularly at base and middle. Pappus 1-seriate, of 10 long subulate-lanceolate, pales, much longer than the achenes, subulate-lanceolate, incurved or spreading, hyaline, undulate with a strong and thick midrib, all united at base in a ring on the achene.

Fl. & Fr. Probably during Sept. - Oct.

Distrib. India: Jammu & Kashmir.

Pakistan, Arabia and Tropical Africa.

Notes. A species having close affinity with *Dicoma*. Not common. The achenes with a ring of long, persistent pales are very characteristic.

6. *Leibnitzia* Cass.

Leaves lyrate, pinnatifid or sinuate, often undeveloped. Scapes 1-4, appearing twice a year (vernal and autumnal generations). Heads dimorphic. *Vernal generation.* Leaves undeveloped or wanting, all parts densely whitish felted or cobwebby tomentose. Heads small. All florets fertile. Involucral bracts linear-lanceolate, elliptic or ovate-oblong, subserrate. Anthers tailed. Achenes elliptic, 5-8-ribbed, hairy, tapering or beaked. *Autumnal generation.* Leaves large. Heads cleistogamous. Florets female, of 2 types; outer somewhat rayed; lower limb short, tridentate; upper narrow, filiform. Achenes larger than in the vernal generation.

Notes. The dimorphic heads in this genus are most remarkable.

Himalayas, E. Asia and C.I.S.; 4 species, 2 in India.

KEY TO THE SPECIES

- | | |
|---|-------------------------|
| 1a. Involucre glabrous; achenes not beaked | 1. <i>L. nepalensis</i> |
| b. Involucre tomentose; achenes distinctly beaked | 2. <i>L. ruficoma</i> |

1. *Leibnitzia nepalensis* (Kunze) Kitam. in J. Jap. Bot. 14: 297. 1938. *Cleistanthium nepalense* Kunze in Bot. Zeit. 9: 350. 1851. *Gerbera kunzeana* Brown & Asch. in App. Pl. Nov. and Cat. Sem. Hort. Berol. 3. 1871; Hook. f., Fl. Brit. India. 3: 390. 1881.

Fig. 57.

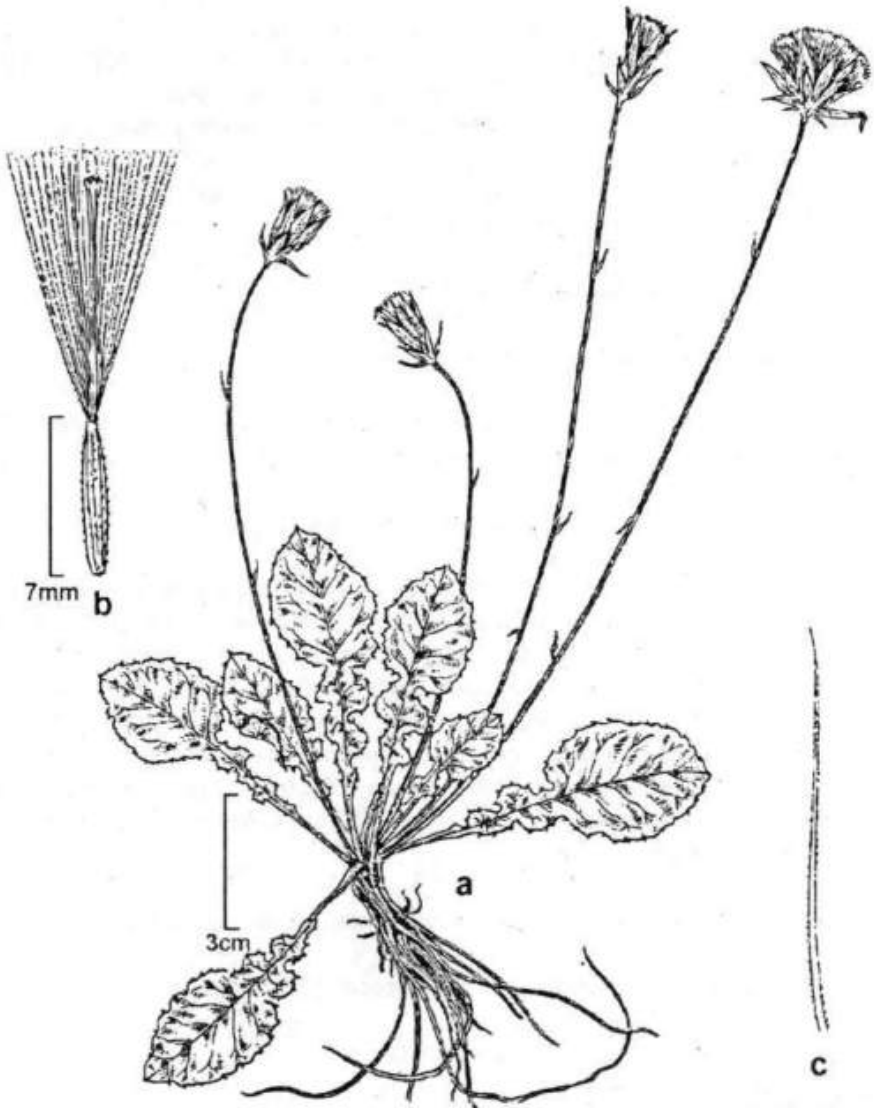


Fig. 57. *Leibnitzia nepalensis* (Kunze) Kitam. : a. Habit; b. Achene; c. Pappus hair.

Herbs, crown and rootstock silky; roots thick, 1-2.5 mm wide. Leaves in both generations quite different; lanceolate, 1-6 x 0.3-1.5 cm in vernal generation; elliptic-oblong, 5-20 x 1.5-3 cm, lyrate or sinuate in autumnal generation; terminal lobe large, cordate or triangular, base decurrent or truncate, margin sinuate or undulate, upper surface green, glabrous, lower surface ashy tomentose. Scapes 1-4, scaly, much larger in autumnal phase, up to 35 cm long, glabrous or cottony above. Heads ca 1.5-2 cm across. Involucral bracts greenish tinged violet, ovate or ovate-oblong, 15-16 mm long, acute, glabrous. Ray florets in vernal generation white above, pinkish below; those in autumnal phase reddish or white tipped reddish; tube 2-2.5 mm long. Disc florets 2-3 mm long. Achenes speckled with violet purple, 3-7 mm long, tapering, scabrid. Pappus more or less violet purple, turning whitish at maturity.

Fl. & Fr. April - June (Vernal); Aug. Sept. (Autumnal)

Distrib. India: Himalayas, up to 3900 m in exposed forest clearings and in *Cedrus* forests. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim and W. Bengal.

Pakistan and Tibet.

2. *Leibnitzia ruficoma* (Franch.) Kitam. in J. Jap. Bot. 14: 297. 1938.
Gerbera ruficoma Franch. in J. de B. 2: 68. 1888.

Herbs. *Vernal generation* : Roots 1-1.5 mm in diam. Leaves undeveloped or 2-2.5 cm long. Scapes 1-4, ca 4-5 cm long. Heads ca 1 cm across. Involucral bracts up to 7 mm long. Ray florets with 2 mm long tube. Style ca 1 mm long. Achenes 6-7 mm long, conspicuously beaked. *Autumnal generation* : Leaves well developed, sinuate or lyrate; lateral lobes 1-4 pairs, undulate and crenate at margins, 8-18 x 1.4-3.5 cm; petiole 3-9 cm long. Scapes 1-10, up to 40 cm long. Ray florets with tube 3.5-4.5 mm long. Style about 1 mm long. Disc florets 5-6.5 mm long. Achenes 7-7.5 mm long including ca 2 mm long beak.

Fl. & Fr. April - June (Vernal); Aug. - Sept. (Autumnal).

Distrib. India: Himalayas, 3500-4500 m. Sikkim.

Nepal, Bhutan, China and S. Tibet.

Notes. One of the little known members of the scapose. Careful field observations are essential for proper understanding of this, as well as the previous species, rather than just the herbarium studies.

7. *Leucomeris* D. Don

Shrubs or small trees. Leaves alternate, entire. Heads homogamous, discoid, in terminal corymbs, few flowered. Involucre shorter than the flowers; bracts 4-5-seriate, coriaceous; outer ones much shorter. Florets white, all bisexual, fertile. Corolla tubular, 5-lobed. Anther bases sagittate. Style filiform, obtuse, 2-fid. Achenes 5-6-ribbed, densely silky. Pappus scabrid, abundant.

Myanmar, Nepal and India (Himalayan and N.E. region); 2 species in India.

KEY TO THE SPECIES

- 1a. Leaves velvety-tomentose beneath; corymbs spreading; pappus dirty white, longer than the achenes 2. *L. spectabilis*
 b. Leaves glabrous beneath; corymbs almost capitate; pappus reddish, as long as the achenes 1. *L. decora*

1. *Leucomeris decora* Kurz in J. Asiat. Soc. Beng. 41(2): 317. 1872.

Small trees; young branches villous-tomentose. Leaves elliptic-lanceolate or oblong-lanceolate, acute or acuminate, narrowed to an unequal base, 10-18 x 3-5 cm, glabrous on both surfaces; petiole 2-2.5 cm long, glabrous. Heads in rounded or capitate corymb, terminal on leafless branches. Peduncle 6-10 cm long, imbricate-scaly. Involucre elongate; bracts lanceolate, rigid, woolly; the outer ones gradually smaller. Florets white, fragrant, ca 2.5 cm long, all fertile and hemaphrodite. Achenes 1.2-1.4 cm long, sulcate, densely appressed silky hairy. Pappus tawny or reddish, as long as the achenes.

Fl. & Fr. March - May.

Distrib. India: N.E. India, in dry deciduous forests. Manipur and Mizoram; rare.

Myanma.

Notes. Trees become almost leafless during flowering time. Very rare, no specimens of this are seen by the author.

2. *Leucomeris spectabilis* D. Don, Prodr. Fl. Nepal. 179. 1825; Hook.f., Fl. Brit. India 3: 386. 1881. Fig. 58.

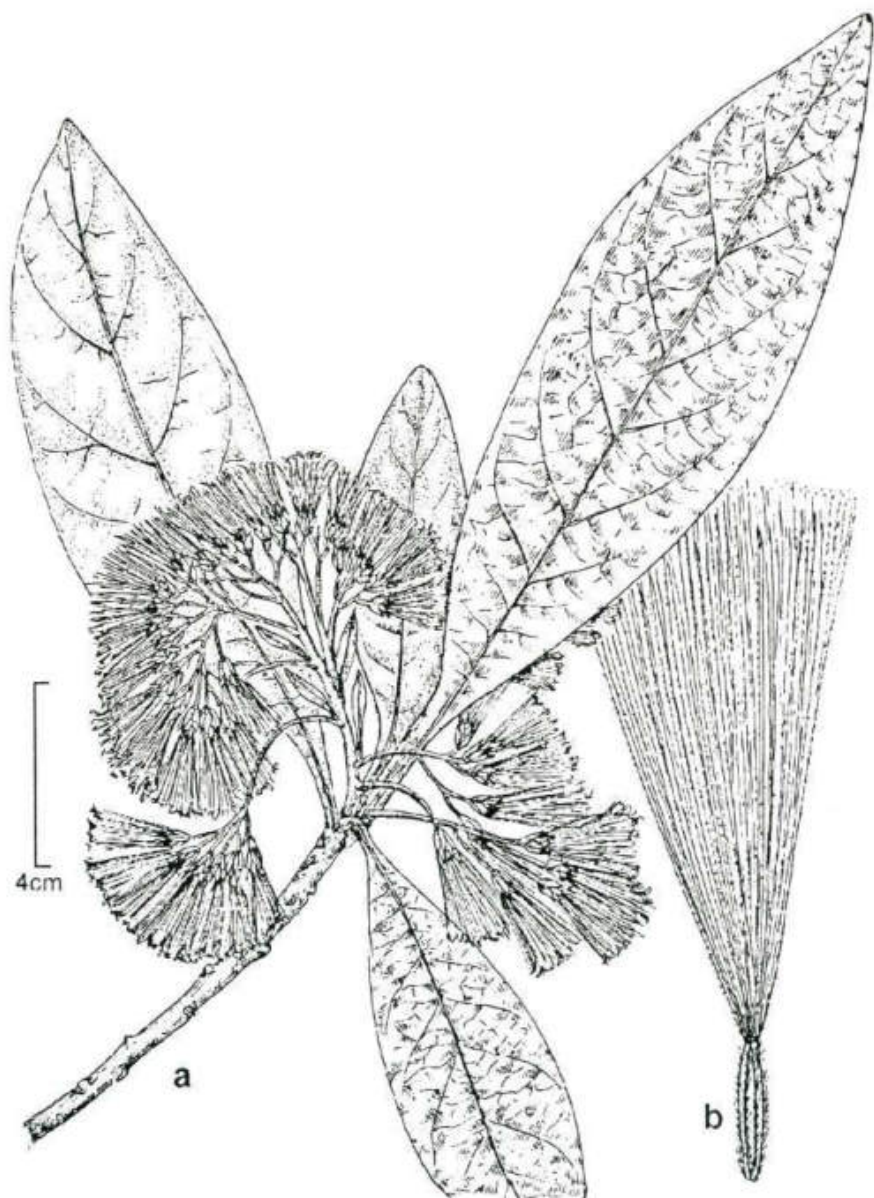


Fig. 58. *Leucomeris spectabilis* D. Don : a. A portion of the twig; b. Achene.

Hindi: *Phusara*, *Phusiari*.

Shrubs to small trees, 2-3 m tall; young branches with persistent leaf scars. Leaves ovate-lanceolate or oblanceolate or elliptic-lanceolate, narrowed or rounded at apex, obtuse, gradually narrowed at base to short petiole, 5-25 x 2-4.5 cm, green and coriaceous above, densely dirty white, velvety tomentose beneath; midrib raised below. Heads corymbose, dense. Involucral bracts in 4-5 rows, imbricate; outer ones ovate-oblong, gradually smaller, 4-5 x 2-2.5 mm, much smaller than the florets, acute, dry. Florets all bisexual, fertile. Corolla pale yellow, tubular, 5-lobed; lobes revolute. Anther bases caudate, ciliate. Style filiform, obtuse, 2-fid. Achenes subterete, 3-ribbed on each face, densely silvery pilose. Pappus dirty white, longer than the achenes, scabrid.

Fl. & Fr. April - June.

Distrib. India: W. Himalayas, Garhwal region, ascending up to 2000 m. Uttar Pradesh.

Nepal.

Notes. Flowers are aromatic and attract large number of insects during peak flowering.

8. *Piloselloides* (Less.) C. Jeffrey

Herbs, scapigerous. Leaves radical. Scape naked, widened below the head. Heads radiate, solitary. Ray florets biseriate, female, fertile, little exceeding the involucre; staminodes in ray florets often very vestigial. Disc florets bisexual. Anthers long tailed at base. Achenes very long, beaked, pilose, with apiculate inflated, hairs. Pappus reddish.

S. Africa, Madagascar, Ethiopia Yemen, Somalia, Sudan, Myanmar, Thailand, China; 2 species, 1 in India.

Piloselloides hirsuta (Forsk.) C. Jeffrey in kew Bull. 21: 218. 1967. *Arnica hirsuta* Forskal, Fl. Aegypt Arab. 151. 1775. *Gerbera piloselloides* (L.) Cass., Dict. Sci. Nat. 18: 461. 1820; Hook.f., Fl. Brit. India 3: 389. 1881.

Herbs, perennial, acaulescent; rootstock thick, silky villose. Leaves elliptic or obovate-oblong, entire or repand-denticulate, rounded at apex, narrowed at the base, 5-12 x 2.5-5 cm, glabrous above, softly villose beneath; petiole 3-4 cm

long. Scapes 1-4, 20-35 cm long, 1-headed, thickened below the head, pilose-tomentose with soft long hairs, glabrous, at length. Heads 2-2.5 cm long, erect. Involucral bracts imbricate, linear-lanceolate, acute, tawny tomentose. Ray florets uniseriate, purplish outside and white tinged purple inside, nearly as long as the involucral bracts; lip 2-partite. Disc florets 2-labiate. Anther bases ~~tailed~~. Style branches linear. Achenes 8-9 mm long, slightly compressed, beaked, papillose, 5-6-ribbed. Pappus subrufous or reddish, setaceous, as long as the achenes.

Fl. & Fr. May - Aug.

Distrib. India: E. Himalayas, undergrowth in coniferous as well as broad leaved temperate forests, 2500-3500 m. Sikkim, Arunachal Pradesh and Meghalaya.

Myanmar, Thailand, China, Tropical S. Africa, Sudan, Somalia, Ethiopia and Yeman.

9. *Uechtritria* Freyn.

Herbs. Leaves lyrate-pinnatifid or entire to subsinuate. Scapes solitary or 2 together, erect, slightly widened below the head, bracteate. Heads hemispherical or campanulate. Involucral bracts imbricate or subseriate. Alveoles of receptacle fimbriate-laciniate. Florets glabrous; lower limb 3-dentate; upper limb of 2 small lobes. Anthers not or slightly reduced and split above. Style branches short, rounded hairy. Achenes elliptic to angular-flattened or subcylindrical, 6-11-ribbed, densely long villose. Pappus coarse, more or less equalling the length of the involucre, in 2 or more rows.

Turkish Armenia and Asia; 3 species, 1 in India.

Uechtritria lacei (Watt) C. Jeffrey in kew Bull. 21: 213. 1967. *Gerbera lacei* Watt in Kew Bull. 1911. 272. 1911.

Herbs, scapose, crown and petiole greyish, cobwebby pilose, glabrous at maturity. Leaves elliptic-oblong, apex rounded-tapering with a small mucro, cordate at base, crenate-dentate or sometimes entire, 10-30 x 4-10 cm, rigid, dark and glabrous above, softly greyish tomentose beneath; veins prominent on the upper surface. Scapes 1-2, erect, 18-45 cm long, slightly widened below the head, greyish tomentose below and cobwebby tomentose above, ebracteate. Heads 2-3 cm across. Involucral bracts ca 1.5 cm long, lanceolate, long

tapering, densely greyish pilose; margin of upper involucre bracts often with reddish, subglandular hairs. Ray florets pale pink; tube 7-8 mm long. Disc florets 8-9 mm long. Achenes 5-9 mm long, brownish tinged reddish, indistinctly tapering, villose; hairs long, white pointed. Pappus whitish tawny, tinged violet with dark spot.

Fl. & Fr. May - July.

Distrib. India: N.W. Himalayas, in open exposed areas and forest margin, 2000-2800 m. Jammu & Kashmir and Himachal Pradesh; rare.

Endemic.

Notes. One of the poorly known endemic species, which has become rare and has not been collected often.

Tribe 10. SENECEONEAE Cass.

(R. Mathur)

Herbs, shrubs or climbers; indumentum soft, whitish, cottony or coarsely brownish hirsute or pubescent. Leaves mostly alternate, both radical and cauline or only cauline, entire, variously toothed or pinnatifid. Capitula heterogamous, homogamous, discoid or disciform. Radiate capitula with ray florets yellow, ligulate, female; ligules entire or toothed. Disc florets, pink, white, cream or yellow, hermaphrodite. Involucre of 1-2 seriate or multiseriata, equal or unequal imbricate, or valvate bracts; bracts with a few, short, calyculate or ecalyculate bracts, herbaceous or membranous. Receptacle usually flat, epaleaceous or paleaceous. Anther base obtuse or tailed. Style branches of disc florets truncate or appendaged. Achenes usually angular, cylindrical, ribbed, striate, truncate or shortly contracted at the end. Pappus of white, yellow, rustish or red, fine capillary hairs or bristles.

More or less cosmopolitan; ca 50 genera, with over 2000 species, 16 genera and 133 species in India.

Literature. BARKLEY, T.M. (1985). Generic boundaries in the Senecioneae. *Taxon* 34(1): 17-21. BENTHAM, G. & J.D. HOOKER (1873). *Compositae. Gen. Pl.* 2: 163-533. CANDOLLE, A.P. DE (1838). *Prodromus Systematis Naturalis*, Vol. VI. CLARKE, C.B. (1876). *Compositae Indicae* London. JEFFREY C. & Y.L. CHEN (1984). Taxonomic studies on the Tribe Senecioneae (Compositae) of Eastern Asia. *Kew. Bull.* 39(2): 1-454. KOYAMA, H. (1968).

Taxonomic studies on the Tribe Senecioneae of Eastern Asia 11. "Enumeration of the species of Eastern Asia". *Mem. Fac. Sci. Kyoto Univ. Ser. Biol.* 2: 19-60. NORDENSTAM, B. (1978). Senecioneae and Liabeae-Systematic review. In HEYWOOD, V.H., J.B. HARBORNE, & B.L. TURNER (ed.) *The Biology & Chemistry of the Compositae* Vol. 2: 799-830. NORDENSTAM, B. (1978). Taxonomic studies in the Tribe Senecioneae (Compositae). *Opera Botanica* 44: 1-83. RYDBERG, P.A. (1924). Some senecioid genera 1. *Bull. Torrey Bot. Club* 51: 369-378.

Notes. Phylogenetically the tribe Senecioneae is proposed by Small, as the most primitive tribe of the family Asteraceae. Cytologically proposed base number for the tribe is $2n=10$. Economically this tribe has a significant importance in the field of medicine and for the perfumery.

KEY TO THE SUBTRIBES

- | | |
|---|---------------------|
| 1a. Involucral bracts multiseriate, imbricate, unequal | 2. Pseudojacobineae |
| b. Involucral bracts 1-2-seriate, valvate, equal | 2 |
| 2a. Style arms of female florets flattened or narrowly clavate, papillose, not hairy all around | 3. Tussilagineae |
| b. Style arms of female florets truncate or obtuse, penicillate or with a hairy tip | 1. Eusenecioneae |

Subtribe 1. EUSENECIONEAE DC.

Herbs, shrubs or climbers. Leaves mostly alternate, both radical and cauline or only cauline, entire, variously toothed or pinnatifid. Capitula yellow, pink, white or brick red, heterogamous, homogamous, discoid or disciform. Involucral bracts uniseriate, free nearly to the base with or without few smaller, outer calyculate bracts. Anther base obtuse or tailed. Style arms of female florets truncate or obtuse, penicillate or with a hairy tip. Achenes usually cylindrical, ribbed. Pappus of white, yellow, rustish or reddish fine capillary hairs or bristles.

Almost cosmopolitan; ca 47 genera with over 1850 species, 12 genera and 115 species in India.

KEY TO THE GENERA

- | | |
|---|-------------------|
| 1a. Involucral bracts in one series | 2 |
| b. Involucral bracts in 2-series | 11 |
| 2a. Anther base with tailed auricles | 3 |
| b. Anther base obtuse | 4 |
| 3a. Plants erect or subscaudent, without prehensile petioles | 12. Synotis |
| b. Plants scandent, with basally thickened, prehensile petioles | 2. Cissampelopsis |
| 4a. Involucre ecalyculate | 5. Emilia |
| b. Involucre calyculate | 5 |
| 5a. Succulent herbs or shrubs | 6 |
| b. Non succulent herbs or shrubs | 7 |

- 6a. Style branches linear, elongate, shortly appendaged; appendages ovoid, thick and papillose 8. *Kleinia*
 b. Style arms slender, filiform, tips long appendaged, subciliate, hispid 7. *Gynura*
 7a. Leaves deltoid or palmately lobed; capitula discoid 1. *Cacalia*
 b. Leaves simple, lyrate or pinnately lobed; capitula radiate or discoid 8
 8a. Capitula radiate, always yellow 9
 b. Capitula discoid, pink, brick red, white or yellow 10
 9a. Leaves with vaginate sheathing base; involucre bracts in two forms, outer smaller, inner longer 9. *Ligularia*
 b. Leaves without vaginate sheathing base; involucre bracts of one form, equal 11. *Senecio*
 10a. Capitula pink or brick red 4. *Crassocephalum*
 b. Capitula yellow 6. *Erechtites*
 11a. Glandular pubescent herbs; leaves broadly ovate-oblong, glabrous or sparingly glandular pubescent; radical leaves long petioled; cauline leaves amplexicaul; capitula 1-2 or several on long peduncle; achenes of ray florets usually epappose 3. *Doronicum*
 b. Densely greyish-villous herbs; leaves narrowly elliptic-lanceolate, greyish villous with short, amplexicaul petioles; capitula solitary; achenes of ray florets pappose 10. *Nannoglottis*

1. *Cacalia* L.

Herbs, perennial; stems flexuous, grooved, pubescent. Leaves alternate, deltoid or palmately lobed, auriculate or exauriculate at the base, petioled. Inflorescence a simple yellowish brown raceme or panicle. Capitula white, pink or yellow, discoid, cylindrical, bracteolate, short peduncled. Involucre cylindrical; involucre bracts 5-30, uniseriate, linear to linear-lanceolate. Receptacle flat, epaleaceous. Florets 1-20, hermaphrodite, fertile, all tubular; corolla 5-lobed. Style branches long, subclavate. Achenes cylindrical, ribbed, glabrous. Pappus of white or reddish brown, scabrid hairs.

Asia, N. America, C. America, W. Indies; ca 50 species, 5 in India.

KEY TO THE SPECIES

- 1a. Leaves deltoid 2
 b. Leaves palmately lobed 3
 2a. Petioles auricled 1. *C. chenopodifolia*
 b. Petioles not auricled 3. *C. levingii*
 3a. Pappus hairs white 5. *C. pentaloba*
 b. Pappus hairs reddish 4
 4a. Achenes 8 mm long 4. *C. mortonii*
 b. Achenes 2 mm long 2. *C. chola*

1. *Cacalia chenopodifolia* (DC.) Kitam. ex H. Koyama in Mem. Fac. Sci. Kyoto Univ. Ser. Biol. 2(2): 170. 1969. *Senecio chenopodifolius* DC., Prodr. 6: 364. 1838; Hook.f., Fl. Brit. India. 3: 354. 1881. Fig. 59.

Herbs, perennial, pubescent; stems flexuous, grooved; branches and inflorescence densely fulvous pubescent. Leaves triangular or obscurely 3-lobed, base cordate or truncate, broadly auriculate; auricles toothed, acuminate; margins regularly sinuate toothed; teeth mucronulate; 1.5-15 x 1-14 cm, dark green on the upper surface; petiole 2-8 cm long, pubescent. Capitula drooping, in axillary and terminal racemose panicle; panicle dense or lax. Peduncle 2 mm long, densely pubescent 2-3-bracteate. Involucre cylindrical, ca 3 mm long, pubescent; bracts 5, broadly-oblong, 3 x 1-1.2 mm, obtuse, imbricate. Disc florets 5.5 mm long; limb 5-lobed; lobes obtuse. Achenes obconic, 1.5 mm long, dilated upwards, glabrous, ribbed. Pappus brownish, 3.5 mm long, scabrid.

Fl. & Fr. Aug. - Oct.

Distrib. India: In *Rhododendron campanulatum* Forests, 3500 - 5000 m. Jammu & Kashmir and Uttar Pradesh.

Nepal.

2. *Cacalia chola* (W.W. Smith) R. Mathur in R.R. Rao *et al.*, *Fl. Ind. Enum. Aster.* 20. 1988. *Senecio chola* W.W. Smith in *J. As. Soc. Bengal*, n.s. 7: 72. 1911.

Herbs, perennial, erect, robust 80-100 cm high; stems glabrous to white villous, branched above. Leaves coriaceous; radical leaves deciduous; cauline leaves ovate-orbicular, 9-11 lobed, cordate, mucronately denticulate, 8-12 x 7-10 cm, glabrous or sparsely pilose; petiole ca 8 cm long, slender with small auricles at the base. Inflorescence racemose, robust, hoary pubescent. Capitula discoid, cylindrical, 4-7, 1-3-bracteolate. Involucre cylindrical, pubescent; bracts 5-6, oblong, ca 5 mm long, obtuse, glabrous with scarious margins. Disc florets 4-6, 3-4-veined. Achenes 2 mm long, ribbed. Pappus reddish, much longer than the achenes.

Distrib. India: Sikkim.

Endemic.

3. *Cacalia levingii* (C.B. Clarke) R. Mathur in R.R. Rao *et al.*, *Fl.*, *Ind. Enum. Aster.* 20. 1988. *Senecio levingii* C.B. Clarke, *Comp. Ind.* 301. 1876; *Hook.f.*, *Fl. Brit. India* 3: 353. 1881.



Fig. 59. *Cacalia chenopodifolia* (DC.) Kitam. ex H. Koyama

Herbs, shrubby, perennial; stems pale brown, glabrous, smooth and branched; young branches and inflorescence pubescent. Leaves deltoid, 3-lobed; lobes acuminate, cuneate at base, coarsely mucronulate, dentate at margins, 1.5-12 x 1-13 cm, glabrous, upper surface dark green, lower surface pale with prominent venation; petiole 0.5-2 cm long, narrowly winged. Capitula discoid; peduncle ca 5 mm long, densely pubescent, bracteate; bracts linear-subulate. Involucre cylindrical, 5-6.5 mm long; bracts 5, linear-oblong, 5 x 1 mm, acute, herbaceous. Disc florets 7 mm long. Achenes cylindrical, 3.5-5 mm long, glabrous, distinctly ribbed. Pappus white, of unequal hairs, ca 7 mm long.

Fl. & Fr. Sept. - Oct.

Distrib. India: N.W. Himalayas. Jammu & Kashmir

Endemic.

4. *Cacalia mortonii* (C.B. Clarke) Kitam. ex H. Koyama in Mem. Fac.Sci. Kyoto Univ. ser. Biol. 2(2): 166. 1969. *Senecio mortonii* C.B. Clarke, Comp. Ind. 208. 1876; Hook.f., Fl. Brit. India 3: 349. 1881. **Fig. 60.**

Shrubby herbs, perennial, erect, ca 1 m high; stems, branches and young inflorescence pubescent. Leaves palmately 5-11-lobed, toothed; teeth mucronulate; glabrous or sparsely puberulous, blackish green on the upper surface, paler on the lower surface; petiole of radical leaves long, not winged, of cauline 2-3 cm long, winged with sheathing base. Capitula discoid, bracteolate; peduncle 1-2 cm long, pubescent, bracteate. Involucre cylindrical, ca 11 mm long, glabrous, blackish on drying; bracts 3-5, linear-oblong, obtuse, 11 x 3 mm, herbaceous with broad scarious margins, apex puberulous. Disc florets yellow, 10 mm long; tube 5 mm long; limb 5-lobed; lobes obtuse. Anthers 3.5 mm long, pubescent. Style arms fringed into two apical papillae. Achenes cylindrical, 8 mm long, strongly ribbed. Pappus reddish, of unequal hairs.

Fl. & Fr. Aug. - Oct.

Distrib. India: Arunachal Pradesh and Sikkim.

Nepal and Bhutan.

5. *Cacalia pentaloba* Hand.-Mazz. in Acta Hort. Gotob. 12: 298. 1938. *Senecio quinquelobus* (DC.) Hook.f. & Thomson in C.B. Clarke, Comp. Ind. 209. 1876; Hook.f., Fl. Brit. India 3: 353. 1881. *Prenanthes quinquelobus* DC.,

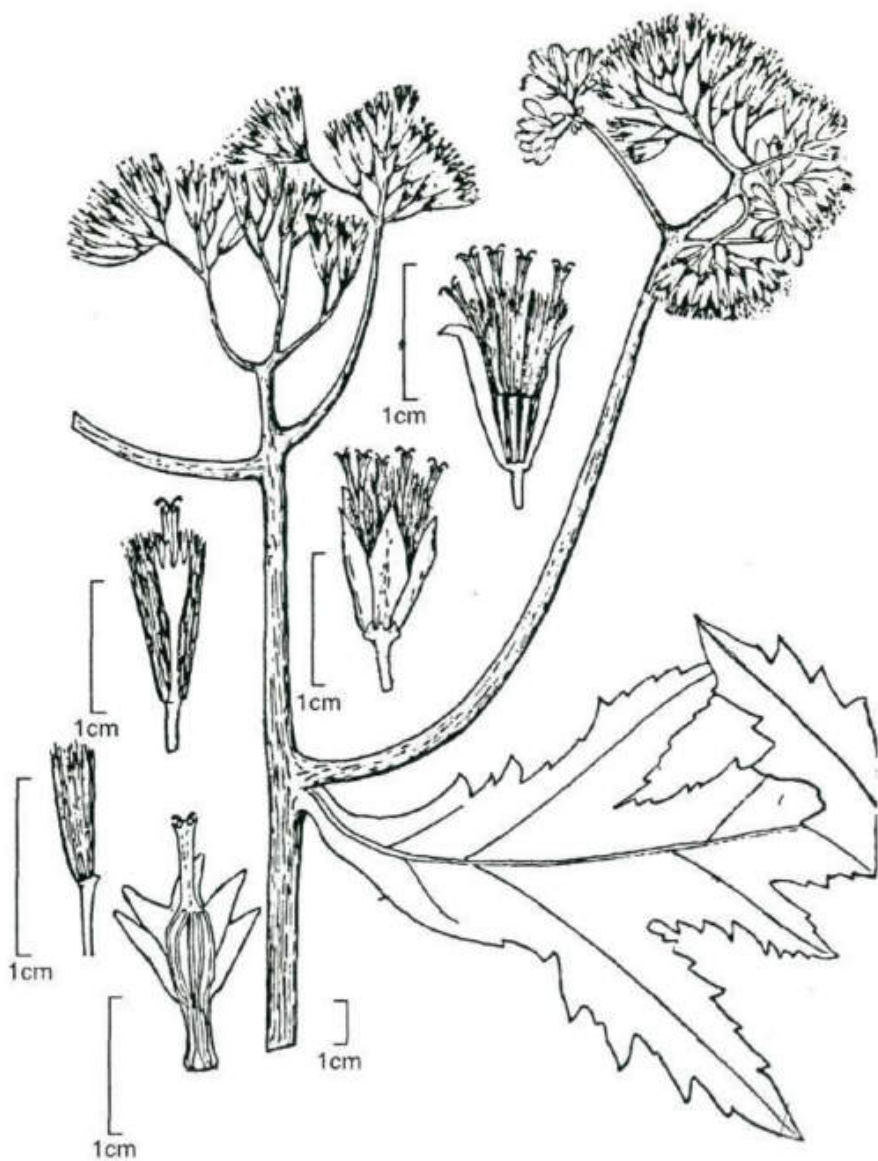


Fig. 60. *Cacalia mortonii* (C.B. Clarke) Kitam. ex H. Koyama : a. Part of the plant; Flower head with a few bracts removed; Flower; Corolla opened showing connate anthers; Pappus.

Prodr. 6: 404. 1838. *Senecio bhutanicus* Balakr. in J. Bombay Nat. Hist. Soc. 67: 61. 1970. *S. himalayensis* Mukherjee in Rec. Bot. Surv. Ind. 20(2): 131. 1973. *S. duthiei* M.A. Rau in High Alt. Fl. Pl. 135. 1975. **Fig. 61.**

Herbs, perennial, glabrous to puberulous, 60-90 cm high; stems long, slender, grooved. Leaves blackish green, 5-7 or 9 angled or palmately lobed; lobes acute, base cordate or subreniform, cuneate, acuminate, margins coarsely sinuate toothed, 1.5-9 x 1-9 cm, subcoriaceous to membranous, glandular-pubescent mainly on veins; venation very prominent; petiole 2.5-5 cm long, slender, slightly winged, sparsely to densely pubescent, exauriculate to minutely auriculate. Capitula discoid, drooping, in simple or branched racemes bearing bulb like leaf buds (Bulbils) in the axils, bracteolate. Involucral bracts 5-6, linear-oblong to linear-lanceolate, 7-8 x 0.5-1 mm, obtuse to subacute, herbaceous or with narrow scarious margins. Disc florets 5-8.5 mm long; tube 1.5-2 mm long. Achenes cylindrical, 2.5 mm long, compressed, ribbed. Pappus white, 5-8 mm long, barbed.

Fl. & Fr. Aug. - Sept.

Distrib. India: On shady slopes of forests. Uttar Pradesh.

Bhutan and Myanmar.

2. *Cissampelopsis* (DC.) Miq.

Climbers, herbaceous or shrubby, perennial; stems much branched, woody. Leaves simple, broadly ovate to ovate-triangular, unlobed, cordate at the base, palmately 3-7 veined, petioled; petiole prehensile, exauriculate, thickened at the base. Capitula heterogamous, discoid or homogamous, in axillary and terminal, compound cymes or thyrses. Involucre cylindrical or narrowly campanulate, bracteolate; involucral bracts 5-24, free, herbaceous with, scarious margins. Ray florets yellow, 5-6 or 8 or absent, spreading, apically 3-dentate, 4-5 veined. Disc florets white, pinkish or yellow, 8-20, tubular, 5-lobed. Anthers linear or linear-oblong, distinctly caudate with tails. Style arms truncate or convex, with short or long marginal papillae. Achenes cylindrical, ribbed, glabrous. Pappus white, dirty white or rufescent, capillary.

Distributed in Asia, Tropical Africa and China; ca 20 species, 7 in India.

KEY TO THE SPECIES

- 1a. Capitula discoid
b. Capitula radiate

2
6

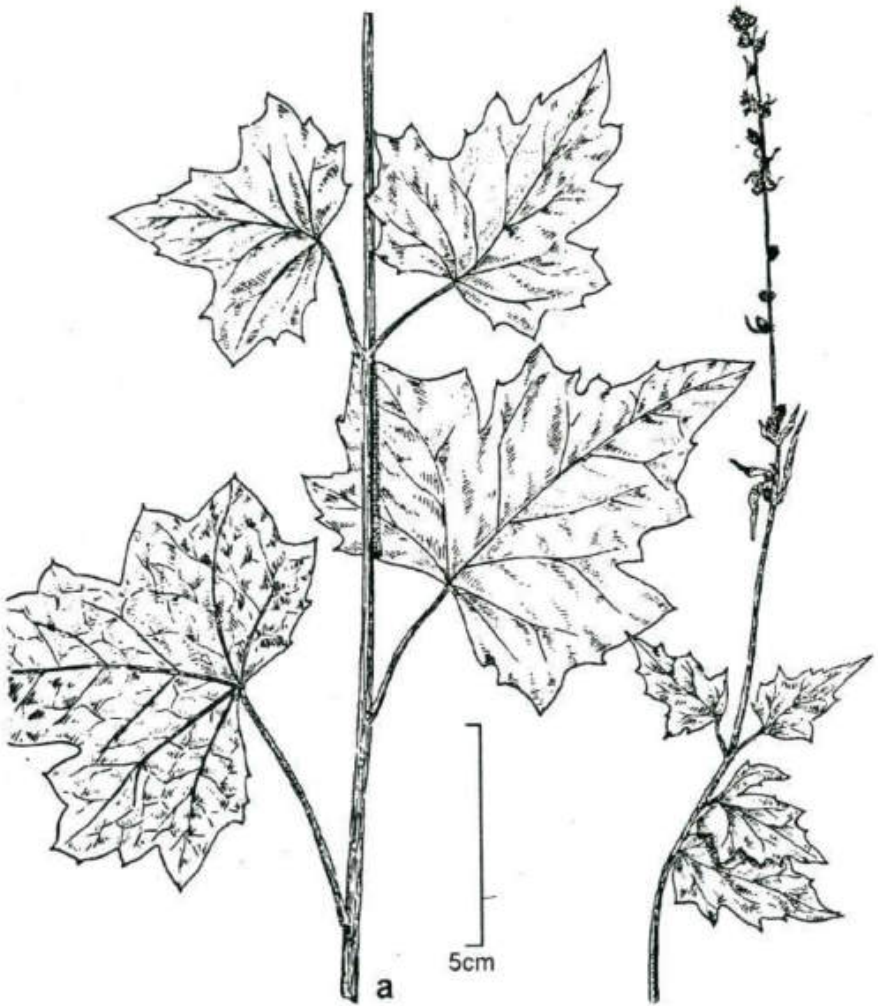


Fig. 61. *Cacalia pentaloba* Hand.-Mazz.

- | | |
|--|--------------------------|
| 2a. Leaves coriaceous | 3 |
| b. Leaves membranous | 4 |
| 3a. Leaves glabrous, blackish-brown, shining | 4. <i>C. corifolia</i> |
| b. Leaves green with upper surface greyish tomentose; lower surface with dense white floccose tomentum | 7. <i>C. walkeri</i> |
| 4a. Lower surface of leaves with rusty-brown tomentum | 5. <i>C. corymbosa</i> |
| b. Lower surface of leaves with greyish-or fulvous tomentum | 5 |
| 5a. Involucral bracts 5; lower surface of leaves fulvous tomentose | 1. <i>C. ansteadii</i> |
| b. Involucral bracts 8; lower surface of leaves greyish tomentose | 6. <i>C. volubilis</i> |
| 6a. Ray florets yellow | 2. <i>C. buimalia</i> |
| b. Ray florets pink | 3. <i>C. calcadensis</i> |

1. *Cissampelopsis ansteadii* (Tad. & Jacob) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 241. 1984. *Senecio ansteadii* Tad. et Jacob in J. Ind. Bot. Soc. 9: 40. 1930. **Fig. 62.**

Shrubby; climbers, perennial, stems branched towards the top, sparsely cottony tomentose, glabrous at maturity. Leaves ovate to broadly ovate, rounded or cordate at base, acuminate, acumen turning to one side, margins mucronulate-dentate, 5-10 x 2.5-7.5 cm, glabrous or sparsely cottony on the upper surface, lower surface with dense fulvous tomentum; petiole 2-3 cm long, grooved, tomentose. Capitula discoid, in terminal and axillary corymbose panicle, peduncled, bracteolate; peduncle ca 3 mm long, tomentose, bracteate; bracts 3-5, linear. Involucre cylindrical, glabrous; bracts 5, unequal, imbricate; the outer 2 narrow; inner 3 broader, linear-oblong, 5 x 1-2 mm, acute, herbaceous with scarious margins. Disc florets 5-6, 7.5 mm long, 5-6, tubular; corolla limb 4.5 mm long, 5-lobed; lobes acute, tip recurved; tube 3 mm long. Achenes black, cylindrical, 2.5 mm long, ribbed. Pappus yellowish, 7 mm long, of barbed hairs.

Fl. & Fr. March - April.

Distrib. India: S. India. ca 1000 m. Tamil Nadu.

Endemic.

2. *Cissampelopsis buimalia* (Buch.-Ham. ex D. Don) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 348. 1984. *Senecio buimalia* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825; Hook.f., Fl. Brit. India 3: 352. 1881. **Fig. 63.**

Herbs, perennial; stems yellowish white, tomentose, divaricately branched. Leaves ovate to ovate-triangular, acuminate, margins sinuate, denticulate with mucronulate teeth, 4.5-10 x 3-7 cm, glabrous to sparsely arachnoid tomentose.

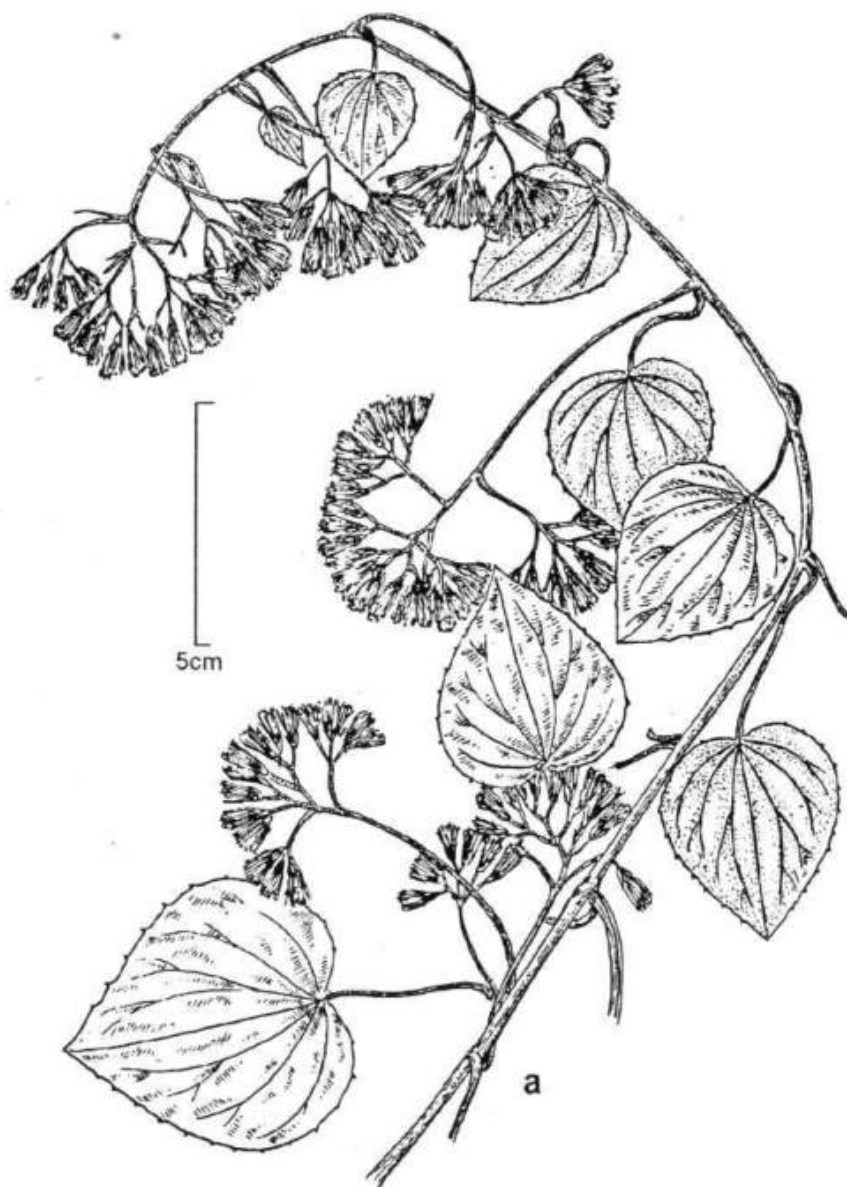


Fig. 62. *Cissampelopsis ansteadii* (Tad. & Jacob.) C. Jeffrey & Y.L. Chen



Fig. 63. *Cissampelopsis buimalia* (Buch.-Ham. ex D. Don) C. Jeffrey & Y.L. Chen

on the upper surface, lower surface with yellowish grey tomentum, palmately veined; petiole 3-5 cm long; upper most leaves ovate to lanceolate, cordate to cuneate at the base. Capitula radiate, 8-14 mm in diam., bracteolate; peduncle slender, 10-15 mm long, bracteate. Involucre campanulate, 8-12 x 4-6 mm, densely tomentose; bracts 5, oblong-lanceolate, 2.5-3 mm broad, obtuse, puberulous at the apex, herbaceous, with broad scarious margins. Ray florets yellow, 5-6, 10-12 mm long; ray linear-oblong, 3-5 x 1-1.5 mm, 4-5 veined. Disc florets 12-13 mm long; corolla limb ca 6.5 mm long; tube 7.5 mm long. Anthers 3.5-4 mm long. Achenes cylindrical, 5.5 mm long, glabrous. Pappus yellowish white, 10-12 mm long.

Fl. & Fr. Feb. - March.

Distrib. India: E. Himalayas, between 1500-2100 m. Sikkim and Mizoram.

Bhutan, Nepal and China.

3. *Cissampelopsis calcadensis* (Ramasw.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 341. 1984. *Senecio calcadensis* Ramasw. in Rec. Bot. Surv. India 6: 138. 1914.

Herbs; stems and branches grooved, cottony. Leaves ovate, shallowly cordate at base, acuminate, margins sinuate, toothed, 5-7 x 3.5-6.5 cm, glabrous above and cottony on the lower surface, 5-7-nerved from the base; petiole ca 3.5 cm long. Capitula radiate, in terminal corymb, 2-3, ca 18 x 15 mm, bracteolate; peduncle 6-10 cm long, bracteate. Involucre campanulate, cottony; bracts ca 24, 2-seriate, outer 10-12 linear, acute, 6.3 mm long, cottony beneath; inner 10-12 linear-oblong, erect, rigid, acute, ca 8 mm long, herbaceous with scarious margins. Ray florets pink, few, 8.5 mm long. Disc florets tubular; corolla 5-lobed; lobes acute with recurved tips. Anthers distinctly tailed. Achenes cylindrical, 4.2 mm long, 5-6-ribbed, sparsely hairy. Pappus of white barbed hairs, 8.5 mm long.

Fl. & Fr. Feb. - March.

Distrib. India: Between 2200-2700 m. Tamil Nadu (Tirunelveli Hills); rare.

Endemic.

4. *Cissampelopsis corifolia* C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 342. 1984.

Subshrubs, large, scandent, woody; stems and branches glabrous. Leaves blackish brown, ovate to broadly ovate, cordate to subtruncate, acuminate, margins minutely coarsely denticulate, 8-14 x 4.5-10.5 cm, glabrous, shining; venation prominent beneath; petiole 3-6 cm long, glabrous; uppermost leaves smaller, ovate-lanceolate, subcordate to rounded at the base. Capitula discoid, bracteolate. Inflorescence branches longer than the leaves, sparsely to densely glandular pubescent. Involucre narrowly campanulate, glabrous; involucre bracts 8, oblong-lanceolate, acute, 1-1.5 mm broad, subcoriaceous, puberulous at the apex with broad scarious margins. Disc florets yellow, cream or pinkish-white, ca 10, tubular, 8-9 mm long. Anthers 3.5 mm long. Style arms 2 mm long. Achenes cylindrical, 2.5-3 mm long, glabrous. Pappus white, 8-8.5 mm long.

Fl. & Fr. Sept. - Jan.

Distrib. India: Between 1500-2000 m. Sikkim, W. Bengal (Darjeeling), Meghalaya and Assam.

Myanmar and China.

5. *Cissampelopsis corymbosa* (Wallich ex DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 341. 1984. *Senecio corymbosus* Wallich ex DC. in Wight, Contrib. Bot. Ind. 22. 1834; Hook.f., Fl. Brit. India 3: 351. 1881.

Climbers, perennial, herbaceous; stems and branches rusty brown tomentose. Leaves green ovate, abruptly acuminate, with acumen turning to one side; margins entire, 1.5-5 x 1-5 cm, glabrous or floccose tomentose on the upper surface, lower surface densely brown tomentose; petiole ca 5 cm long. Capitula discoid, bracteolate; peduncle 3 mm long, bracteate, densely tomentose. Involucre narrowly campanulate, 8 mm long, tomentose; involucre bracts 8, oblong-lanceolate, acute, 8 x 1-1.2 mm, unequal, 3 broad and 5 narrow, herbaceous, with broad scarious margins, apex puberulous. Disc florets white, 5.5 mm long; corolla 3.5 mm long, 5 lobed; lobes obtuse, 2 mm long. Achenes compressed, 1.5 mm long, striate. Pappus of yellowish, barbed hairs, 5.5 mm long.

Fl. & Fr. March - Nov.

Distrib. India: between 1980-2200 m. Madhya Pradesh and Tamil Nadu.

Sri Lanka.

6. *Cissampelopsis volubilis* (Blume) Miq., Fl. Ind. Bat. 2: 103. 1856. *Cacalia volubilis* Blume, Bijdr. 903. 1826. *Senecio araneosus* DC., Prodr 6: 364. 1838; Hook.f., Fl. Brit. India 3: 351. 1881.

Herbs, perennial, shrubby; stems woody, branched, arachnoid tomentose with brownish hairs. Leaves green, broadly ovate, cordate, acute, acuminate, coarsely toothed, coriaceous, upper surface greyish tomentose, lower surface with dense or sparse white floccose tomentum mixed with brownish hairs, palmately 5-7 veined from the base; petiole stout, 2.5-6 cm long. Capitula discoid, bracteolate. Involucre cylindrical, 7-8 mm long; bracts linear-oblong, acute, 7-8 x 1-1.5 mm, puberulous, herbaceous, with broad scarious margins. Disc florets 9-10 mm long; limb 5-lobed; lobes acute; tube 4-4.5 mm long. Achenes cylindrical, ca 4 mm long, glabrous. Pappus white, 8-9 mm long.

Fl. & Fr. Jan. - Feb.

Distrib. India: Meghalaya.

Myanmar, Thailand, Indochina and Malaysia.

7. *Cissampelopsis walkeri* (Arn.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 341. 1984. *Senecio walkeri* Arn. in Nova Acta Phys. Med. Acad. Caes. Leop. Carol. Nat. Cur. 18: 349. 1831.

Herbs, perennial; stems and young branches floccose-arachnoid tomentose. Leaves obovate, acute or acuminate, margins mucronulate toothed, 1.5-5 x 1.5-4 cm, glabrous; venation prominent on the lower surface; petiole 1.5-2.5 cm long, glabrous. Capitula discoid, bracteolate. Involucre campanulate, 6.5 mm long, glabrescent; bracts ca 8, linear-oblong, 6.5 x 1-1.5 mm, obtuse, margins scarious and ciliated. Disc florets ca 8-9 mm long; limb ca 5 mm long; tube 4.5 mm long. Achenes black, ca 1 mm long, ribbed. Pappus white, 8.5 mm long.

Fl. & Fr. Feb. - April.

Distrib. India: S. India, between 800-1400 m. Tamil Nadu and Kerala.

Sri Lanka.

3. *Crassocephalum* Moench.

Herbs, annual, erect 30-60 cm high; stems branched, leafy. Leaves alternate, simple to lyrate pinnatifid. Inflorescence of lax terminal racemes. Capitula homogamous, discoid, bracteolate. Involucre campanulate; bracts uniseriate, connivent. Receptacle convex, naked, shallowly alveolate. Florets narrowly campanulate, numerous, tubular, 5-lobed. Anthers lanceolate, minutely sagittate at the base. Style arms very slender with long, subulate appendages of fused papillose hairs and central prominent tuft. Achenes cylindrical, faintly 8-10-ribbed. Pappus of fine, capillaceous, brittle, long hairs; hairs longer than the florets.

Distributed in Africa and Madagascar; ca 30 species, 1 in India.

Literature. BELCHER, R.O. (1955). The typification of *Crassocephalum* Moench. and *Gynura* Cass. Kew Bull. 1955: 455-465. RAO, R.R. & M.K.V. RAO (1976). On the Identity of *crassocephalum crepidioides* and *Galinsoga ciliata* from Mysore. *Geobios* 3: 163-164. STEENIS, C.G.G.J. VAN (1967). Notes on the Introduction of *Crassocephalum crepidioides* (Benth.) S. Moore in Indo-Australia (Compositae). *J. Ind. Bot. Soc.* 46: 463-469.

Crassocephalum crepidioides (Benth.) S. Moore in *J. Bot.* 1: 211. 1912. *Gynura crepidioides* Benth. in Hook.f., *Fl. Niger.* 438. 1849. *Erechtites valerianaefolia* sensu. Fischer in *Rec. Bot. Surv. Ind.* 9: 98. 1921. **Fig. 64.**

Herbs, annual, 30-60 cm high; stems corymbosely branched, greenish brown pubescent. Leaves elliptic-ob lanceolate, lyrate lobed, base attenuate, margins mucronately dentate with 1-2 pairs of oblong, lateral segments, acute to acuminate, 3-14 x 1-5 cm, puberulous on both surfaces; venation raised; petiole ca 3 cm long. Capitula discoid, cylindrical, arranged in loose, terminal corymb, purplish pubescent, pendulate on 0.5-10 cm long peduncle; bracteoles 3-5. Involucre cylindrical, puberulous; bracts linear-lanceolate, 0.8-1 cm long, acute, scarious, puberulous, faintly ribbed. Disc florets pink to brick red or dark orange, filiform, ca 10-12 mm long; corolla limb ca 3 mm long; tube ca 7 mm long. Achenes dark brown, oblong, ca 2 mm long, white puberulous on the ribs. Pappus hairs white, 10-12 mm long.

Distrib. India: Uttar Pradesh, Sikkim, Assam, Madhya Pradesh, Maharashtra and Tamil Nadu.

Sri Lanka, China, Africa and Madagascar.



Fig. 64. *Crassocephalum crepidioides* (Benth.) S. Moore : a. Habit; b. Involucre; c. Disc floret; d. Achene with pappus.

Note. This species has significant importance in the field of medicine. The leaf sap is taken for upset stomach with colic and flatulence. A lotion is also prepared from leaves, used as an analgesic for headache and is also known to be useful in giving soothing effect in epilepsy by rubbing it on the body. The roots are reported to contain Tannin.

4. *Doronicum* L.

Herbs, perennial, glabrous or glandular pubescent, rhizomatous; rhizome short; stems erect, simple or corymbosely branched above. Leaves both radical and cauline, alternate; radical leaves broadly ovate or oblong, cordate, entire or mucronately dentate, glabrous or sparsely glandular hairy, long petioled; cauline leaves ovate-oblong or lanceolate, shortly petiolate or sessile, amplexicaul. Capitula yellow, heterogamous, radiate, broadly campanulate, solitary or several on long peduncle in terminal corymb; peduncle densely-glandular pubescent. Involucre broadly campanulate; involucre bracts 2-seriate, subequal, acuminate, densely glandular pubescent. Receptacle hemispherical, epaleaceous. Ray florets yellow uniseriate; ray entire to 2-3-toothed. Disc florets yellow, hermaphrodite, tubular. Anther base entire or subauricled. Style arms linear, tip rounded, truncate and penicillate. Achenes oblong, turbinate, 10-ribbed, those of ray florets usually epappose and of disc florets pappose. Pappus reddish; hairs short, rigid, scabrous and copious.

Distributed in Nepal, Bhutan, Asia and Europe; ca 35 species, 3 in India.

KEY TO THE SPECIES

- | | |
|--------------------------------------|----------------------------|
| 1a. Ray florets pappose | 2. <i>D. pardalianches</i> |
| b. Ray florets epappose | 2 |
| 2a. Capitula solitary, terminal | 1. <i>D. falconeri</i> |
| b. Capitula many in terminal corymbs | 3. <i>D. roylei</i> |

1. *Doronicum falconeri* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 333. 1881.

Herbs, stout, erect 30-45 cm high, puberulous; stems simple, erect, reddish-brown on drying, ribbed. Leaves obovate to spatulate, acute, irregularly serrate, 2.5-8 x 2-4 cm, puberulous on upper surface, glabrescent on the lower surface; lower leaves long petioled; petiole 2-8 cm long; cauline leaves spatulate; uppermost leaves lanceolate, serrate, sessile, amplexicaul. Capitula radiate, solitary ebracteolate, 3 to 6 cm, pubescent. Involucre bracts lanceolate, 12-13 mm long, acute, serrate. Ray florets yellow, ca 25 mm long; ray oblong,

20-22 mm long, 3-4 veined, 3-dentate; tube 4-5 mm long, hairy. Disc florets 5-6 mm long; corolla limb 2-3 mm long, 5-lobed; lobes triangular-ovate, ca 1 mm long; tube 2.5 mm long. Achenes broadly oblong, 1.5-2 mm long, ribbed, white pubescent on the ribs. Pappus of reddish-brown, scabrid deciduous hairs, 4.5-5 mm long; scanty, absent in ray achenes.

Fl. & Fr. June - Aug.

Distrib. India: N.W. Himalayas, between 4000-4500 m. Jammu & Kashmir and Himachal Pradesh.

Pakistan.

Note. Roots are used as an aromatic tonic and are also considered to be useful in nervous depression. (vide Chopra *et al.*, Gloss. Ind. Med. Pls. 101. 1956).

2. *Doronicum pardalianches* L., Sp. Pl. 885. 1753.

Fig. 65.

Herbs, perennial, erect, glandular hairy, 30-60 cm high; stems stramineous below and greenish brown above, branched, grooved. Leaves both radical and cauline; radical leaves broadly ovate, cordate, acute to subacute entire to distantly mucronate dentate, 10 x 9 cm, membranous, sparingly scattered hairy on both the surfaces; venation reticulate, prominent on the lower surface, long petioled; petiole 7-8 cm long; middle cauline leaves ovate-panduriform with 2 rounded, amplexicaul lobes at the base; uppermost cauline leaves linear-lanceolate, sessile. Inflorescence subcorymbose. Capitula radiate, 2-3 cm in diam., ebracteolate, on 2-11 cm long, densely glandular hairy peduncle; peduncle turbinate just below the capitula. Involucre broadly campanulate, densely glandular hairy; bracts linear, 10-11 x 1 mm, acuminate. Ray florets 10-12 mm long; ray oblanceolate, 8.5-10 mm, 3-4 veined, 2-3-dentate; teeth black-tipped; tube ca 2.5 mm long. Disc florets numerous, ca 4 mm long; limb 2 mm long; tube 2 mm. Achenes dark brown, obconic, 2.5-3 mm long, deeply grooved, scabrid on the ribs, pappose. Pappus of reddish, unequal hairs, 3-3.5 mm long, bristly.

Fl. & Fr. June - Sept.

Distrib. India: W. Himalayas, between 2500-4000 m. Jammu & Kashmir.

Note. European species, closely allied to *Doronicum roylei* and often kept mixed with the same in the herbaria, but differs in having panduriform cauline

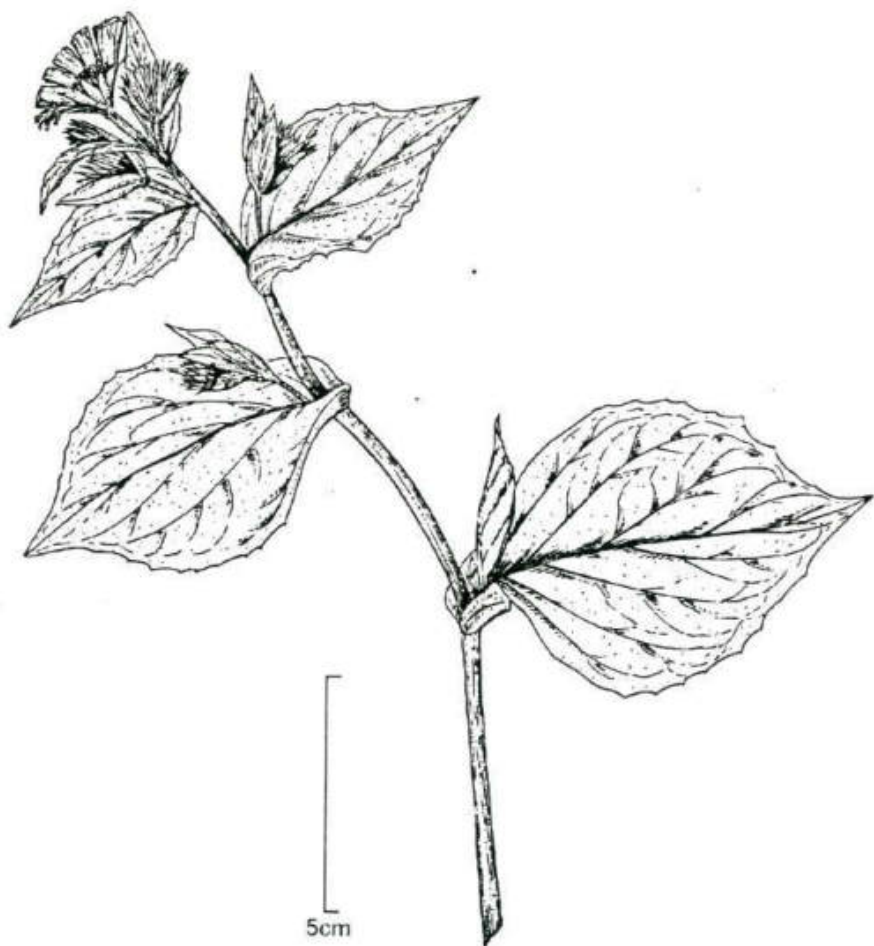


Fig. 65. *Doronicum pardalianches* L.

leaves and achenes of ray florets being pappose. It is the first report of this species from India.

3. *Doronicum roylei* DC., Prodr. 6: 321. 1838; Hook.f., Fl. Brit. India 3: 332. 1881.

Herbs, perennial, erect, glandular pubescent, 0.6-1.2 cm tall; stems pale brown, corymbosely branched, grooved, shining, glandular hairy. Leaves broadly ovate to linear-lanceolate, cuneate, acute, denticulate, 1.5-10 x 2-10 cm, glabrous or sparingly pubescent or hispid; venation prominent; petiole, 4-12 cm long, winged; cauline leaves sessile with semi amplexicaul base. Inflorescence corymbose. Capitula radiate, broadly campanulate, ebracteolate, 2-3 cm in diam., on slender peduncle; peduncle up to 12 cm long, densely glandular pubescent. Involucre ca 7 mm long, glandular pubescent; bracts lanceolate, acuminate, 7 mm, herbaceous with brownish veins. Ray florets yellow, linear-oblong, ca 7 mm long; ray ca 4 mm long, many veined; tube ca 3 mm long, with long, spreading hairs. Style arms linear-oblong, obtuse. Disc florets 3-4 mm long; limb 5-lobed; lobes papillose. Achenes of ray florets cylindrical, 3 mm long, ribbed, glabrous; those of disc florets dark brown, elliptic-oblong, 2.2 mm long, ribbed, scabrid. Pappus of disc florets (it present) with reddish bristles, 2.5-3 mm long; absent in ray florets.

Note. Roots aromatic, prevent giddiness during high altitude ascent.

KEY TO THE VARIETIES

- | | |
|--|---------------------------|
| 1a. Pappus present in disc florets and absent in ray florets | 3.2. var. <i>roylei</i> |
| b. Pappus totally absent | 3.1. var. <i>epapposa</i> |

3.1. var. *epapposa* Hook.f., Fl. Brit. India 3: 332. 1881.

Fl. & Fr. June - Oct.

Distrib. India: Jammu & Kashmir.

Endemic.

3.2. var. *roylei*

Fig. 66.

Fl. & Fr. June - Oct.*Distrib.* India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Nepal and Bhutan.

DOUBTFUL SPECIES

Doronicum altaicum Pall. in Act. Acad. Petrop. 2: 271. t. 16. 1779.
Included in the checklist (R.R. Rao *et al*, 1988) on the authority of Stewart
(Cat. Vasc. Pl. W. Pakistan 1972).

EXCLUDED SPECIES

Doronicum latesquamatum C.E.C. Fischer in Kew Bull. 1937: 98. 1937.

This taxon has been transferred to genus *Aster* under a new name *Aster platylepis* Y.L. Chen [Kew Bull. 39(1): 159. 1984a].

5. *Emilia* Cass.

Herbs, annual to perennial, glabrous to crispately pubescent; stems slender to robust, often glaucous. Leaves alternate very variable, entire, toothed or lyrate-pinnatifid; radical leaves few, simple, linear-lanceolate, usually auricled and amplexicaul. Inflorescence 1-few-headed, loosely branched corymb or subumbellate. Capitula blue, purple, pink or scarlet red, homogamous, discoid, cylindrical, small to medium sized, ebracteolate, long peduncled. Involucral bracts uniseriate, 8-10, linear-oblong, equal, coherent, imbricate, striate. Receptacle flat to convex, not pitted. Florets all tubular, hermaphrodite, very slender, corolla limb dilated, 5-lobed; lobes triangular to oblong-lanceolate, spreading. Stamens 5; filaments filiform; anther base obtuse, subentire. Style arms subterete with a short or elongate, acute or obtuse appendage, slightly recurved. Achenes subterete or angled, 5-ribbed, glabrous or scabrid on the angles. Pappus hairs copious, capillary, minutely scabrid.

S. Africa, S. China, Japan, Philippines and Sri Lanka; ca 30 species, 8 in India.



Fig. 66. *Doronicum roylei* DC. var. *roylei*

Literature. BALDWIN J.T. Jr. (1946). Cytogeography of *Emilia* Cass. in the Americas *Bull. Torrey Bot. Club* 73: 18-23. FOSBERG, F.R. (1972). *Emilia* (Compositae) in *Ceylon J. Sci. (Bio. Sci.)* 10: 61-69. GARABEDIAN, S. (1924). A revision of *Emilia*. *Kew Bull. Misc. Inf.* 1924: 137-144.

KEY TO THE SPECIES

- | | |
|---|-------------------------|
| 1a. Small, 3.5-20 cm tall herbs; leaves chiefly radical, scabrid; capitula pink purple; achenes 2 mm long, dirty brown, hispid | <i>E. scabra</i> |
| b. Herbs more than 20 cm tall; leaves both radical and cauline or only cauline | 2 |
| 2a. Leaves only cauline | 3 |
| b. Leaves both radical and cauline | 7 |
| 3a. Weak herbs | 4 |
| b. Stout herbs | 6 |
| 4a. Achenes glabrous; capitula scarlet-red | <i>E. prenanthoides</i> |
| b. Achenes hispid; capitula not as above | 5 |
| 5a. Capitula pinkish lavender; florets exerted about 5-6 mm from the involucre | <i>E. exserta</i> |
| b. Capitula bright purple; florets exerted about 2-3 mm from the involucre | <i>E. alstonii</i> |
| 6a. Stems much branched; leaves linear-oblong or spatulate, glabrous above and softly crisped hirsute beneath; margins recurved; capitula solitary, terminating long, naked peduncles | <i>E. ramulosa</i> |
| b. Stems simple, not much branched; leaves lanceolate, glabrous, margins entire or distantly serrate, not recurved; capitula in corymb on short peduncles | <i>E. javanica</i> |
| 7a. Capitula scarlet red; achenes glabrous | <i>E. paenanthoides</i> |
| b. Capitula purple. Achenes hispid | 8 |
| 8a. Leaves lyrate pinnatifid with triangular-ovate terminal lobe | <i>E. sonchifolia</i> |
| b. Leaves linear-oblong or oblanceolate | <i>E. zeylanica</i> |

1. *Emilia alstonii* Fosberg in *Ceylon. J. Sci. (Bio. Sci.)* 10: 66. 1972.

Herbs; stems short, ascending. Leaves all cauline; lower leaves orbicular to reniform or ovate, rounded at apex, 4 x 2 cm, petioled; petiole scarcely or narrowly winged; middle leaves with terminal lobe orbicular or reniform, cordate, with broad winged petiole, clasping at the base; uppermost leaves more or less oblong or lanceolate, prominently undulate, dentate or crenate. Inflorescence simple, terminal, ebracteate. Capitula bright purple. Involucre cylindrical, ca 8 x 4 mm; bracts ca 8 mm long. Disc florets 12-13 mm long, 5-lobed; lobes 1.2-1.5 mm long. Anthers 0.6-0.8 mm long. Achenes 5-angled, minutely scabrid on the angles.

Distrib. India: South India, in wet deciduous to evergreen forests. Karnataka.

Sri Lanka.

2. *Emilia exserta* Fosberg in Ceylon J. Sci. (Bio. Sci.) 10: 65. 1972.

Herbs; stems creeping with erect branches, leafy in lower part. Leaves all cauline, variable; lower leaves lyrate, pinnately lobed with large triangular-ovate terminal lobe; petiole winged or scarcely so, clasping; upper cauline leaves oblong to lanceolate or strap shaped, entire or very remotely and shallowly dentate, woolly or pilose, amplexicaul, sessile. Inflorescence very lax, much branched; each branch 1-3 cm long, bracteate, terminating in 1-3-pedunculate capitula. Capitula pinkish lavender, homogamous, discoid, ebracteolate. Involucre cylindrical, 6 x 3 mm. Disc florets tubular, 13 mm long, 5-lobed; lobes 1.5-2 mm long, exserted about 5-6 mm from the involucre. Anther tube ca 1.5 mm long; appendage 0.3 mm long. Achenes 5-angled, minutely setulose or scabrid.

Distrib. India: S. India, between 50-600 m. Karnataka.

Sri Lanka.

3. *Emilia javanica* (Burm.f.) C. Robinson in Philipp. J. Sci. 3: 217. 1908. *Hieracium javanicum* Burm.f., Fl. Ind. 174. t. 57. f.1. 1768. *Emilia sagittata* (Vahl) DC., Prodr. 6: 302. 1838. *E. flammea* Cass., Dict. Sci. Nat. 14: 406. t. 5. 1825; Hook.f., Fl. Brit. India 3: 336. 1881.

Herbs; stems pale brown, stout, terete, faintly ribbed, glabrous, branched above. Leaves lanceolate, acute, entire to distantly serrate, 2.5-15 x 0.3-3 cm, glabrous, pale brown, prominently veined on lower surface, sessile and amplexicaul. Capitula reddish magenta, campanulate, in corymb; peduncle ca 2.5 cm long. Involucre campanulate, glabrous; bracts lanceolate, 15-16 x 1 mm, subæute, herbaceous with 3-4 veins on the dorsal surface, with narrow scarious margins. Disc florets very slender, ca 10 mm long. Achenes pale brown, cylindrical, 2-3 mm long, deeply ribbed, white pubescent between the ribs. Pappus of white hairs, 6 mm long.

Fl. & Fr. Jan. - Nov.

Distrib. India: W. Ghats, between 3000-4000 m. Maharashtra.

Philippines and Africa.

Note. Used as an ornamental herb for its scarlet capitula.

4. *Emilia prenanthoides* DC., Prodr. 6: 303. 1838; Hook.f., Fl. Brit. India 3: 336. 1881.

Herbs, slender, 30-90 cm high, glabrous, rarely scabrid; stems erect, subsimple. Leaves both radical and cauline or only cauline; radical if present, ovate and petioled; cauline leaves linear-oblong, obtuse, acute or acuminate, margins entire or distantly dentate, upper surface glabrescent, lower surface scabrid, broadly auriculate, amplexicaul. Capitula homogamous, ebracteolate, long pedunculate. Involucre ovate-cylindrical; bracts shorter than the florets. Style arms slender, dilated at the tip. Achenes cylindrical, 5-6-ribbed, glabrous. Pappus of white hairs.

Fl. & Fr. Nov. - Dec.

Distrib. India: Sikkim and Assam.

Bangla Desh and Myanmar.

5. *Emilia ramulosa* Gamble in Kew Bull. 1921: 120. 1921.

Herbs, suffruticose, low growing, much branched; stems stout, branches sometimes very long. Leaves all cauline, linear-oblong to spatulate, obtuse, entire, recurved, 2-7 x 1-1.5 cm, glabrous above, crispate hirsute beneath, obscurely veined, base attenuated into two small auricles, sessile or subsessile. Capitula homogamous, solitary, 1.5 cm in diam., many-flowered, long peduncled; peduncle bracteate; bracts oblong, 7-8 cm long, glabrous. Receptacle naked. Florets all tubular, ca 4 mm long; corolla lobes linear, ca 3 mm long, apex minutely puberulous. Style arms terete, apex dilated, puberulous. Achenes oblong, ca 3 mm long, 5-ribbed, scabrid on the angles. Pappus of white, short, scabrid hairs.

Fl. & Fr. May - June.

Distrib. India: Tamil Nadu and Kerala.

Endemic.

6. *Emilia scabra* DC., Prodr. 6: 303. 1838. *E. sonchifolia* (L.) DC. var. *scabra* (DC.) Hook.f., Fl. Brit. India 3: 336. 1881.

Herbs, small, 3.5-20 cm high; stems stramineous, slender, glabrescent, faintly ribbed, many from the base. Leaves chiefly radical, cauline very few;

radical leaves ovate-lanceolate, subobtusely, lyrate, dentate, 2-2.5 x 0.5-1 cm, scabrid on both the surfaces, lower surface purplish green with prominent crispate-pubescent veins; cauline leaves lanceolate, 7-10 mm long, scabrid, all leaves sessile, amplexicaul. Capitula pink-purple, discoid, ebracteolate, up to 11 mm long; peduncle 1-2 bracteate, 0.7 to 4.5 cm long. Involucre dark brown; cylindrical, ca 7-7.5 x 2-2.5 mm, glabrous to sparingly crispate-pubescent; bracts linear-lanceolate, 7-7.5 x 1-1.2 mm, subacute, faintly veined on the dorsal surface, with narrow scarious margins. Disc florets slender, ca 6 mm long; corolla limb ca 2.5 mm long. Style arms truncate. Achenes dirty brown, linear-oblong, ca 2 mm long, deeply ribbed, hispid on the angles. Pappus white, ca 4.5 mm long.

Fl. & Fr. April - Nov.

Distrib. India: Meghalaya, Maharashtra, Karnataka and Tamil Nadu.

7. *Emilia sonchifolia* (L.) DC. in Wight, Contrib. Bot. Ind. 24. 1834. *Cacalia sonchifolia* L., Sp. Pl. 1835. 1753; Hook.f., Fl. Brit. India 3: 336. 1881.

Bengal.: *Sadhimodi*; Hindi: *Hirankhuri*; Mal.: *Mulshevi*.

Herbs, annual, weak, 20-40 cm high, erect, subglabrous, sparsely puberulous or glaucescent; stems pale brown, branched, faintly ribbed. Leaves lyrate-pinnatifid with triangular-ovate terminal lobe and irregularly toothed lateral lobes, cuneate, apex rounded or acute, 3-10 x 0.5-4 cm, membranous, glabrous to sparsely puberulous, pale green to dark blackish green, all sessile or lower leaves petioled; petiole winged, up to 6 cm long; cauline leaves obovate, acute to subobtusely, sessile, auricled, amplexicaul. Inflorescence corymbose. Capitula purple, discoid, 7-9 mm long, ebracteolate, on 5-6 mm long peduncle; peduncle 2-3 bracteate; bracts cordate, clasping at the base. Involucre cylindrical, 7-9 x 2.5-3 mm, glabrous to sparsely puberulous; bracts linear-lanceolate, 7 x 1 mm, acute, 3-5 veined, margins narrow, scarious. Disc florets 7-9 mm long; corolla limb ca 2-2.5 mm long; tube 5-7 mm long. Style arms cylindrical with conical tip. Achenes brown, cylindrical, 2.5-3 mm long, 5-ribbed, scabrid. Pappus of white soft hairs, copious, 7-9 mm long.

Note. Cauline leaves are cooked and eaten as vegetable; also used as salad. Decoction of the herb used as a febrifuge and also in bowel complaints. Juice of leaves used for sore eyes and night blindness.

KEY TO THE VARIETIES

- 1a. Radical leaves lyrate lobed, ovate at apex, cuneate into winged petiole at base 7.2. var. *sonchifolia*
 b. Radical leaves elliptic, serrate, acute at both ends, sessile 7.1. var. *mucronata*

7.1. var. *mucronata* C.B. Clarke, Comp. Ind. 175. 1876.

Fl. & Fr. June - Oct.

Distrib. India: South India.

7.2. var. *sonchifolia*

Fig. 67.

Fl. & Fr. June - Oct.

Distrib. India: Throughout

8. *Emilia zeylanica* C.B. Clarke, Comp. Ind. 175. 1876; Hook.f., Fl. Brit. India 3: 336. 1881.

Herbs, erect, slender, up to 60 cm high; stems slender, simple or branched near the base, leafy, glabrous. Leaves narrow, linear-oblong or oblanceolate, acute or sometimes with hooked tips, entire or subentire; upper cauline ones hastate, with sessile, auricled base. Capitula few. Involucral, bracts shorter than the flowers, oblong, acute. Florets longer than the involucre; corolla lobes 2.5 mm long. Style arms with enlarged conic tips. Achenes long, white hispid on the ribs. Pappus white.

KEY TO THE VARIETIES

- 1a. Leaves linear-oblong or oblanceolate; tip not hooked 8.2. var. *zeylanica*
 b. Leaves linear, tip hooked 8.1. var. *pahudosa*



Fig. 67. *Emilia sonchifolia* (L.) DC. var. *sonchifolia*

8.1. var. *paludosa* Gamble, Fl. Pres. Madras 2: 504. 1957 (rep. ed.)

Fl. & Fr. June - July.

Distrib. India: W. Ghats, in swamps. Maharashtra and Tamil Nadu.

Endemic.

8.2. var. *zeylanica*

Fl. & Fr. Nov. - Dec.

Distrib. India: Maharashtra, Karnataka and Tamil Nadu.

Sri Lanka.

6. *Erechtites* Rafin.

Herbs, annual or perennial, erect; stems leafy, usually branched above, glabrous to scabro puberulous or sometimes white tomentose. Leaves alternate, pinnatisect to lyrate pinnatifid. Inflorescence of terminal or axillary corymb or panicle. Capitula yellow to pink or mauve, heterogamous, disciform. Involucre urceolate, campanulate; bracts uniseriate, with few outer calyculate bracts. Receptacle flat, naked. Marginal flowers female, filiform, 4-5 lobed at the apex. Disc florets narrowly campanulate, hermaphrodite, 5-lobed. Anther base obtuse, apices with short linear appendage. Style arms elongate with short appendages of fused papillae. Achenes oblong-linear to subcylindrical, 5-10 ribbed. Pappus hairs pink above and white at the base, numerous, capillary, as long as florets and exceeding the involucre.

S. America, Malaya, Australia, Polynesia, China and Japan; ca 15 species, 2 in India.

Literature. BELCHER, R.O. (1956). A revision of the genus *Erechtites* (Compositae) with enquiries into *Senecio* and *Erechtites*. *Ann. Missouri Bot. Gard.* 43: 1-85. NAIR, N.C. & SRINIVASAN, S.R. (1982). *Erechtites valerianifolia* (Wolf.) DC. and *Crassocephalum crepidioides* (Benth.) S. Moore (Asteraceae). Their identity and distribution in South India. *J. Econ. Taxon. Bot.* 3: 289-294.

KEY TO THE SPECIES

- 1a. Pappus hairs pink above and white below
 b. Pappus hairs entirely white

2. *E. valerianaeifolia*
 1. *E. hieracifolia*

1. *Erechtites hieracifolia* (L.) Rafin ex DC., Prodr. 6: 294. 1838. *Senecio hieracifolius* L. Sp. Pl. 866. 1753.

Herbs, erect; stems ribbed, thinly hairy or glabrescent. Leaves oblong-lanceolate to lanceolate, acute to subacute, 3-25 x 0.5-7 cm, sessile; lower leaves serrate; upper cauline leaves pinnately lobed, coarsely dentate; lobes triangular, acute, hairy. Capitula heterogamous, disciform, cylindrical, in terminal corymb, 12-15 x 8-12 mm in diam., bracteolate; bracteoles linear, scabrid; peduncle up to 5.5 cm long, pubescent. Involucre green, 10-12 mm long; bracts greenish brown, linear, 10-12 x 1.2 mm, acute. Marginal florets yellow, filiform, ca 8 mm long. Disc florets 9-10 mm long. Achenes brown, cylindrical, ca 2.5 mm long, appressed hairy between the ribs. Pappus entirely white, 8-12 mm long.

Fl. & Fr. Jan. - Feb.

Distrib. India: Madhya Pradesh and Andhra Pradesh.

Note. A native of Tropical America and Indonesia, the species has naturalised in agricultural fields and Tea, Coffee, Cinchona and Rubber plantations.

2. *Erechtites valerianaefolia* (Wolf) DC., Prodr. 6: 295. 1838. *Senecio valerianaefolius* Wolf., Ind. sem. H. Berol. 1825, teste Rechenb. Ic. Bot. Exot. 59. t. 85. 1827.

Herbs, erect, 0.5-1.5 m tall, glabrous or glabrescent. Leaves ovate-elliptic or ovate-lanceolate, acuminate, irregularly incised dentate or pinnatisect, 6-30 x 4-16 cm, glabrous, lobes oblong-lanceolate, serrate; petiole up to 6 cm long. Capitula pink or mauve, heterogamous, disciform, cylindrical, 3-5 mm in diam. Involucral bracts 12-14, linear, ca 8 x 0.7 mm, glabrous, connate, margins scarious. Female florets filiform, 7-9 mm long, 5-lobed. Marginal male florets narrowly campanulate, 8-9 mm long, 5-lobed. Achenes brown, 3-3.5 mm long, sparsely puberulous. Pappus hairs pink above white at the base, 7.5 mm long.

Fl. & Fr. Dec. - June.

Distrib. India: W. Bengal, Madhya Pradesh, Kerala and Tamil Nadu.

Sri Lanka, Nepal, S. America, Malaya, Australia, Polynesia, China and Japan.

7. *Gynura* Cass.

Herbs, rarely undershrubs, perennial, decumbent or erect, glabrous or hispid; stems angular, striate. Leaves alternate, entire, toothed or pinnatisect, glabrous to hispidly puberulous. Capitula yellow to purple, homogamous, discoid, medium sized, solitary or corymbose, bracteolate. Involucre cylindrical or narrowly campanulate; bracts 10-12, 1-seriate, equal, linear, acute or acuminate, herbaceous with narrow, scarious margins, faintly ribbed on the dorsal surface, free or connate in bud condition. Receptacle flat, pitted or shortly fimbriate. Florets all tubular, hermaphrodite, fertile or rarely few outer female, regular, slender; corolla limb lobed; lobes papillose. Anthers acute at the apex, base entire or sub auricled. Style arms slender, filiform, tips long appendaged, subulate, hispid. Achenes fusiform, narrow, 5-10-ribbed, glabrous. Pappus hairs white, copious, soft.

Asia, Africa, Australia, Malaysia, China, Nepal and Sri Lanka; ca 100 species, 8 in India.

Literature. DAVIS, F.G. (1979). 'The genus *Gynura* (Compositae) in Eastern Asia and the Himalaya' *Kew Bull.* 34: 629-640. DAVIS, F.G. (1980). The genus *Gynura* (Compositae) in India, Sri Lanka and the Seychelles. *Kew Bull.* 35: 363-367. LEVEILLE, H. (1914). Compositae novae asiaticae; Genus *Gynura* in Asia orientali. *Bull. Geogr. Bot.* 24: 290-291.

KEY TO THE SPECIES

- | | |
|--|-----------------------------|
| 1a. Roots tuberous | 7. <i>G. pseudochina</i> |
| b. Roots not tuberous | 2 |
| 2a. Stems climbing | 6. <i>G. procumbens</i> |
| b. Stems erect | 3 |
| 3a. Leaves sessile | 2. <i>G. bicolor</i> |
| b. Leaves petioled | 4 |
| 4a. Capitula orange-orange red | 5 |
| b. Capitula yellow | 6 |
| 5a. Leaves lyrate-pinnatisect; achenes ca 4 mm long, cylindrical, black | 3. <i>G. lycopersifolia</i> |
| b. Leaves not lyrate-pinnatisect; achenes ca 1-1.2 mm, grey black | 5. <i>G. nitida</i> |
| 6a. Leaves ovate to lyrate pinnatifid, densely purplish hairy on both the surfaces | 1. <i>G. aurantiaca</i> |
| b. Leaves elliptic-lanceolate to obovate, white-pubescent or with dense, yellow hairs on upper surface | 7 |
| 7a. Leaves with scattered white hairs on the upper surface | 4. <i>G. nepalensis</i> |
| b. Leaves with dense yellow hairs on the upper surface | 8. <i>G. travancorica</i> |

1. *Gynura aurantiaca* (Blume) DC., Prodr. 6: 300. 1838. *Cacalia aurantiaca* Blume, Bijdr. 908. 1826.

Herbs, perennial, robust, densely purplish hairy; stems much branched, leafy, stout, ribbed; leaves ovate, acute to acuminate, lyrate-pinnatifid with 2-8 lateral lobes, serrate, 2-8 x 1.5-4.5 cm, densely purplish hairy on both the surfaces, conspicuously veined on upper surface; petiole 1-1.5 cm long, densely purplish hairy, auricled at the base. Inflorescence terminal on long branches with 1-3 capitula on 1-5 cm long, pubescent peduncle. Capitula campanulate, many bracteolate; bracteoles ca 6 mm long, densely purplish hairy. Involucre campanulate; bracts 8-12, linear-lanceolate, 5 x 1 mm, acute, equal, with broad scarious margins. Florets all tubular, ca 9 mm long; tube yellow, ca 6 mm; limb 3 mm long; corolla lobes ca 1 mm long. Style arms orange, long, much exerted, hairy. Achenes pale brown, cylindrical, 1.5 mm long, slender, ribbed, glabrous. Pappus of white hairs, 10-11 mm long.

Fl. & Fr. April - May.

Distrib. India: Tamil Nadu, Karnataka and Uttar Pradesh.

Indonesia.

Note. Commonly known as 'Velvet plant', used as an ornamental. The leaves are used for ring worm in Java.

2. *Gynura bicolor* (Roxb. ex Willd.) DC., Prodr. 6: 299. 1838. *Cacalia bicolor* Roxb. ex Willd., Sp. Pl. 3: 1731. 1804. *Gynura angulosa* DC., Prodr. 6: 298. 1838; Hook.f., Fl. Brit. India 3: 334. 1881. *G. angulosa* var. *petiolata* Hook.f., Fl. Brit. India 3: 334. 1881. **Fig. 68.**

Herbs, perennial, decumbent to erect; stems slender to robust, ca 4 m tall, faintly ribbed, woody at the base, much branched and leafy. Leaves ovate or elliptic-lanceolate to rhomboid, acute, toothed, 4-5 x 2-10 cm, glabrous or with inconspicuous hairs chiefly on the veins, green on upper surface, greenish black on lower surface, cuneate into broad, amplexicaul, auricled base, sessile. Capitula discoid, campanulate, in 2-6-clustered corymbs or lax panicle, bracteolate; bracteoles ca 9 mm long; peduncle very variable in length, pubescent, minutely bracteate. Involucre campanulate, 9-15 mm long; bracts blackish green, oblong, 9-15 x 2 mm, glabrous, ribbed, with broad scarious margins. Disc florets yellow, 11-14 mm long; limb 4 mm long; 5-lobed; lobes purple tinged, slightly papillose. Achenes oblong, ca 3 mm long, slightly flattened, faintly ribbed, slightly narrowed above, glabrous or pubescent. Pappus hairs white, ca 9-10 mm long, copious.

Fl. & Fr. July - Sept.



Fig. 68. *Gynura bicolor* (Roxb. ex Willd.) DC.

Distrib. India: Widely distributed between 2000-3000 m. Himachal Pradesh, Uttar Pradesh, Arunachal Pradesh, Nagaland, Meghalaya and Maharashtra.

Nepal, Bhutan, Myanmar, China and Japan.

3. *Gynura lycopersicifolia* DC., Prodr. 6: 300. 1838; Hook.f., Fl. Brit. India 3: 334. 1881.

Herbs, shrubby; stems stramineous, slightly fleshy, angular, hollow, up to 2 m tall, coarsely brownish hispid. Leaves 10-20 cm long, lyrate pinnatisect, ovate, terminal lobe and 1-3 pairs of lateral segments with few intermediate lobes, margins irregularly coarsely dentate, 2-10 x 1-8 cm; brownish hispid on both the surfaces; petiole 1-5 cm long, densely pubescent. Capitula discoid, in terminal corymb, bracteolate. Involucre campanulate; bracts linear-lanceolate, 10-14 x 1.5-2.5 mm, acute, glabrous; peduncle many-bracteate, 1-4 cm long. Florets orange, 10-14 mm long. Achenes black, ca 4 mm long, ribbed, sparsely pubescent between the ribs. Pappus white, 10-13 mm long.

KEY TO THE SUBSPECIES

- 1a. Leaves softly pubescent; peduncles bearing several bracts at the base of the capitula; involucre 1.2-1.3 cm long; bracts 3-ribbed; florets 10-11 mm long
3.1. subsp. *lycopersicifolia*
- b. Leaves hispid; peduncles with regularly spaced bracts along their length; involucre 1.5-1.7 cm long; bracts, 4-5 ribbed; florets 13-14 mm long
3.2. subsp. *taprobanensis*

3.1. subsp. *lycopersicifolia*

Fl. & Fr. Feb. - March.

Distrib. India: South India.

3.2. subsp. *taprobanensis* Grierson in J. Sci. Biol. 11: 20. 1974.

Fl. & Fr. Jan. - Dec.

Distrib. India: Orissa, Karnataka, Kerala and Tamil Nadu.

Sri Lanka.

4. *Gynura nepalensis* DC., Prodr. 6: 300. 1838; Hook.f., Fl. Brit. India 3: 333. 1881. *Gynura foetens* Wallich ex DC., Prodr. 6: 300. 1838. *Gynura nepalensis* DC. var. *thomsoni* C.B. Clarke, Comp. Ind. 171. 1876. **Fig. 69.**

Shrubs, perennial, hoary pubescent; stems corymbosely branched above, grooved. Leaves obovate to elliptic-lanceolate or rhomboid, acute to acuminate, margins incised with mucronulate teeth or shallow angular lobes, 3-20 x 1-6 cm, canescent or with scattered white hairs on the upper surface, base cuneate into 0.5-5 cm long petiole; uppermost leaves linear-lanceolate, transitional to bracts, sessile. Capitula, discoid, campanulate, loosely aranged in terminal corymb, 1.5-2 cm in diam., on peduncle with few linear bracts; peduncle 1-10 cm long, pubescent. Involucre campanulate, slightly longer than broad, bracteolate; bracteoles half the length of the involucre bracts, linear, subulate with spreading white hairs on the margins; bracts 14, linear-lanceolate, 9-5-14 x 1.5 mm, subglabrous to densely hoary pubescent, with narrow scarious margins. Florets yellow, ca 10.5 mm long. Achenes dark brown, cylindrical, 4-6 mm long, pubescent or glabrous, deeply-many ribbed. Pappus of white, slender hairs, ca 10 mm long.

Fl. & Fr. March - May.

Distrib. India: Himalayas and the N.E. region. Himachal Pradesh, Uttar Pradesh, Sikkim and Meghalaya.

Nepal, China, Myanmar and Thailand.

5. *Gynura nitida* DC. in Wight, Contrib. Bot. Ind. 24. 1834; Hook.f., Fl. Brit. India 3: 333. 1881.

Herbs, stout, glabrous to sparingly pubescent; stems pale brown, stout, angular, grooved, sparingly pubescent, branched above in the inflorescence. Leaves obovate-lanceolate, acute or obtuse, 3-14 x 1-5 cm, coarsely toothed, glabrous, base narrowed, auricled or not; uppermost leaves sessile. Capitula orange-red, campanulate, 5-7-bracteolate, on 5-20 cm long peduncle; peduncle densely brownish pubescent. Involucre campanulate; bracts 12-16, linear-oblong, ca 8-9 mm long, subacute, membranous. Disc florets



Fig. 69. *Gynura nepalensis* DC.

10-12 mm long; tube 9-10 mm long; limb 1.3-2.5 mm long. Achenes greyish-black, oblong, 1-1.2 mm long, strongly ribbed, hispid between the ribs. Pappus white, ca 15 mm long, slender.

Fl. & Fr. Jan. - Dec.

Distrib. India: Penninsular India, between 1200-2500 m. Maharashtra, Karnataka, Kerala and Tamil Nadu.

6. *Gynura procumbens* (Lour.) Merr. Enum. Philip. Fl. Pls. 3: 618. 1923. *Cacalia procumbens* Lour. Fl. Cochinch. 485. 1790. *Gynura sarmentosa* DC., Prodr. 6: 298. 1838; Hook.f., Fl. Brit. India 3: 335. 1881.

Herbs, climbing; stems pale brown, leafy, pubescent when young. Leaves elliptic to rhomboid, acute, entire to dentate or lobed, 3-7 x 0.7-5 cm, green, purplish tinged beneath, sparsely pubescent, shortly petioled; petiole 0.1-0.5 cm long. Inflorescence of lax corymb with 1-5 capitula. Capitula discoid, campanulate, 20-30-flowered bracteolate. Involucral bracts ca 13, 10-16 x 1-1.5 mm, gradually tapering from near the base. Disc florets 14 mm long; corolla tube 9 mm long; limb 5 mm long. Achenes chest nut brown, 6 mm long, glabrous.

Distrib. India: Arunachal Pradesh, Abor Hills.

Tropical W. Africa, China, Thailand, Indonesia, Philippines, Malesia, Nigeria, Siberia, Ivory-Coast and Central African Empire.

Note. The plant is grown in the rice fields of Mindane in the Philippine Islands as a remedy for rice-aphids. Horticultural cultivars of the species are popular as house plants in temperate countries. The leaves are served in Malaya for flavouring food and in S.E. Asia the plant is used for kidney troubles, dysentery and as a febrifuge. In Sierra-Keoha it is the boiled leaves that are applied for general body pain. [Burkill, useful pls. W. Trop. Africa 476. 1985].

7. *Gynura pseudochina* (L.) DC., Prodr. 6: 299. 1838; Hook.f., Fl. Brit. India 3: 335. 1881. *Senecio pseudochina* L., Sp. Pl. 867. 1753. *Gynura sinuata* DC., Prodr. 6: 301. 1838.

Herbs, perennial, erect, fleshy, 7-50 cm high, pubescent with tuberous rootstock; stems many from the base. Leaves in basal rosette, obovate or elliptic-obtuse, spatulate, pubescent on both the surfaces, denticulate or pinnatisect, 1-40 x 1-12 cm, cuneate into 0.3 - 8 cm long petiole; petiole thick,

broad and fleshy. Inflorescence scapose, simple or 1-2 branched, bearing small, leaf like, dissected and auricled bracts on each branch. Capitula discoid, campanulate, bracteolate, on 0.5-4 cm long pubescent peduncle. Involucre campanulate; bracts greenish purple, ca 13, lanceolate, 7-12 mm long, suddenly expanded below the recurved tip. Florets yellow tinged, 10-13 mm long; limb 3-4 mm long, 5-lobed; lobes blunt. Achenes red to brown, 3-4 mm long, glabrous or sparingly pubescent. Pappus white.

Distrib. India: Sikkim and Kerala.

Sri Lanka, China, Myanmar, Indonesia and Thailand.

Note. The tuberous roots are used both externally and internally when the circulation of blood is interfered with, particularly when the blue spot and blotches result from blows. It is also used as a cooling medicine and in leprosy.

8. *Gynura travancorica* W.W. Smith in Rec. Bot. Surv. Ind. 6: 29. 1914.

Herbs, erect, 0.8-1.2 m tall; stems stout, branched, grooved, fulvous pubescent. Leaves elliptic-lanceolate, acute or subacute, distantly serrate, 7-8 x 1.5 cm, coriaceous, glabrous, reddish brown on drying; lower leaves with cuneate base; uppermost leaves lanceolate, sessile, with amplexicaul, auricled base. Capitula 1.5-2 cm in diam., many-bracteolate, on ca 2.5 cm long peduncle. Involucre narrowly campanulate, glabrous; bracts ca 14-16, linear-lanceolate, 12-15 x 2.5 mm, acute with membranous margins. Disc florets 8-12 mm long, very slender; limb very small, 5-lobed. Style arms long, subulate. Achenes greyish-black, cylindrical, 4 mm long, ribbed, with dense yellow pubescence. Pappus white, 10 mm long.

Fl. & Fr. Feb. - May.

Distrib. India: Maharashtra, Tamil Nadu and Kerala.

Endemic.

8. *Kleinia* Miller

Herbs, or undershrubs, perennial, succulent, glabrous. Leaves alternate, obovate or lanceolate, suborbicular to spatulate, simple, entire or finely serrate, succulent or herbaceous. Capitula cream to deep yellow, discoid, homogamous, large or medium sized, long peduncled, subcorymbose or paniculate, bracteolate or ebracteolate. Involucre cylindrical; bracts 1-seriate, equal, with a few shorter

calyculate bracts at the base. Receptacle flat, naked. Florets all hermaphrodite; corolla narrowly tubular at the base widening gradually into the cylindrical or campanulate limb, 5-lobed at the apex. Anthers acutely appendaged at the apex, bluntly sagittate at the base. Style branches linear, elongate, appendaged; appendage short, ovoid, thick and papillose. Achenes cylindrical, glabrous, 10-ribbed. Pappus copious, capillacious, persistent or deciduous.

Tropical and S. Africa, Arabia and Sri Lanka; ca 50 species, 4 in India.

Literature. FYSON, P.F. (1932). Notes on four species of flowering plants from the South Indian Highlands. *J. Indian Bot. Soc.* 11: 48-50.

KEY TO THE SPECIES

- | | |
|--|----------------------------|
| 1a. Pappus hairs stiff and flattened | 1. <i>K. balsamica</i> |
| b. Pappus hairs not flattened | 2 |
| 2a. Leaves elliptic-lanceolate, acuminate, long petioled | 4. <i>K. walkeri</i> |
| b. Leaves elliptic-oblong, oblanceolate, obovate, suborbicular or spatulate, obtuse, shortly petiolate or subsessile | 3 |
| 3a. Leaves elliptic-oblong, oblanceolate, suborbicular or spatulate, blackish green, glaucous; capitula creamy | 2. <i>K. grandiflora</i> |
| b. Leaves obovate, green above and always purplish beneath glabrous; capitula deep yellow | 3. <i>K. shevaroyensis</i> |

1. *Kleinia balsamica* (Dalz. & Gibs.) P. Halliday in Kew Bull. 42: 442. 1987. *Notonia balsamica* Dalz. & Gibs., Bombay Fl. 133. 1861; Hook.f., Fl. Brit. India 3: 337. 1881.

Herbs; stems and branches short, very stout. Leaves oblong, ovate-oblong or oblanceolate, quite entire. Capitula creamy, up to 2.5 cm long. Achenes glabrous. Pappus hairs stiff and flattened.

Fl. & Fr. April - May.

Distrib. India: W. Ghats.

Note. This species is very closely allied to *Kleinia grandiflora*. Santapau (Fl. Khandala 135. 1966) after examining the type of *Notonia balsamica* Dalz. & Gibs. at Kew commented, "I can not see the difference between the pappus of *N. balsamica* and *N. grandiflora*" and treated *N. balsamica* as a synonym of *N. grandiflora* on the basis of his observation. But Halliday (Kew Bull. 42: 442. 1987) has treated *Kleinia balsamica* (*N. balsamica*) as a separate species.

2. *Kleinia grandiflora* (Wallich ex DC.) N. Rani in Matthew, Fl. Tamil Nadu Carnatic 2: 801. 1983. *Notonia grandiflora* Wallich ex DC., Arch. Bot. (Paris) 2: 518. 1833; Hook. f., Fl. Brit. India 3: 337. 1881.. *Cacalia grandiflora* Wallich, Cat. 3147. 1831.

Bombay: *Gaidar*; Mar.: *Wander-roti*; Tam.: *Mosakalhu-thalai*; Tel.: *Kundalaseviyalai*.

Herbs, succulent; stems blackish brown, 0.6-2 m tall, covered with prominent leaf scars, glabrous, glaucous, little branched above. Leaves blackish brown, elliptic-oblong, oblanceolate, suborbicular or spatulate, obtuse, entire or narrowly revolute 6-22.5 x 2.5-15 cm, glabrous, glaucous (especially beneath), base attenuate and subpetiolate. Capitula campanulate, 3-6, in short, terminal corymb or 15-20 in longer lax branched panicle, 5-6 mm in diam. Involucre campanulate, 2-3 cm broad; bracts pale green, 8-12, lanceolate, 1.3-1.8 x 2.5-3.5 mm, striate, sub membranous with purplish margins. Florets greenish white, 1.7-2 cm long, exserted. Achenes somewhat compressed, 5-7 mm long, glabrous. Pappus white, persistent, 1.5-1.75 cm long.

Notes. Used as a cure for pimples and as a remedy for hydrophobia. (Chopra *et al.*, Gloss. Ind. Med. Pl. 177. 1956).

KEY TO THE VARIETIES

- | | |
|---|------------------------------|
| 1a. Leaves 6-15 x 2.5-4 cm; achenes 5-7 mm long | 2.1. var. <i>grandiflora</i> |
| b. Leaves 17.5-22.5 x 10-15 cm; achenes 8 mm long | 2.2. var. <i>major</i> |

2.1. var. *grandiflora*

Fl. & Fr. Aug. - May.

Distrib. India: S. India in scrubs in dry regions near the coast. Karnataka and Tamil Nadu; rare.

Nepal and Sri Lanka.

2.2. var. *major* (Ramasw.) Uniyal in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 47. 1988. *Notonia grandiflora* DC. var. *major* Ramasw. in Rec. Bot. Surv. India 6: 151. 1914.

Fl. & Fr. Aug. - May.

Distrib. India: Tamil Nadu.

3. *Kleinia shevaroyensis* (Fyson) Uniyal in R.R. Rao *et al.*, Fl. Ind. Enum. Asteraceae 47. 1988. *Notonia shevaroyensis* Fyson in J. Bot. Soc. 11: 49. 1932.

Herbs, 25-50 cm high; stems simple, erect, glabrous. Leaves obovate, obtuse, 6-8 x 2.5-3 cm, glabrous, purplish on the lower surface, narrowed at base into a petiole. Inflorescence corymbose; corymb ca 10 cm in diam., glabrous; lower branches 5-8 cm long; uppermost branches 1-2 cm long, bracteate; bracts linear, 0.5-0.8 cm, glabrous. Capitula homogamous, 8-12. Involucral bracts uniseriate, lanceolate, 5-6 cm long, equal, with few outer smaller bracteoles, glabrous; margins scarious. Florets all tubular; corolla lobes yellow; triangular. Anther base entire, not tailed, apex acuminate, scarious, style exserted; style arms obtuse at the apex. Achenes cylindrical, shortly setulose. Pappus hairs white, 9-10 mm long.

Distrib. India: S. India, Shevaroy hills, in swamps.

Endemic.

4. *Kleinia walkeri* (Wight) Uniyal in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 49. 1988. *Gynura walkeri* Wight, Ic. t. 1122. 1846. *Notonia walkeri* C.B. Clarke. Comp. Ind. 176. 1876; Hook.f., Fl. Brit. India 3: 337. 1881. *Senecio stylosus* Balakr. in J. Bombay Nat. Hist. Soc. 67: 61. 1970.

Shrubs, perennial; stems erect, ca 2 m tall, softly woody, covered with leaf scars, glabrous. Leaves elliptic-lanceolate, base attenuated, gradually acuminate at apex, margins entire or regularly and sharply serrate, 7-13 x 2-4 cm, glabrous on both the surfaces; venation pinnate, prominent beneath; petiole 2-4 cm long. Capitula orange, cylindrical to campanulate, in large lax, terminal corymb, 3-4 mm diam., peduncle bearing linear bracts, 2-3 mm long. Involucre cylindrical, campanulate, ca 1.5 cm broad (when pressed); bracts linear-lanceolate, 0.8-1 x 0.1-0.2 mm, glabrous, 1-2-striate in the middle, margins thin, submembranous. Florets white or creamy, exserted; corolla 0.8-1 cm long. Achenes somewhat compressed, puberulous between the ribs. Pappus of white, 6.8 mm long hairs, deciduous.

Fl. & Fr. Sept. - April.

Distrib. India: In forest shade of upper montane zone. Tamil Nadu, (Nilgiri hills) and Meghalaya; rare.

Sri Lanka and Indonesia.

9. *Ligularia* Cass.

Herbs, perennial. Leaves both radical and cauline; radical leaves with long and slender or short and stout petiole, broadly orbicular to reniform; cauline leaves broadly ovate-orbicular to reniform with large vaginate sheathing base. Inflorescence racemose, corymbose, thyrsoid or solitary, on long peduncle. Capitula bright yellow, radiate, many-flowered, bracteolate or ebracteolate. Involucre narrowly campanulate or obconic; bracts uniseriate, of two forms, the narrower outer one overlapping both the margins of the broader inner, connate to subconnate at the base. Receptacle flat, naked. Ray florets in one series, female, ligulate; ligules often bifid. Disc florets tubular, hermaphrodite, 5-lobed. Style arms of disc florets long, obtuse, pubescent. Achenes cylindrical, erostrate, ribbed, glabrous or rarely hairy. Pappus white, stramineous or reddish, multiseriate.

A Genus of European-Asiatic distribution; ca 150 species, 10 in India.

Literature. HANDEL-MAZZETTI, H. (1938). Die Chinesischen Arten der Gattung *Ligularia*. *Bot. Jahrb. Engler* 69: 95-142. A systematic study.

KEY TO THE SPECIES

- | | |
|---|-----------------------------|
| 1a. Inflorescence corymbose | 2 |
| b. Inflorescence racemose or rarely with solitary capitula | 7 |
| 2a. Capitula discoid | 2. <i>L. dux</i> |
| b. Capitula radiate | 3 |
| 3a. Leaves reniform or broadly orbicular, cordate | 4 |
| b. Leaves palmately lobed | 6. <i>L. japonica</i> |
| 4a. Ray floret only one | 9. <i>L. thomsoni</i> |
| b. Ray florets more than one | 5 |
| 5a. Leaves greyish-white, velvety tomentose beneath; capitula with 3-7 florets | 7. <i>L. kingiana</i> |
| b. Leaves glabrous on the lower surface; capitula with more than 7 florets | 6 |
| 6a. Achenes 2 mm long | 1. <i>L. amplexicaulis</i> |
| b. Achenes 5-6 mm long | 8. <i>L. pachycarpa</i> |
| 7a. Capitula arranged in a terminal, conical raceme; pappus red, very short, coroniform | 5. <i>L. jacquemontiana</i> |
| b. Capitula solitary or arranged in a terminal elongated raceme, pappus of hairs | 8 |

- 8a. Radical leaves oblanceolate; capitula broadly campanulate, arranged in lax raceme; 10. *L. virgaurea*
 b. Radical leaves reniform, ovate-cordate, hastate. Capitula narrowly campanulate, solitary
 or many subsecund or pendulous, arranged in a raceme 9
- 9a. Capitula subsecund or pendulous, numerous. 3. *L. fischeri*
 b. Capitula not pendulous, solitary or 2-14 4. *L. hookeri*

1. *Ligularia amplexicaulis* DC., Prodr. 6: 314. 1838. *L. corymbosa* DC., Prodr 6: 314. 1838. *Senecio amplexicaulis* Wallich ex C.B. Clarke, Comp. Ind. 204. 1876; Hook.f., Fl. Brit. India 3: 348. 1881. *S. yakla* C.B. Clarke, Comp. Ind. 204. 1876.

Herbs, perennial, robust, 0.6-1.2 m tall; stems dark brown, stout, grooved, branched above, glabrous below; densely rustish-brown pubescent on the inflorescence. Leaves orbicular to reniform, cordate, acute, irregularly toothed, ca 30 cm in diam., glabrous on both the surfaces with raised prominent reticulate venation; petiole of radical leaves long and interruptedly winged. Capitula radiate, in corymb, narrowly campanulate, 1-2 cm in diam., bracteolate; peduncle 9-10 mm long, bracteate. Involucre campanulate, sparsely pubescent; bracts 8, oblong, 5-7 x 1-1.2 mm; herbaceous with membranous margins, connate below. Ray florets linear-oblong, ca 15 mm long; ray 5-6 mm long, 3-5-veined; tube 9-10 mm long. Disc florets ca 7 mm long; corolla limb ca 3 mm long, 5-lobed; tube 4 mm long. Achenes pale brown, oblong, ca 2 mm long, oblong, slightly ribbed. Pappus of pale-brown hairs, ca 6 mm long.

Fl. & Fr. Aug. - Sept.

Distrib. India: Jammu & Kashmir, Uttar Pradesh, Sikkim and West Bengal.

Bhutan.

2. *Ligularia dux* (C.B. Clarke) R. Mathur in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 53. 1988. *Senecio dux* C.B. Clarke in J. Linn. Soc. 25: 48. 1889.

Herbs, perennial, robust, 0.6-1.2 m tall; stems dark brown, stout, grooved, branched, glabrous below and brownish-pubescent above, especially on the inflorescence. Leaves orbicular, cordate, acute or subacute, irregularly mucronulate toothed, ca 15 cm in diam., glabrous, dark green above pale green beneath with prominent venation; radical leaves long petioled; uppermost cauline leaves ovate, sessile with broad sheathing amplexicaul base. Capitula discoid; peduncle ca 5 mm long, densely brownish pubescent. Involucre narrowly

campanulate, brownish pubescent; bracts 5, unequal, elliptic-oblong, 12-13 x 1.2-2 mm, obtuse, brown pubescent at the base, with broad scarious margins. Ray florets absent. Disc florets 6-7 mm long; limb ca 3 mm long; tube 3-5 mm long. Achenes dark brown, linear-oblong, 6.5-7 mm long, deeply ribbed, shining. Pappus reddish, ca 7.5 mm long, unequal, rigid.

Fl. & Fr. Oct. - Nov.

Distrib. India: E. Himalayas, at 3000 m. Sikkim.

Endemic.

3. *Ligularia fischeri* (Ledeb.) Turcz. in Bull. S. Nat. Mosco 20: 11. 1847. *Cineraria fischeri* Ledeb., Ind. Sem. H. Dorpat. 17. 1820. *Senecio racemosus* Wallich, Cat. 3140. 1831. *Ligularia racemosa* DC., Prodr. 6: 314. 1838. *Senecio ligularia* Hook.f., Fl. Brit. India 3: 349. 1881. *Senecio ligularia* var. *atkinsonii* Hook.f., Fl. Brit. India 3: 350. 1881.

Shrubs, perennial, stout, erect; stems pale brown, simple, smooth, glaucous, deeply grooved, densely brownish appressed pubescent above, glabrous below. Leaves cordate, sagittate or subdeltoid or reniform, obtuse or subacute, coarsely, mucronulately toothed, ca 20-30 cm in diam., upper surface blackish brown, lower surface pale green with prominent reticulate venation; radical leaves with long, simple petiole; cauline leaves with winged, sheathing petiole. Capitula radiate, campanulate, in long, leafy racemes, subsecund, bracteolate or ebracteolate; peduncle 10-15 mm long. Involucre campanulate; bracts 8-10, unequal, linear-oblong, ca 10-12 x 2 mm, with broad overlapping, scarious margins; outer narrow, acute, herbaceous. Ray florets yellow, ca 15 mm long; ray 10 mm long, linear-oblong, 2-3-lobed at the tip, 3-5-veined. Disc florets ca 11 mm long; limb 4-5 mm long; tube 6-6.5 mm long. Achenes reddish brown, oblong, ca 7 mm long, ribbed, curved. Pappus of reddish, unequal hairs, ca 8 mm long, longer than the achenes.

Fl. & Fr. Sept. - Oct.

Distrib. India: Temperate and subalpine Himalayas, between 2800-3000 m. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

China, Mongolia, E. Siberia, Korea and Japan.

4. *Ligularia hookeri* (C.B. Clarke) Hand.-Mazz. in Engl. Bot. Jahrb. 69: 127. 1938. *Cremanthodium hookeri* C.B. Clarke, Comp. Ind. 169. 1876; Hook.f., Fl. Brit. India 3: 331. 1881.

Herbs, perennial, glabrous, slender, 25-45 cm high; roots with fibrous remains of old leaves; stems slender, faintly ribbed, glabrous. Leaves both radical and cauline; radical leaves hastate, cordate or roundly reniform, acutely dentate, 4-14 cm in diam., dark green above, paler beneath; venation distinctly reticulate and prominent on the lower surface; petiole very long, slender, with sheathing base; cauline leaves reniform to linear with shorter, petioled, sheathing base. Capitula radiate campanulate, solitary, terminal or 2-14, arranged in terminal raceme, ca 2.5 cm in diam., bracteolate; bracteoles linear. Involucre campanulate; bracts ca 10, oblong, ca 6 mm long, acute, glabrous, scaly, membranous. Ray florets yellow or orange, 1.7 cm long; ray 3 times longer than the tube, 5-9-veined, distinctly 3-fid at the tip. Disc florets numerous, tubular. Achenes blackish, cylindrical, ribbed, longer than the yellowish brown pappus.

KEY TO THE SUBSPECIES

- 1a. Capitula large, solitary or 2-3, terminal 4.1. subsp. *clarkei*
 b. Capitula small, 6-14 in racemes 4.2. subsp. *polycephala*

4.1. subsp. *clarkei* (R. Good) R. Mathur in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 53. 1988. *Cremanthodium hookeri* subsp. *clarkei* R. Good in J. Linn. Soc. 48: 280. 1929.

KEY TO THE FORMA

- 1a. Ray florets linear, entire at the apex 4.1.1. f. *angustiligulatum*
 b. Ray florets ovate-oblong, truncate or deeply denticulate at the apex 4.1.2. f. *latiligulatum*

4.1.1. f. *angustiligulatum* (R. Good) R. Mathur in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 53. 1988. *Cremanthodium hookeri* subsp. *clarkei* R. Good f. *angustiligulatum* R. Good in J. Linn. Soc. Bot. 48 : 280. 1929.

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas, between 2700-5000 m. Sikkim.

4.1.2. f. *latiligulatum* (R. Good) R. Mathur in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 53. 1988. *Cremanthodium hookeri* subsp. *clarkei* R. Good f. *latiligulatum* R. Good in J. Linn. Soc. Bot. 48: 280. 1929.

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas, between 2700-5000 m. Sikkim.

4.2. subsp. *polycephala* (R. Good) Hand.-Mazz. in Engl. Bot. Jahrb. 69: 127. 1938. *Cremanthodium hookeri* subsp. *polycephalum* R. Good in J. Linn. Soc. Bot. 48: 280. 1929. *Senecio atkinsonii* C.B. Clarke, comp. Ind. 207. 1876. *Senecio calthaeifolius* Hook.f., Fl. Brit. India 3: 350. 1881. **Fig. 70.**

Fl. & Fr. Aug. - Sept.

Distrib. India: Himachal Pradesh and Sikkim.

5. *Ligularia jacquemontiana* (Decne.) M.A. Rau, High Alt. Fl. Plants 134. 1975. *Senecillis jacquemontiana* Decne. in Jacq. Voy. Bot. 90. t. 98. 1844. *Senecio jacquemontianus* (Decne.) Benth. ex Hook.f., Fl. Brit. India 3: 350. 1881. **Fig. 71.**

Shrubs, perennial, robust, glabrous, 0.9-1.5 m tall; stems reddish brown, stout, grooved, smooth. Leaves broadly ovate-cordate or subhastate, subacute, toothed, 25-30 cm in diam., glabrous on both the surfaces with prominent, reticulate venation; radical leaves with narrowly winged, with ca 15-30 cm long petiole; cauline leaves with sheathing petiole. Capitula bright yellow, broadly campanulate, arranged in terminal, conical raceme, bracteolate, on 2-7 cm long peduncle. Involucre broadly campanulate; bracts 8-12, ovate-oblong, ca 5 x 2 mm, acute, glabrous, subconnate at the base. Ray florets 12-15, ca 15 mm long; ray linear-oblong, 12.5 mm long, 3-5-veined, tip entire to 2-dentate; tube ca 2.2 mm long. Disc florets ca 5 mm long; limb 3 mm long, 5-lobed; lobes slightly papillose at the tip; tube ca 2 mm long. Achenes black, linear-oblong, 5-8 mm long, faintly ribbed. Pappus of reddish hairs, very short, coroniform.

Fl. & Fr. July - Sept.

Distrib. India: N.W. Himalayas, between 3000-4000 m. Jammu & Kashmir and Himachal Pradesh.

6. *Ligularia japonica* (Thunb.) Less., Syn. Comp. 390. 1832. *Arnica japonica* Thunb., Fl. Jap. 319. 1784. *Senecio macranthus* C.B. Clarke, Comp. Ind. 205. 1876; Hook.f., Fl. Brit. India 3: 349. 1881.

Herbs, perennial, robust, glabrous to sparingly pubescent, 0.9-1.2 m tall; stems pale brown, stout, corymbosely branched, rough, faintly ribbed. Leaves palmately up to 7-9-lobed; lobes oblong-lanceolate, acute, serrate to irregularly toothed; 14-15 x 20 cm, glabrous above, glandular pubescent beneath; venation prominent, raised on the lower surface; radical leaves with long petiole; cauline leaves with broad sheathing amplexicaul base. Capitula radiate, campanulate,

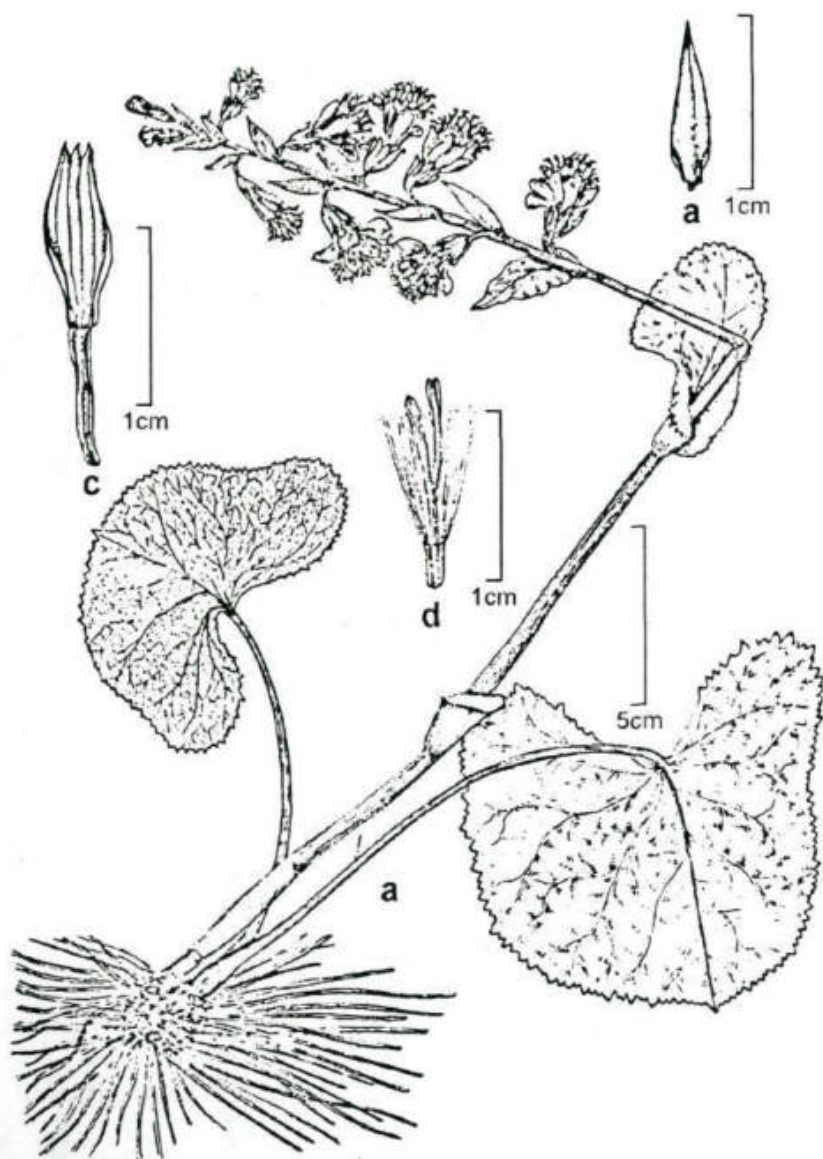


Fig. 70. *Ligularia hookeri* (C.B. Clarke) Hand. - Mazz. var. *polycephala* (R. Good) Hand.-Mazz. : a. Habit; b. Involucral bract; c. Ray floret; d. Achene with pappus.

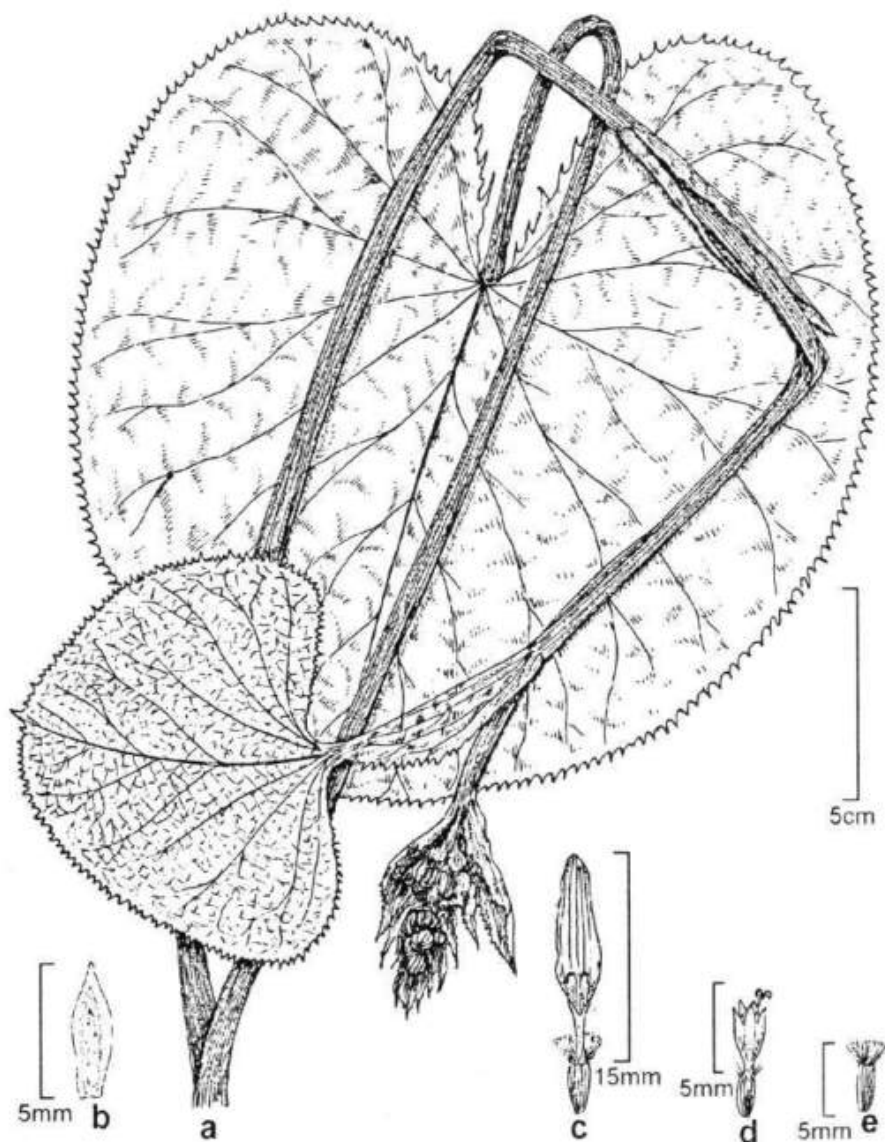


Fig. 71. *Ligularia jacquemontiana* (Decne.) M.A. Rau : a. Habit; b. Involucral bract; c. Ray floret; d. Disc floret; e. Achene with pappus.

2 x 1.5-2.5 cm, ebracteolate, glabrous to sparingly pubescent, on 1-2.5 cm long peduncle. Involucre campanulate; bracts brown, unequal, 5-8, broadly elliptic to oblong, 12 x 1-3 mm, subacute, with broad scarious margins. Ray florets linear, ca 20-30 mm long. Disc florets 11-12 mm long; limb 5.5-6 mm long; tube 6 mm long. Achenes black, oblong, ca 4-5 mm long, deeply grooved, sparingly hairy. Pappus of red, rigid, scabrid hairs, ca 10-11 mm long.

Fl. & Fr. June - July.

Distrib. India: N.E. region at 1400 m. Meghalaya.

Endemic.

7. *Ligularia kingiana* (W.W. Smith) R. Mathur in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 53. 1988. *Senecio kingianus* W.W. Smith in J. Proc. As. Soc. Bengal 7: 71. 1911.

Herbs, perennial, robust, 60-90 cm high; stems erect, 1-2 cm in diam., densely covered with velvety tomentum, corymbosely branched above. Radical leaves broadly orbicular, cordate, mucronately denticulate, 20-30 cm in diam., glabrous above, pubescent beneath with velvety tomentum on the veins, petioled; petiole 40-50 cm long, not winged; cauline leaves alternate, orbicular or reniform, denticulate, 10-30 cm in diam., velvety tomentose, with sheathing base; sheath large, 6-10 cm long, much dilated; petiole 2-4 cm long. Capitula narrowly radiate, campanulate, 10 x 3-4 mm, 3-7-flowered, bracteolate; bracteoles 3-5, 1-4 mm long, subulate. Involucre narrowly campanulate; bracts oblong, subobtuse, rarely acute, with narrow scarious margins. Ray florets linear, 10-15 mm long, apex 3-4-denticulate. Disc florets hermaphrodite, tubular. Achenes 5-6 mm long, cylindrical to oblong. Pappus of short white hairs.

Distrib. India: E. Himalayas, between 3500-4000 m. Sikkim.

Endemic.

8. *Ligularia pachycarpa* (C.B. Clarke, ex Hook.f.) Kitam. in Hara *et al.*, Fl. E. Himalaya 2: 139. 1971. *Senecio pachycarpus* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 349. 1881. *S. corymbosus* C.B. Clarke, Comp. Ind. 205. 1876 (*non* DC).

Herbs, perennial, stout, erect, almost glabrous, up to 1 m high; stems pale brown to blackish green, stout, ribbed, pubescent above. Leaves orbicular-reniform to ovate, cordate, rounded to acute, serrate, 6-20 x 2.5-15 cm, glabrous to sparingly pubescent on both the surfaces, upper surface blackish brown, lower surface pale, with prominent reticulate venation; radical leaves with long winged petiole; wing usually toothed; cauline leaves with dilated, sheathing bases. Capitula radiate, campanulate, bracteolate, more or less drooping. Involucre campanulate, sparingly pubescent; bracts 10-12, oblong, acute, connate at the base. Ray florets ca 15 mm long; ray 5-6.5 mm long. Disc florets tubular. Achenes broadly oblong, 5-6 mm long. Pappus of brown hairs, ca 5-6 mm.

Fl. & Fr. Sept. - Nov.

Distrib. India: E. Himalaya at 4000 m. Sikkim.

9. *Ligularia thomsoni* (C.B. Clarke) Pojark in Spisok. Rast. Herb. Fl. URSS. 11. 165. 1949. *Senecio thomsoni* C.B. Clarke, Comp. Ind. 205. 1876; Hook.f., Fl. Brit. India 3: 348. 1881.

Herbs, shrubby, large, robust, ca 1.2 m tall; stems pale brown, simple, erect, unbranched, white floccose tomentose. Leaves ovate, cordate, subacute, regularly sinuate toothed, up to 20 cm in diam., pale brown above, glabrous, white floccose tomentose on the lower surface; radical leaves long petioled; middle cauline leaves shortly petioled to sessile; petiole 1-25 cm long; uppermost leaves linear-lanceolate, serrate. Capitula radiate, narrowly campanulate, arranged in terminal corymb, bracteolate; peduncle 2.5 cm long, densely white cottony to glabrous. Involucre densely cottony tomentose or glabrous; bracts dark brown, oblong, ca 7-10 mm long, obtuse, apex dark with narrow scarious margins. Ray floret yellow, 1, ca 1.5 mm long; ray oblong, ca 12 mm long; tube 3 mm long, 9-veined. Disc florets 6-7 mm long; limb ca 4.5 mm long; tube ca 2.5 mm. Achenes of ray florets flat, dark brown, 2 x 1 mm; those of disc florets terete cylindrical, flattened, 3.5 mm long, ribbed. Pappus of scabrid, hairs, ca 3 mm long, scanty.

Distrib. India: N.W. Himalayas, between 2000-3500 m. Jammu & Kashmir and Himachal Pradesh.

Nepal.

10. *Ligularia virgaurea* (Maxim.) Matt. ex Rheder & Kobuski in J. Arn. Arb. 14: 40. 1933. *Senecio virgaurea* Maxim. in Bull. Acad. Sci. St. Petersb.

27: 484. 1881. *Cremanthodium plantaginifolium* (Franch) R. Good subsp. *franchetii* f. *lagotis* (W.W. Smith) R. Good in J. Linn. Soc. 48: 293. 1929. *Senecio lagotis* W.W. Smith in J. As. Soc. Bengal n.s. 7: 70. 1911.

Herbs, perennial, robust, glabrous (except inflorescence); stems 45-60 cm long, erect, 4-5 mm in diam., simple, unbranched, striate. Radical leaves oblanceolate, attenuated, subobtusate, entire; ca 15 x 4 cm; petiole ca 5 cm long; cauline leaves 3-9, oblong to obovate, obtuse to acute, 7-12 x 2-6 cm, venation prominent, reticulate; amplexicaul at base. Capitula yellow, radiate, broadly campanulate, in terminal raceme, 2-3 cm in diam., nodding, bracteolate; bracteoles 2-3, subulate; peduncle ca 1.5 cm long, bracteate. Involucre broadly campanulate, blackish pubescent mixed with white hairs; bracts green, 12-16, uniseriate, linear-lanceolate, ca 1 cm long, acute, fleshy, apex villous. Ray florets yellow, 12-16, lanceolate, 10 x 4 mm. Disc florets ca 3 mm long, tubular, numerous. Anthers not tailed. Achenes narrowly oblong, ca 3 x 1.5 mm, 5-6 ribbed, narrow at the base. Pappus of slender, scabrid, dirty white hairs.

Fl. & Fr. May - June.

Distrib. India: E. Himalayas at 3000 m. Sikkim.

Nepal, Bhutan, Tibet and China.

10. *Nannoglottis* Maxim.

Herbs, densely greyish villous, robust, 30-60 cm high; stems erect, subsimple. Leaves all cauline, elliptic-lanceolate, acuminate, coarsely dentate to remotely dentate, sparsely to densely lanate, shortly petioled. Capitula radiate, solitary, terminal, ebracteolate. Involucre broadly campanulate; bracts ovate, acuminate, margins scarious. Ray florets 2-3-seriate, ligulate, female, very long. Disc florets numerous, shorter than the ray florets. Achenes of ray florets oblong, ribbed, hoary pubescent, narrowed below; those of disc florets brownish and scabrid. Pappus hairs uniseriate, unequal, scabrid, deciduous.

Distributed in Nepal, Bhutan, S. Tibet and W. China; ca 8 species, 1 in India.

Note. This genus can be distinguished by having florets of 3 kinds in each capitulum; 2-3 outer rows of female ligulate florets; the outer with short strap

shaped corolla; the inner with tubular corolla; innermost florets all hermaphrodite with tubular corolla. Jeffrey (1984) is of the opinion that since the achene anatomy of genus *Nannoglottis* is typical of tribe Astereae, this genus should be transferred under that tribe.

Nannoglottis hookeri (C.B. Clarke ex Hook.f.) Kitam. in Acta Phyt. Geobot. 31: 50. 1980. *Doronicum hookeri* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 222. 1881.

Punj.: *Darunaj-akrabi*

Herbs; stems simple, erect, sparsely villous. Leaves elliptic-lanceolate, oblique at base, acuminate, coarsely dentate, upper surface blackish brown pubescent, lower pale brown, sparsely lanate cuneate into a short, semiamplexicaul petiole. Capitula radiate, broadly campanulate, solitary, ca 2.5 cm in diam., ebracteolate. Involucre broadly campanulate, glabrous to sparingly villous; bracts dark brown, ovate, acuminate, 9-11 x 3 mm, 3-5-veined, with scarious margins. Ray florets oblong, 2-3 seriate, ca 15 mm long; ray ca 12.5 mm long, 3-veined; tube 2.2 mm long. Disc florets ca 5.5 mm long; corolla limb 3 mm; tube ca 2.5 mm. Achenes of ray florets oblong, ca 3 mm long, narrowed below, ribbed, hoary pubescent; those of disc florets brownish-red, ca 4 mm long, scabrid. Pappus of ray florets ca 3 mm long unequal, scabrid hairs; of disc florets, 4.5 mm long.

Fl. & Fr. July - Aug.

Distrib. India: E. Himalayas, between 3400-4100 m. Sikkim.

Nepal, Bhutan and Tibet.

Note. Roots used as an Aromatic tonic.

11. Senecio L.

Herbs, undershrubs or shrubs. Annual or perennial, erect, decumbent or scandent, rhizomatous; stems usually leafy, rarely subscapiform. Leaves both radical and cauline; radical leaves exauriculate, lyrate or pinnately divided, usually petiolate; cauline leaves simple, lyrate or pinnately lobed, auriculate at the base, margins dentate, serrate or toothed, usually sessile. Capitula heterogamous, radiate, or homogamous, discoid or disciform, solitary, axillary or few to many in terminal, simple or compound corymb or thyrse, pedunculate.

Involucre hemispherical, campanulate or cylindrical, calyculate; bracts 5-22, uniseriate, equal, free or connate at the base, herbaceous with scarious margins. Receptacle flat, naked, pitted or fimbriate. Ray florets yellow to orange, 1-24, ligulate, usually conspicuous, 3-9 veined, apically 3-dentate. Disc florets yellow, 3-numerous, tubular, 5-lobed. Anthers oblong to linear, base obtuse, not tailed. Style arms curved, truncate with obtuse marginal papillae. Achenes cylindrical 5-10 ribbed, smooth, glabrous to pubescent. Pappus white, stramineous or rufous, of capillary, uniform or barbellate hairs, sometimes absent in the ray florets. Pollen spherical, more or less spiny, prominently tricolporate.

Cosmopolitan, ca 1000 species; 43 in India.

Literature. CHATER, A.O. (1974). Taxonomic and Nomenclature notes on *Senecio* L. *Bot. J. Linn. Soc.* 68: 272-276. CUFODONTIS, G. (1933). Kritisch Revision von *Senecio*. Sectio. Tephrosieris. *Fedde, Rep. Beih.* 70: 1-266. DRURY, D.G. & L. WATSON. (1966). A bizarre pappus form in *Senecio*. *Taxon* 15: 309-311. JEFFREY, C. (1979a). Generic and sectional limits in *Senecio* (Compositae): 11. Evaluation of some recent studies. *Kew Bull.* 34: 49-58. JEFFREY, C., P. HALLIDAY, M. WILMOT-DEAR, & S.W. JONES, (1977). Generic and Sectional limits in *Senecio* (Compositae) : 1. Progress Report. *Kew Bull.* 32: 47-67. PARKER, J.G. (1972). A Taxonomic and phytogeographical review of some Arctic and Alpine *Senecio* species *Canad. J. Bot.* 50(3): 517-518.

Notes. One of the largest, cosmopolitan genera with ca 3000 species. A polymorphic genus. It is considered to be the most primitive in the entire family. Recently the complex genus is segregated into several other distinct genera.

The genus is of considerable toxicological importance in some countries, viz. S. Africa, New Zealand and Nova Scotia. Several poisonous alkaloids have been isolated from species belonging to this genus. Cases of chronic poisoning by *Senecio* in man have been recorded particularly from Rivers dale, Cape Province. The symptoms are dyspepsia, abdominal pain and vomiting. The poisoning results from the accidental inclusion of the plant with wheat during harvesting and ineffective sieving of the grains (Chopra *et al.*, Poisonous Pls. Ind. 590. 1949).

KEY TO THE SPECIES

- | | |
|---|---|
| 1a. Capitula discoid | 2 |
| b. Capitula radiate | 5 |
| 2a. Annual herbs; leaves pinnatifid, glabrous or pubescent | 3 |
| b. Perennial herbs; leaves dentate, white tomentose beneath | 4 |

- 3a. Capitula campanulate; involucre bracts 12-16, green with purplish tips 9. *S. dubitabilis*
 b. Capitula conical; involucre bracts 18-22, with black tips 40. *S. vulgaris*
- 4a. Stems and branches reddish brown, black glandular pubescent; achenes pubescent 6. *S. candolleanus*
 b. Stems and branches arachnoid with sparsely crispate pubescence; achenes glabrous 18. *S. kumaonensis*
- 5a. Erect herbs or shrubs 6
 b. Climbing or scandent herbs or undershrubs 41
- 6a. Leaves both radical and cauline 7
 b. Leaves only cauline 22
- 7a. Radical leaves long petioled, lyrate-pinnatifid; cauline leaves sessile, semi amplexicaul, lyrate-pinnatisect 8
 b. Radical and cauline leaves not lyrate-pinnatifid, sessile or very shortly petioled 12
- 8a. Tall herbs or undershrubs; leaves glabrous or sparsely arachnoid tomentose beneath 9
 b. Dwarf, perennial herbs; leaves white cottony tomentose beneath 11
- 9a. Involucre cylindrical 3. *S. biligulatus*
 b. Involucre broadly campanulate 10
- 10a. Involucre 5-7 x 10-15 mm; ray florets ca 8 mm long; pappus always reddish brown 32. *S. raphanifolius*
 b. Involucre 3-4 mm in diam.; ray florets ca 6.5 mm long; pappus pale-yellow 21. *S. laetus*
- 11a. Capitula with many, long bracteoles, adpressed to the purplish involucre 1. *S. albobpurpureus*
 b. Capitula with bracteoles scattered on the peduncle; involucre white cottony; 37. *S. tibeticus*
- 12a. Radical leaves rosulate at the base 13
 b. Radical leaves not rosulate at the base 14
- 13a. Radical leaves obovate, obovate-oblong or spatulate, purplish beneath; involucre bracts distinctly 3-nerved 30. *S. nudicaulis*
 b. Radical leaves elliptic, elliptic-lanceolate, greyish green beneath; involucre bracts obscurely nerved 31. *S. obtusatus*
- 14a. Pappus white 15
 b. Pappus red, pale brown or stramineous 19
- 15a. Leaves linear-oblong, tomentose beneath 29. *S. neelgherryanus*
 b. Leaves linear or broadly oblong to elliptic-oblong, glabrous to glandular pubescent 16
- 16a. Leaves broadly oblong, sessile, glandular pubescent on both the surfaces 27. *S. mishmi*
 b. Leaves narrow, linear-oblong, glabrous or sparsely pubescent 17
- 17a. Leaves linear-oblong, obtuse, distantly serrate, auricled; auricles rounded 19. *S. kundaicus*
 b. Leaves linear, long, acute or subacute, sessile, not auricled 18
- 18a. Leaves with apex dilated; ligules 16-20; achenes black, distinctly ribbed, glabrous 43. *S. zeylanicus*
 b. Leaves with apex not dilated upwards; ligules 8-14; achenes not distinctly ribbed, scabrid 13. *S. griffithii*
- 19a. Glabrous herbs; leaves elongate, linear, sessile, not auricled, green 24. *S. linifolius*
 b. Hispid or pubescent herbs; leaves auricled, reddish-brown 20
- 20a. Capitula large, broadly campanulate, on long, stout peduncle; pappus red 21
 b. Capitula small, narrowly campanulate, on long, slender peduncle; pappus stramineous 41. *S. wightii*

- 21a. Leaves obovate, serrate, upper cauline leaves with dilated, auricled base 28. *S. multiceps*
 b. Leaves linear-oblong, deeply toothed, without dilated, auricled base 23. *S. lessingianus*
- 22a. Leaves oblong, lanceolate, serrate or pinnatifid, never white tomentose beneath; 23
 b. Leaves linear, oblong, obovate, elliptic-lanceolate, or rhomboidal, pinnatifid, pubescent, white to grey tomentose beneath 31
- 23a. Rays of female, ligulate florets short, not exceeding the involucre 24
 b. Rays of female ligulate florets over topping the involucre 26
- 24a. Erect, tall herbs, upto 60 cm high 31. *S. ramosus*
 b. Dwarf herbs, upto 25 cm high 25
- 25a. Capitula narrowly cylindrical; peduncle upto 1 cm long, 20. *S. ladakhensis*
 b. Capitula campanulate; peduncle 1.5-4 cm long 17. *S. krascheninnikovii*
- 26a. Lower cauline leaves shortly petioled; upper sessile and amplexicaul; ray florets revolute 8. *S. desfontainei*
 b. All cauline leaves sessile; ray florets not revolute 27
- 27a. Glabrous herbs 28
 b. Hispid, hirsute, densely puberulous or scabrous herbs 29
- 28a. Leaf lobes very slender, linear, spreading, acute; capitula on long, slender peduncle; pappus yellowish brown 35. *S. tenuifolius*
 b. Leaf lobes linear-oblong, not spreading; capitula on short and stout peduncle; pappus white 36. *S. tetrandrus*
- 29a. Leaves small, pinnatifid; segments few, short, acute, margins thickened, often recurved; base not auricled; pappus red 15. *S. hohenackeri*
 b. Leaves large, polymorphous, oblong to ovate-lanceolate to orbicular-ovate, rhomboid, serrate to deeply lobulate, sessile to shortly petioled, auriculate or exauriculate; pappus white to pale yellow 30
- 30a. Annual dwarf herbs, densely greyish pubescent; leaves ovate-lanceolate, serrate; capitula on long, slender, capillary peduncle; involucre bracts triangular, hairy with white scarious margins; achenes pubescent 14. *S. hewrensis*
 b. Suffruticose, glabrous undershrubs; leaves oblong to obovate, serrate, broadly amplexicaul at the base; capitula on short peduncle; involucre bracts scaly; achenes striate and hispidulous 39. *S. vestitus*
- 31a. Shrubs; leaves blackish, elliptic-lanceolate, mucronately serrate, densely reddish pubescent on the lower surface 34. *S. rhabdos*
 b. Herbs or undershrubs; leaves green to dark brown, linear-oblong, ovate, subrotund, rhomboid, serrate, toothed, deeply white to grey tomentose or densely adpressed glandular hispid 32
- 32a. Leaves ovate-oblong, pinnatifid, glabrous or pubescent, petioled; capitula small, numerous, in terminal corymb; ray florets short 33
 b. Leaves linear to linear-lanceolate, ovate, subrotund, rhomboid, entire or deeply lobed or pinnatisect, glabrous or densely adpressed glandular hispid or white to grey tomentose; capitula large, few in terminal corymb; ray florets long 34
- 33a. Involucre cylindrical; ray florets inconspicuous 12. *S. graciliflorus*
 b. Involucre campanulate; ray florets conspicuous 35. *S. royleanus*
- 34a. Leaves linear to linear-lanceolate, blackish brown, white villous on the midrib, entire, sessile, uniformly arranged on the stems; capitula 1-6, terminal, with very long ray florets 22. *S. lawsoni*

- b. Leaves ovate, oblong, lanceolate or subrotund, rhomboid, glandular hispid or white to grey adpressed tomentose, short petioled, entire to deeply lobed or pinnatisect; capitula few in terminal corymb; ray florets not very long 35
- 35a. Leaves ovate to subrotund, densely adpressed glandular hispid on upper surface; lower surface with prominent dark brown venation, margins thickened, mucronately dentate or sometimes pinnatisect into 2-3 lateral lobes 25. *S. ludens*
- b. Leaves oblong, lanceolate, rhomboid, densely white tomentose or grey adpressed tomentose on the lower surface, with prominent venation, margins entire, toothed or deeply lobed 36
- 36a. Pappus present in both ray and disc florets 37
- b. Pappus present only in disc florets or completely lacking 40
- 37a. Leaves elliptic to linear-lanceolate with prominent midrib 7. *S. dalzellii*
- b. Leaves lanceolate, ovate-lanceolate to rhomboid, venation prominent, brown 38
- 38a. Leaves lanceolate, acuminate, blackish brown on upper surface 26. *S. mayurii*
- b. Leaves ovate-oblong to rhomboid, obtuse, greenish brown on upper surface 39
- 39a. Achenes 2.5 mm long, glabrous to sparsely puberulous; pappus of pale white, scabrid hairs 11. *S. gibsonii*
- b. Achenes 4 mm long, pubescent; pappus of white hairs, not scabrid 10. *S. edgeworthii*
- 40a. Achenes of ray florets epappose and of disc florets pappose; pappus hairs paleaceous 4. *S. bombayensis*
- b. Achenes of ray florets and disc florets both epappose 2. *S. belgaumensis*
- 41a. Scandent shrubs; glabrous to puberulous or densely white tomentose; leaves ovate to ovate lanceolate, acuminate; petioles auriculate 42
- b. Climbing or straggling herbs, glabrous or pubescent; leaves elliptic-lanceolate, acute to acuminate; petioles exauriculate 41. *S. wightianus*
- 42a. Leaves ovate, densely white tomentose beneath; petioles with densely white tomentose, small, reniform auricles 5. *S. candicans*
- b. Leaves ovate-lanceolate, glabrous to floccose grey tomentose beneath; auricles large, foliaceous, glabrous to puberulous 16. *S. intermedium*

1. *Senecio alborpurpureus* Kitam. in F. & Fl. Nepal Himalaya 271. 1955.
Senecio bracteolatus Hook.f., Fl. Brit. India 3: 339. 1881. *S. alpinus* C.B. Clarke, Comp. Ind. 100. 1876; Hook.f., Fl. Brit. India 3: 339. 1881.

Herbs, dwarf, rhizomatous, ca 8 cm high; stems erect, slender, simple, arachnoid tomentose. Leaves both radical and cauline; radical leaves elliptic or obovate, obtuse, 3-5 x 1-1.5 cm, long petioled; cauline leaves oblong or oblong-lanceolate, lobulate 3-5 x 1-1.5 cm, sparsely arachnoid tomentose on the upper surface, lower surface densely whitish tomentose, pinnately veined; petiole 1-1.5 cm, slightly dilated at the base, exauriculate; uppermost leaves smaller, linear-lanceolate, subentire, sessile, semiamplexicaul at the base. Capitula radiate, 1-4 in lax corymb, many bracteolate; bracteoles linear-subulate, adpressed to the involucre. Involucre green or purplish, campanulate; bracts; 18-20, linear-lanceolate, 8-10 x 1-1.2 mm, pubescent, herbaceous. Ray florets yellow, 8-10; oblong, 8-10 x 2 mm, 4-veined. Disc florets yellow, numerous, 7-8 mm long. Achenes cylindrical, 2.5 mm long, glabrous. Pappus white, ca 7 mm long.

Fl. & Fr. July - Aug.

Distrib. India: E. Himalayas. Sikkim.

Nepal and China.

2. *Senecio belgaumensis* (Wight) C.B. Clarke, *Comp. Ind.* 200. 1876. Hook.f., *Fl. Brit. India* 3: 348. 1881. *Madacarpus belgaumensis* Wight, in *Calc. J. Nat. Hist.* 7: 157. 1847.

Mar. *Sonki*.

Herbs, annual, glabrous to scaberulous, erect; stems much branched, pubescent. Leaves rhombic-ovate, acute, 1.5-7 x 0.4-3.5 cm, margins irregularly toothed, teeth apiculate, greenish brown, puberulous to glabrous on the upper surface, lower surface with streaks of white tomentum except on the broad prominent green veins, narrowed abruptly into simple or lobulate petiole; petiole 1-3.5 cm long; upper cauline leaves with a pair of lanceolate auricles at the base of the petiole; lower leaves exauriculate. Capitula radiate, solitary, axillary, 0.5-1.5 cm in diam., on long slender peduncle, ebracteolate; peduncle 2-7 cm long with setaceous bracts. Involucre campanulate, densely pubescent; bracts 12-18, linear-oblong to obovate, acuminate, 4-4.5 mm long, herbaceous with scarious margins, connate about 2/3 above the base. Ray florets yellow, ca 8, linear-oblong, 8-10 mm long, 3-4-veined, 2-3-dentate. Disc florets yellow, 2.5-3 mm long; limb equalling the tube. Achenes of ray florets linear, curved, ca 2.5 mm long, ribbed, scabrid; of disc florets pale green, oblong-obconic, 2.5-3.5 mm long, ribbed, strigose. Pappus totally absent.

Fl. & Fr. Aug. - Jan.

Distrib. India: On grassy slopes and along the road sides on gravelly soil. Maharashtra, Goa and Karnataka.

Endemic.

Note. The total absence of the pappus is the peculiar character of this particular species and the only distinguishing character from *Senecio bombayensis* Balakr. This epappose stage is anomalous in Senecioneae.

3. *Senecio biligulatus* W.W. Smith in *J. As. Soc. Bengal n.s.* 7: 69. 1911.

Herbs, perennial, rhizomatous; stems solitary, erect. 60-100 cm high, flexuous, yellowish pubescent. Leaves lyrate-pinnatifid into large, triangular, terminal lobe and 2-4 lateral lobes, irregularly, coarsely dentate, 5-12.5 x 2-5 cm, pubescent above; petiole irregularly winged and auriculate at the base; auricles dentate, semiamplexicaul; uppermost cauline leaves lanceolate, acuminate, 5-10 x 1-2 cm, sessile with auricled base. Capitula radiate, small, dense in terminal corymb. Involucre narrowly campanulate ca 5 x 1-2 mm, sparingly hairy; bracts 5-6, linear, ca 5 x 1 mm, obtuse, black at the apex, herbaceous with narrow scarious margins. Ray florets 2, ca 4 mm long; ray yellow, linear-oblong. Disc florets yellow, 2-3; ca 3.5 mm long. Achenes oblong, ca 1 mm, long glabrous, ribbed. Pappus of white hairs.

Fl. & Fr. June - Sept.

Distrib. India: E. Himalayas, in open places between 3000-3900 m. Sikkim.

Bhutan, Nepal and Myanmar.

4. *Senecio bombayensis* Balakr. in J. Bombay Nat. Hist. Soc. 67(1) 57: 1970. *Doronicum reticulatum* Wight in Cal. J. Nat. Hist. 7: 156. 1847. *S. grahami* Hook.f., Fl. Brit. India 3: 347. 1881, non Benth. 1857. Fig. 72.

Mar.: *Sonki*

Herbs, annual, erect, 30-90 cm high; stems stramineous, much branched, angular, glabrescent below and densely appressed white pubescent above. Leaves ovate-rhomboid, acute, margins irregularly mucronate, toothed, 1-6 x 0.5-3 cm, brownish green, glabrous to sparingly pubescent on the upper surface, lower surface with streaks of appressed white tomentum, except on the broad prominent green veins, base narrowed abruptly into a slender, simple petiole; petiole 1-4 cm long; upper cauline leaves with a pair of lanceolate auricles at the base of the petiole; lowermost leaves auriculate. Inflorescence subcorymbose or axillary. Capitula radiate, 2-3 cm in diam., bracteolate, on 2-8 cm long, slender peduncle; peduncle densely appressed pubescent. Involucre broadly campanulate, densely appressed, greyish pubescent; bracts obovate-oblong, ca 6 mm long, very slender, black tipped, herbaceous with broad, green pubescent veins on the dorsal surface, connate at the base. Ray florets yellow, 9-12, oblong, 10-12 mm long, 3-4-veined, 2-3-dentate. Disc florets yellow, numerous, 3-3.5 mm long; corolla limb equalling the tube. Achenes of ray florets linear, ca 3 mm long, curved, compressed, scabrid; of disc florets pale green, obconic, 3.5-4.5 mm

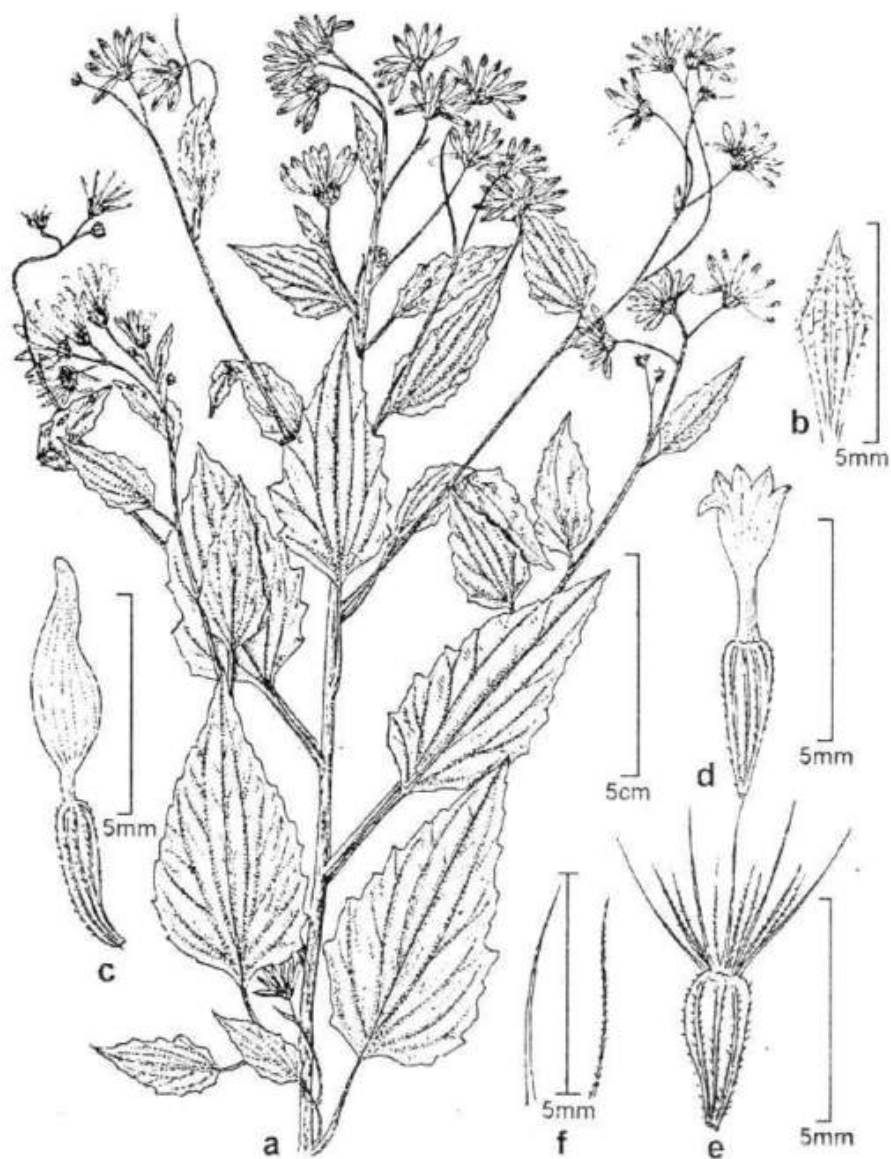


Fig. 72. *Senecio bombayensis* Balakr. : a. Habit; b. Involucral bract; c. Ray floret with achene; d. Disc floret with achene; e. Achene with Pappus; f. Pappus.

long, ribbed, strigose. Pappus absent in ray florets, of long, brownish, paleaceous and short setaceous hairs in disc florets.

Fl. & Fr. Aug. - Dec.

Distrib. India: Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, Goa and Tamil Nadu.

5. *Senecio candicans* DC. in wight, Contrib. Bot. Ind. 22. 1834; Hook.f., Fl. Brit. India 3: 352. 1881. *S. campylodes* var. *candicans* C.B. Clarke, Comp. Ind. 184. 1876.

Shrubs, perennial, scandent; stems zig-zag, angled, branched, white cottony tomentose. Leaves ovate, acuminate, dentate or pinnatifid into lateral lobes, 2.5-9 x 0.5-2.5 cm, blackish green, pubescent on the upper surface, densely white tomentose on the lower surface, base cordate or hastate; petiole 2-2.5 cm long, auriculate; auricles reniform and densely white tomentose beneath. Capitula radiate, yellow, in terminal and axillary, divaricately branched corymb or in lax panicle, ca 8 mm in diam., bracteolate; peduncle ca 1 cm long, pubescent. Involucre campanulate, white tomentose; bracts ca 12, lanceolate, acuminate, obscurely 3-veined, herbaceous with broad scarious margins. Achenes of ray florets, dark brown elliptic-oblong, 4 mm long, with broad membranous wing, inner face distinctly 2-ribbed; of disc florets brown, cylindrical, 2.5 mm long, smooth or inconspicuously ribbed. Pappus of white hairs.

Fl. & Fr. Jan. - June.

Distrib. India: Tamil Nadu.

Endemic.

6. *Senecio candolleanus* Wallich ex DC., Prodr. 6. 364. 1838; Hook.f., Fl. Brit. India 3: 353. 1881. Fig. 73.

Herbs, perennial, 30-45 cm high; stems slender, simple or branched, flexuous, reddish on drying, black glandular pubescent. Leaves ovate, acute, margins coarsely mucronulate toothed, 2-4 x 1.5-3 cm; petiole ca 2 cm long. Capitula discoid, ca 6 mm in diam., bracteolate; bracteoles 2-3, linear-oblong, drooping, in terminal panicle. Involucre narrowly cylindrical, ca 5 mm long, glandular pubescent; bracts linear-oblong, 5 x 1 mm, obtuse, dark brown on drying, herbaceous with broad, scarious, margins; peduncle ca 4 mm

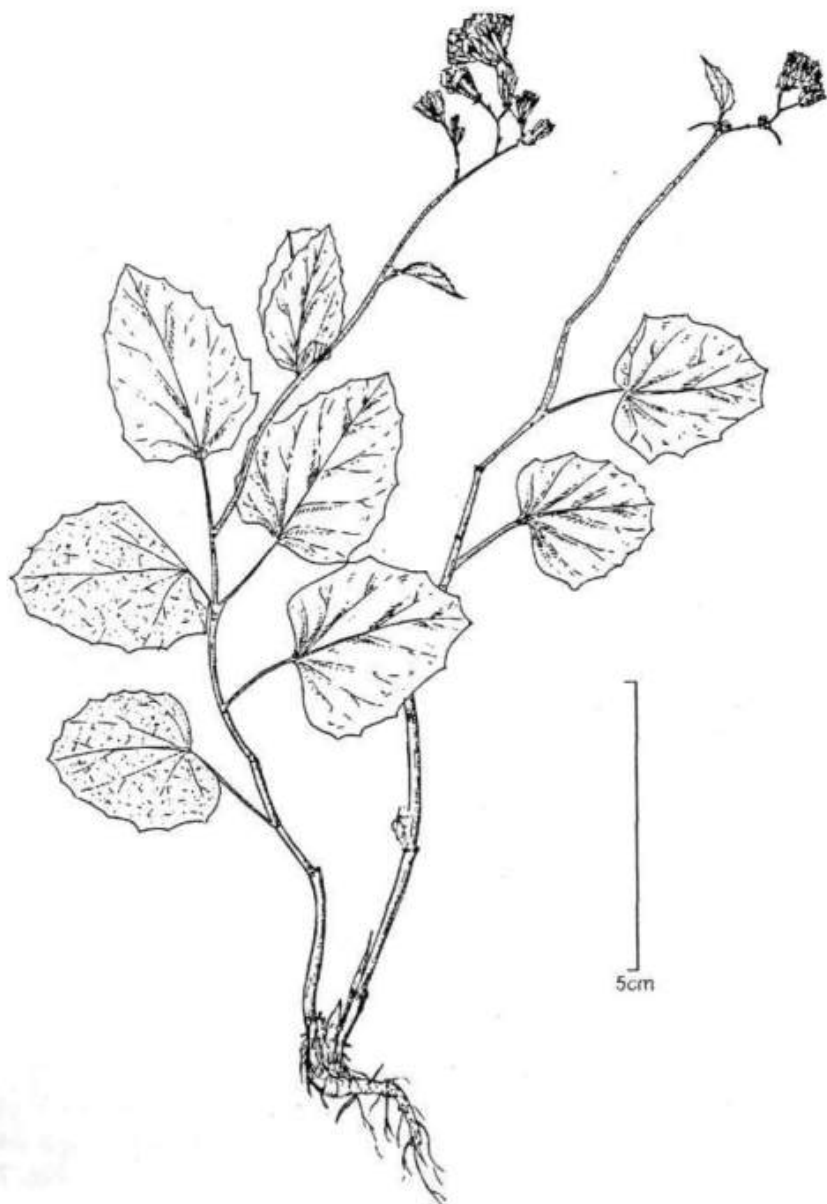


Fig. 73. *Senecio candolleanus* Wallich ex DC.

long, densely glandular pubescent. Disc florets ca 5 mm long; tube yellow, 2.5 mm long. Achenes, cylindrical, 1.5 mm long, blackish brown, ribbed. Pappus hairs yellowish, 3-3.5 mm long.

Fl. & Fr. July - Dec.

Distrib. India: Uttar Pradesh and Sikkim.

Bhutan.

7. *Senecio dalzellii* C.B. Clarke, Comp. Ind. 201. 1876; Hook.f., Fl. Brit. India 3: 346. 1881. *S. lawii* C.B. Clarke, Comp. Ind. 201. 1876; Hook.f., Fl. Brit. India 3: 347. 1881.

Herbs, erect, much branched; stems and branches villous with yellowish white silky hairs. Leaves pale green, elliptic-lanceolate 1.5-7 x 0.1-0.8 cm, entire, strigose on the upper surface, 1-nerved, lower surface densely white tomentose, sessile, semiamplexicaul. Capitula radiate, bracteolate. Involucre broadly campanulate, ca 4 mm long, strigosely hairy; bracts 10-15, oblong-lanceolate, ca 4 x 1 mm, acuminate, puberulous at the apex, herbaceous with broad membranous margins. Ray florets ca 15; ray linear-oblong, ca 3 mm long; tube ca 1.2 mm long. Disc florets ca 3 mm long. Achenes obconic, ca 1 mm long, scabrid with scattered yellowish hairs. Pappus of very short, scabrid bristles, scanty.

Fl. & Fr. Nov. - Jan.

Distrib. India: Maharashtra and Tamil Nadu.

Endemic.

8. *Senecio desfontainei* Druce, Brit. Pl. List, ed. 2: 61. 1928. *S. coronopifolius* Desf., Fl. Atlant. 2: 273. 1799 (nom. illegit, non Burm.f. 1768). *S. chrysanthemifolius* DC., Prodr. 6: 345. 1838; Hook.f., Fl. Brit. India 3: 341. 1881. Fig. 74.

Herbs, annual; suberect or decumbent, 10-40 cm high; stems slender, much branched from the middle, branches divaricating, sparsely pubescent. Leaves dark green, oblong, obtuse, pinnatifid into irregular, linear-oblong lobes, 1.5-4 x 0.5-1 cm, sparsely pubescent on both the surface; base of lower leaves attenuated into petiole; uppermost leaves sessile with auricled bases; auricles

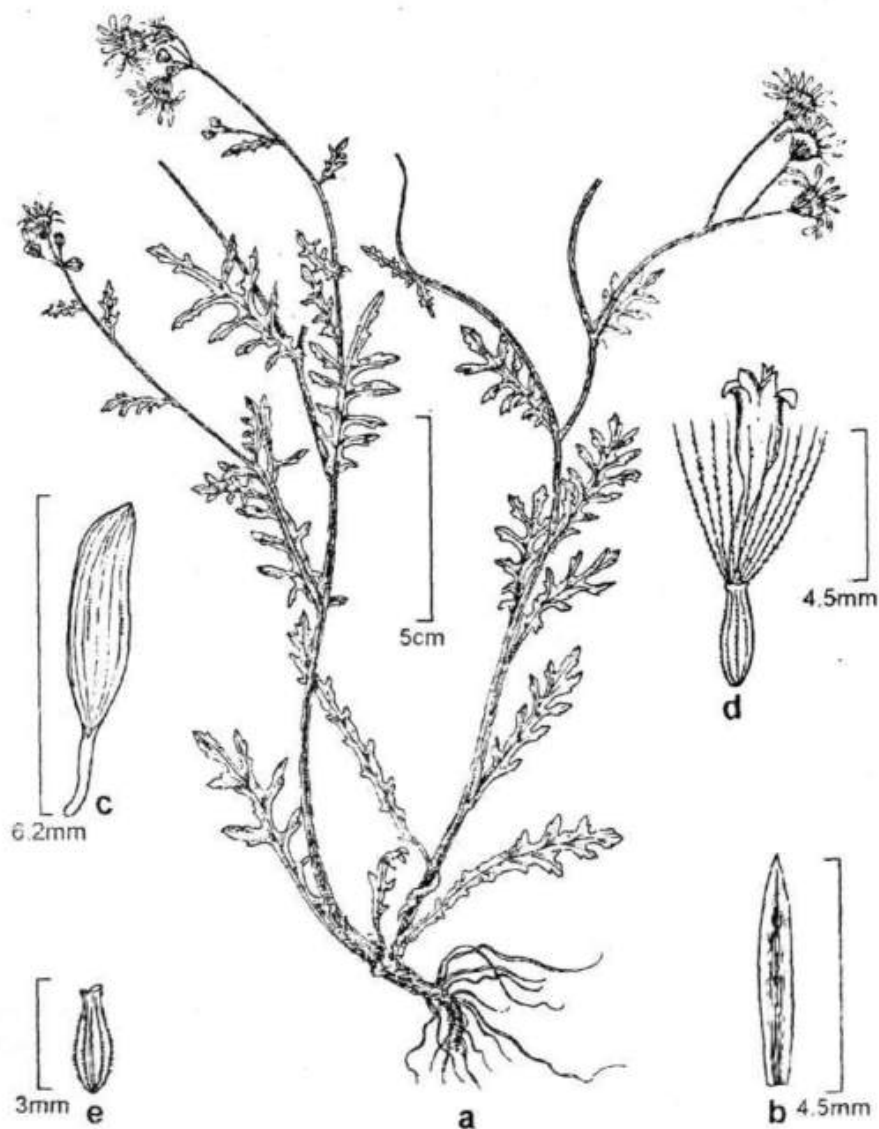


Fig. 74. *Senecio desfontainei* Druce : a. Habit, b. Involucral bract; c. Ray floret; d. Disc floret; e. Achene.

amplexicaul. Capitula radiate, ca 8 mm in diam., bracteolate; peduncle 1-3 cm long, pubescent. Involucre campanulate, 4.5 x 2-4 mm; bracts blackish, 15-20, linear-lanceolate, 4.5 x 1 mm, puberulous at the tip, herbaceous. Ray florets 8-12, 6.2 mm long; ray elliptic-oblong, 3 mm broad, revolute. Disc florets very slender, ca 5.6 mm long. Achenes brownish, cylindrical, ca 3 mm long, scabrid. Pappus of white hairs, 4.5 mm long.

Fl. & Fr. May - Sept.

Distrib. India: N.W. Himalayas, on hill slopes. Jammu & Kashmir and Himachal Pradesh.

N. Africa, S. & W. Asia, (Canary Island).

9. *Senecio dubitabilis* C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 427. 1984. *S. dubius* Ledeb., Fl. Alt. 4: 112 (July - Dec.) 1833; Hook.f., Fl. Brit. India 3: 342. 1881. **Fig. 75.**

Herbs, annual, erect, 5-30 cm high; stems branched from the base, glabrous or sparsely white hairy when young. Leaves oblong-lanceolate or linear-oblong, subacute, 3-7 x 0.3-1.2 cm, glabrous, pinnatifid, base of lower leaves attenuated; upper leaves sessile, auricled and amplexicaul. Capitula discoid, 1-2 bracteolate; bracteoles linear; peduncle 1.5-4 cm long. Involucre narrowly campanulate, 4-7 x 2.5-5 mm; involucre bracts green with acute purplish tip, linear-oblong, 4-7 mm long, white scarious margined. Disc florets 4.5-6.5 mm long; limb cylindrical, ca 2 mm long; tube 2.5-4.5 mm long. Achenes 2.5-3 mm long, densely pubescent. Pappus white, 5-6.5 mm long.

Fl. & Fr. June - Sept.

Distrib. India: N.W. Himalayas between 2000-4800 m, in sandy and rocky places and also on river banks. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, U.S.S.R., and Mongolia.

10. *Senecio edgeworthii* Hook.f., Fl. Brit. India 3: 346. 1881. *S. tomentosus* C.B. Clarke, Comp. Ind. 200. 1876. *Madaractis lanuginosa* Edgew. in Trans. Linn. Soc. 20: 75. 1851. *Doronicum tomentosum* Wight in Calc. J. Nat. Hist. 7: 155. 1847.

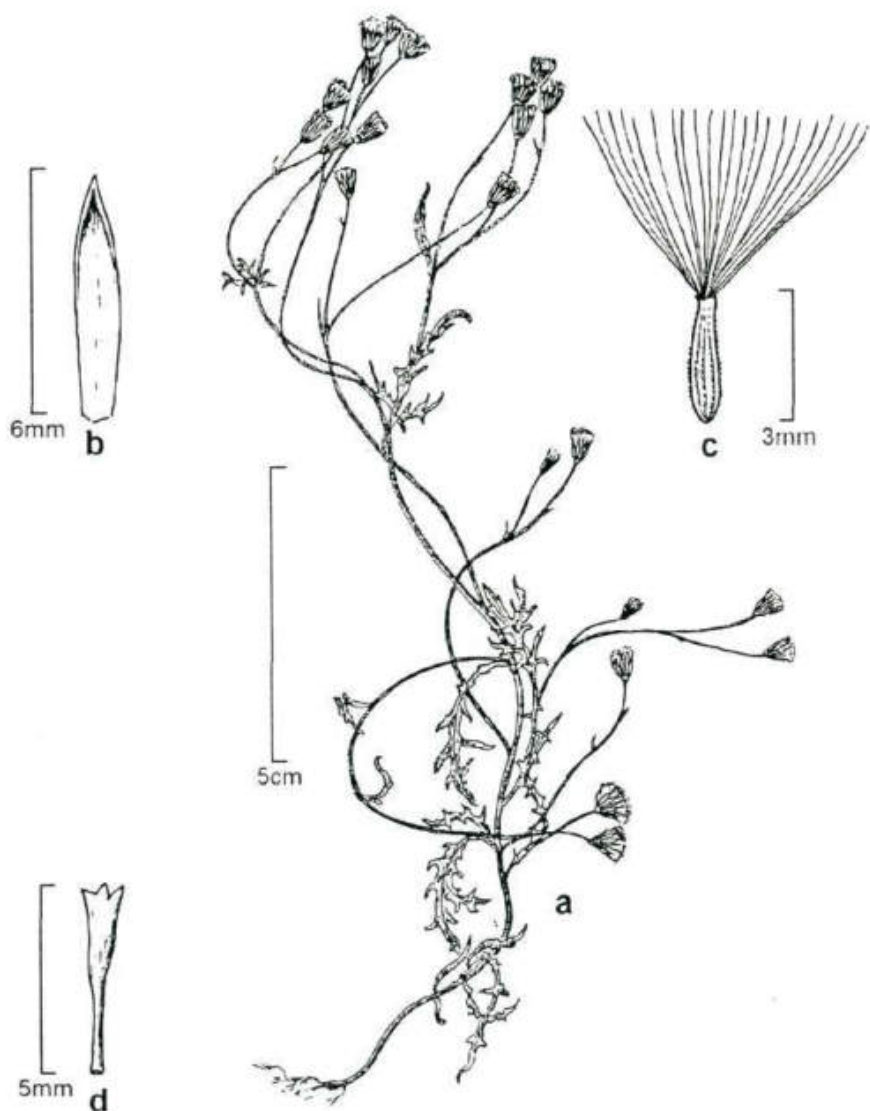


Fig. 75. *Senecio dubitabilis* C. Jeffrey & Y.L. Chen : a. Habit; b. Involucral bract; c. Achene with pappus; d. Disc floret.

Herbs, perennial, erect, white tomentose; stems and branches angular, branched or simple. Leaves ovate-lanceolate to rhomboid, obtuse, margins thickened, recurved, irregularly toothed to lobulate, 4 x 1.5 cm, coriaceous, upper surface greenish brown, puberulous, lower surface densely white tomentose with prominent brown venation; petiole ca 6 mm long, auricled at the base. Capitula radiate, broadly campanulate, bracteolate, 0.5-1 cm in diam., pedunculate. Involucre greyish green, campanulate; bracts oblanceolate, 0.4 cm, acuminate, tip dilated, herbaceous with broad scarious margins. Ray florets 10-14, linear, 4-nerved, 3-dentate. Disc florets numerous. Achenes obconic, 4 mm long, pubescent, deeply ribbed. Pappus of white, unequal hairs.

Fl. & Fr. Aug. - Nov.

Distrib. India: On hilly exposed slopes at ca 200 m. Maharashtra, Madhya Pradesh and Tamil Nadu.

11. *Senecio gibsoni* Hook.f., Fl. Brit. India 3: 347. 1881.

Herbs, perennial, erect, much branched, 30-60 cm high scabrous; stems and branches slender, terete, dark brown on drying. Leaves ovate-lanceolate to rhomboid, mucronate, serrate, ca 1-3.5 x 1.5-2 cm, scaberulous above and greyish tomentose beneath, venation prominent, narrowed at base into a broadly winged, auricled petiole or sessile. Capitula radiate, ebracteolate. Involucre campanulate, 2-3 x 4.5 mm; bracts 12-15, linear-lanceolate or oblong, 2-3 x 1.5 mm, acuminate, herbaceous with broad scarious margins. Ray florets ca 5.5 mm long; ray linear-oblong, ca 4 mm, long; tube ca 1.5 mm long. Disc florets numerous, ca 3.5 mm long. Achenes pale brown, obconic, 2.5 mm long, ribbed, glabrous to sparsely pubescent. Pappus of pale white, unequal, scabrid hairs, very scanty, 2.5 mm long.

Fl. & Fr. Oct. - Nov.

Distrib. India: Maharashtra; rare.

12. *Senecio graciliflorus* DC., Prodr. 6: 365. 1838; Hook.f., Fl. Brit. India 3: 338. 1881. Fig. 76.

Herbs, perennial, rhizomatous, 30-90 cm high; stems erect, branched above, glabrous, smooth, shining. Leaves ovate-oblong to oblong-lanceolate,



Fig. 76. *Senecio graciliflorus* DC.

acuminate, coarsely serrate, 7.5-25 x 5-13 cm, pinnatipartite into oblong-lanceolate terminal lobe and 8-10, long, acuminate, lateral lobes, sparsely pubescent on both the surfaces especially on the lower surface; petiole slender, 2-5 cm long, dilated at the base, exauriculate. Capitula cylindrical, in axillary and terminal lax corymb, bracteolate. Involucre narrow, cylindrical, 8-9 x 1.5-2 mm; bracts linear, 8-9 x 1 mm, obtuse, glabrous, herbaceous, with narrow scarious margins. Ray florets 1-2, minute, linear-oblong, 3-4-veined, 3-denticulate at the apex. Disc florets 8 mm long. Achenes greyish brown, ca 3 mm long, ribbed. Pappus of white hairs, ca 4.5 mm long.

Fl. & Fr. May - Oct.

Distrib. India: Himalayas, between 2000-4100 m, in open places in forests, grassy slopes and stream sides. Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh and Sikkim.

Bhutan and China.

13. *Senecio griffithii* Hook.f. & Thomson ex C.B. Clarke, *Comp. Ind.* 193. 1876; Hook.f., *Fl. Brit. India* 3: 341. 1881. Fig. 77.

Herbs, dwarf or tall, perennial, glabrous to sparingly pubescent; stems dark brown, branched, woody, up to 30 cm high, densely leafy below. Leaves linear, very narrow, acute entire, revolute, 2.5-5 x 2 mm, glabrous to sparingly pubescent; midrib very prominent; closely set on the stem, sessile, upper most leaves smaller. Capitula radiate 1.2-2.5 cm in diam., bracteolate, 1-3, on long peduncles; peduncles 3-7 mm long, bracteate. Involucres broadly campanulate, ca 1.2 cm in diam., pubescent; bracts 12-18, linear-oblong, 4 x 1.2 mm, acute or acuminate, 1-nerved. Ray florets 10.5-11 mm long; ray oblong; 8-9 x 1.5 mm; tube ca 3 mm long. Disc florets ca 4.5 mm long; limb 3 mm long, 5-lobed; tube ca 1.5 mm long. Achenes cylindrical, ca 1.5 mm long; strongly ribbed, scabrid. Pappus hairs yellowish brown, scabrid, ca 5 mm long.

Fl. & Fr. Oct. - Nov.

Distrib. India : Meghalaya.

Myanmar.

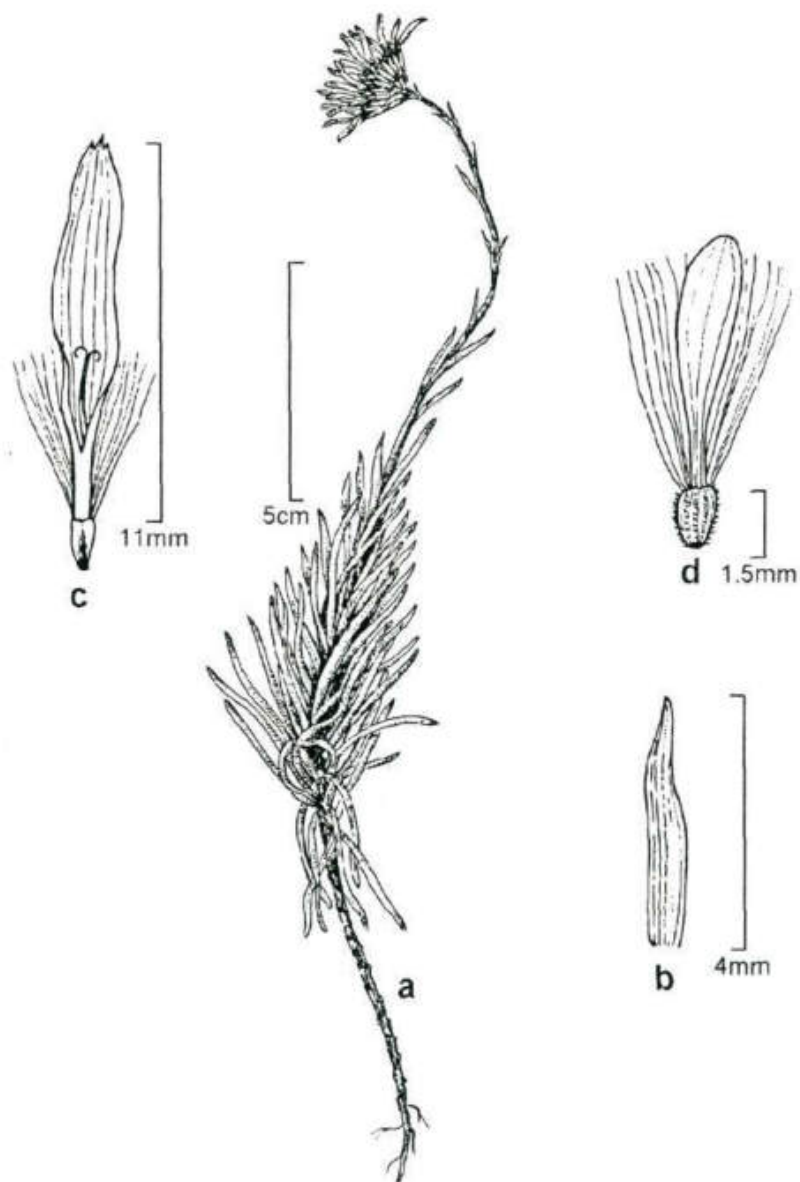


Fig. 77. *Senecio griffithii* Hook.f. & Thomson ex C.B. Clarke : a. Habit; b. Involucral bract; c. Ray floret; d. Achene with pappus.

14. *Senecio hewrensis* Hook.f., Fl. Brit. India 3: 346. 1881. Fig. 78.

Herbs, annual, erect, dwarf, 10-20 cm high; stems very slender, grey pubescent, branched. Leaves pale green, ovate-lanceolate, toothed or pinnatisect, 1.5-4 x 1.5-2 cm, greyish pubescent on both the surfaces; sessile to shortly petioled, auriculate. Capitula radiate, 5 mm in diam., bracteolate; peduncle long, capillary, hairy. Involucre campanulate, greyish green; bracts 8-10, 3 mm long, hairy, herbaceous with white, scarious margins. Ray florets constantly 3. Disc florets numerous, tubular. Achenes brownish, broader upwards, 1-2 mm long, hairy. Pappus of pale brown, barbellate hairs.

Fl. & Fr. Aug. - Oct.

Distrib. India: in rocky places, and as forest undergrowth, at ca 900 m. Rajasthan and Maharashtra.

15. *Senecio hohenackeri* Hook.f., Fl. Brit. India 3: 345. 1881. *S. pinnatifidus* C.B. Clarke, Comp. Ind. 198. 1876. *Madaractis pinnatifida* DC., Prodr. 6. 439. 1838. *Doronicum candolenum* Wight & Arn. in Arn. Pugill. 108. 1836. *D. rupestre* Wight, Ic. t. 1128. 1846.

Herbs, perennial, decumbent, hispid; root-stock woody; stems ascending and much branched from the base; branches dark-brown, slender, terete. Leaves deeply pinnatifid into narrow segments; lobes acute, 1-2.2 cm long, hispid, especially on the lower surface; petiole ca 4 mm long, not auricled. Capitula radiate, ca 1.2 cm in diam., bracteolate; bracteoles linear-lanceolate. Involucre broadly campanulate, ca 5 mm long, scabrid; bracts 10-15, elliptic-oblong or oblanceolate, 5 x 1.5 mm, acuminate, rigid, margins narrow scarious, herbaceous. Ray florets pale white, elliptic-oblong, ca 8 mm long; ray, 6 mm long, prominently 3-4-veined; tube 2 mm long. Disc florets ca 4-5 mm long; limb ca 2.2 mm long, 5-lobed; lobes slightly papillose. Achenes brown, slender, 3.5 mm long, papillose, ribbed, densely hairy. Pappus of reddish, unequal, barbed, ca 4 mm long hairs.

KEY TO THE VARIETIES

- 1a. Leaves densely hispid; capitula ca 1.2 cm in diam.
b. Leaves less hispid; capitula more than 1.2 cm in diam.

- 15.1. var. *hohenackeri*
15.2. var. *rupestris*

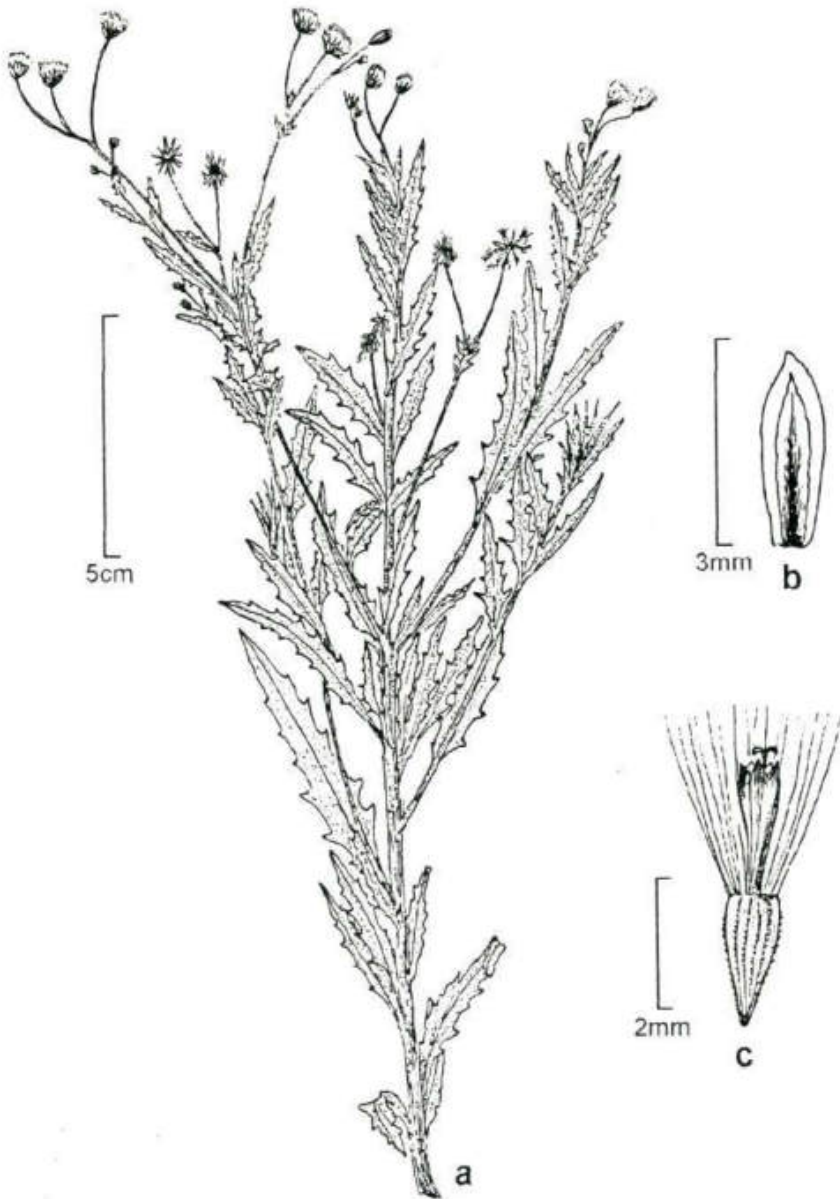


Fig. 78. *Senecio hewrensis* Hook.f. : a. Habit; b. Involucral bract; c. Achene with pappus.

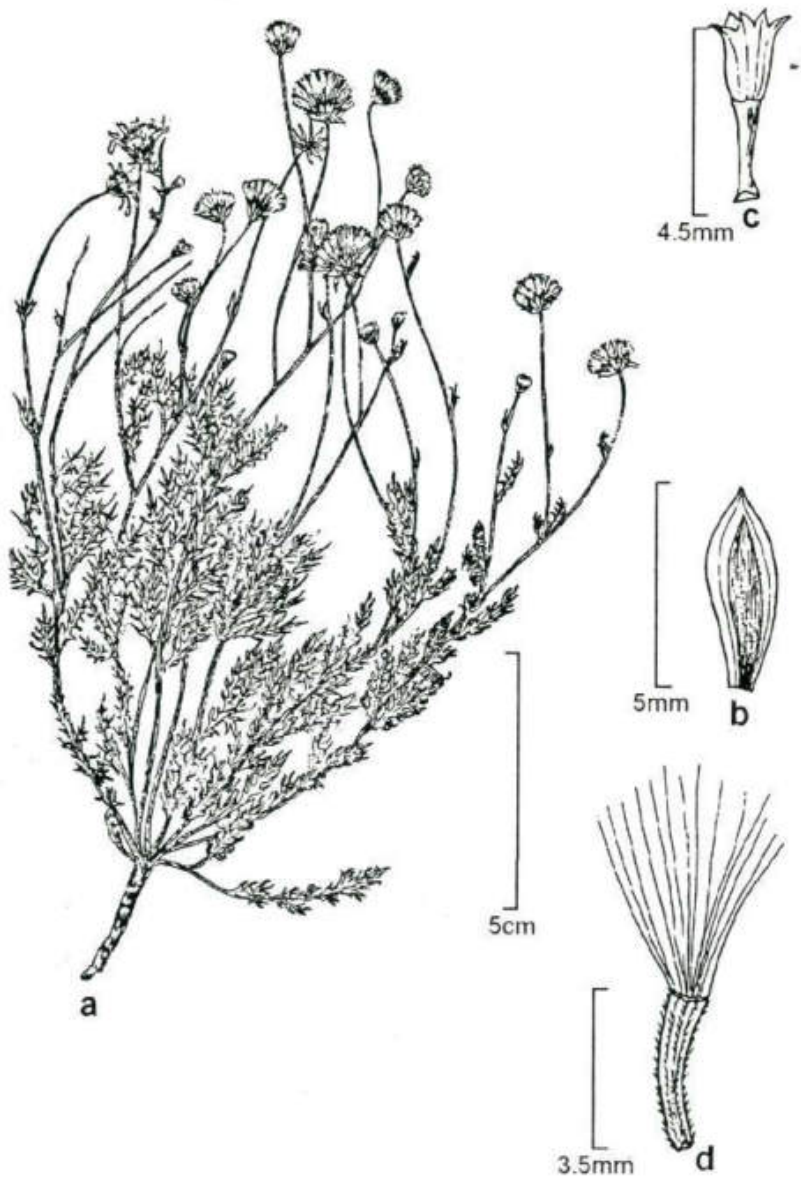


Fig. 79. *Senecio hohenackeri* Hook.f. var. *hohenackeri* : a. Habit; b. Involucral bract; c. Disc floret; d. Achene with pappus.

15.1. var. *hohenackeri*

Fig. 79.

Fl. & Fr. Jan. - Sept.*Distrib.* India : Andhra Pradesh and Tamil Nadu.

Endemic.

15.2. var. *rupestris* (Wight) Gamble, *Fl. Pres. Madras* 722. 1921.
Doronicum rupestre Wight, *Ic. t.* 1128. 1846.

Fl. & Fr. Jan. - Sept.*Distrib.* India : On clefts of rocks. Tamil Nadu (Tirunelveli District).

Endemic.

16. *Senecio intermedius* Wight, *Ic. t.* 1135. 1846. *S. scandens* Hook.f., *Fl. Brit. India* 3: 352. 1881, (non Buch-Ham. ex D. Don, 1825).

Shrubs, scandent; stems glabrous to puberulous, grooved or terete. Leaves ovate-lanceolate, acuminate, dentate, 0.5-9 x 0.5-5 cm, glabrous on the upper surface and glabrous to floccose tomentose on the lower surface, venation prominent on the lower surface; petiole 1.5-2.5 cm, auricled at the base; auricles large, reniform, foliaceous, toothed. Capitula radiate, in corymbose panicle. Involucre ca 1 cm in diam., herbaceous with broad membranous margins. Ray florets 12-14 ca 9 mm long; ray oblong, ca 3.5 mm broad, 4-veined; tube ca 4.5 mm long. Achenes compressed, 3 mm long, ribbed, pubescent on ribs. Pappus of dirty white, ca 3.5 mm long, minutely barbed hairs.

Fl. & Fr. Dec. - April.*Distrib.* India: 900 - 2100 m. Tamil Nadu.

17 *Senecio krascheninnikovii* Schischk. in *Not. Syst. Herb. Inst. Bot. Kon. Acad. Sc. U.R.S.S.* 15: 410. 1953. *Senecio pedunculatus* Edgew. in *Trans.*

Linn. Soc. 20: 74. 1846, Bip. non Sch. nom. illegit, Hook.f., Fl. Brit. India 3: 342. 1881. *S. kashmirianus* Balakr. in J. Bombay Nat. Hist. Soc. 67: 61. 1970.

Herbs, annual, erect, dwarf, 5-25 cm high; stems much branched from the base; branches divaricate, sparsely pubescent or subglabrous. Leaves all cauline, pinnatifid into linear, irregularly dentate or entire lobes, 1.5-5 x 0.4-1 cm, glabrous to sparsely pubescent on both the surfaces, sessile, slightly dilated and semiamplexicaul at base. Capitula radiate, ca 4 mm in diam., bracteolate; bracteoles 2-4, linear; peduncle slender 1.5-4 cm long. Involucre campanulate, 5-7 x 1.5-4 mm; bracts linear, 5-7 x 1 mm, acuminate with dark tip, herbaceous with narrow scarious margins, glabrous. Ray florets 4-7, oblong, 2-2.5 mm long, equalling the involucre. Disc florets numerous, 5.5 mm long; tube 3 mm long. Achenes cylindrical, 2.5-3 mm long, sparsely adpressed pubescent. Pappus hairs white, ca 5.5 mm long.

KEY TO THE VARIETIES

- | | |
|--------------------------------------|-------------------------------------|
| 1a. Capitula with ray florets yellow | 18.2. var. <i>krascheninnikovii</i> |
| b. Capitula with ray florets white | 18.1. var. <i>alba</i> |

17.1. var. *alba* (Ghosh & Bhattacharyya) Aswal in Ind. J. For. 13(1): 66. 1990. *S. pedunculatus* Edgew. Var. *alba* Ghosh & Bhattacharyya in J. Econ. Taxon Bot. 10(2): 311. 1987.

Fl. Aug.

Distrib. India: Himachal Pradesh.

17.2. var. *krascheninnikovii*

Fig. 80.

Fl. & Fr. June - Sept.

Distrib. India: N.W. Himalayas between 2800-3600 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, N.E. Afghanistan.

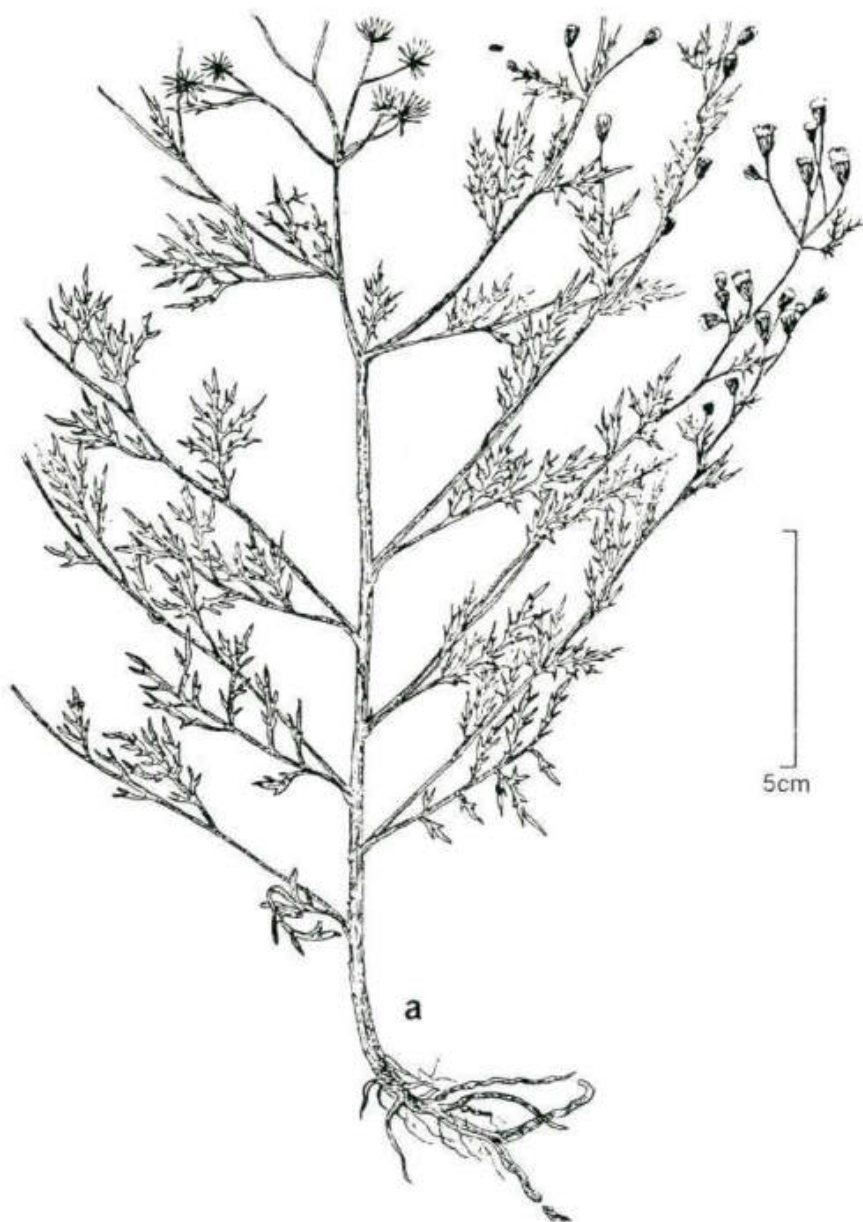


Fig. 80. *Senecio krascheninnikovii* Schischk. var. *krascheninnikovii*

18. *Senecio kumaonensis* Duthie ex C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 359. 1984.

Herbs, perennial, 30-40 cm high, woody, rhizomatous; stems simple to branched, flexuous, arachnoid and crispate pubescent. Leaves blackish green, ovate to ovate-oblong, acute or obtuse, margins coarsely mucronulate toothed, 6-13 x 3-3.5 cm, glabrous to pubescent on the upper surface, densely dirty white tomentose beneath, base cordate or rounded; petiole 2-6 cm long; uppermost leaves lanceolate, small, cuneate at the base. Capitula discoid, drooping, in terminal panicle, ca 6 mm long, narrow, ebracteolate; peduncle 2.5-8 cm. Involucre cylindrical, crispate pubescent; bracts 5, linear-oblong, 7-8 x 1.2 mm, obtuse, puberulous at the apex, herbaceous, obscurely 3-veined. Disc florets yellow, 5-7, 5.5 mm; tube ca 2 mm long. Achenes 2-3 mm long, glabrous. Pappus dirty white, shorter than the corolla tube, ca 5 mm long.

Fl. & Fr. June - Aug.

Distrib. India: E. Himalayas, between 3600-4500 m, Sikkim.

Nepal, Bhutan and China.

19. *Senecio kundaicus* C. Fischer, in Kew Bull. 1940: 45-46. 1940.

Herbs, glabrous or sparsely puberulous; stems sulcate. Leaves linear-oblong, obtuse, minutely and distantly toothed, 6-12 x 1-2 cm, venation obscure, sessile with auricled base; auricles rounded, semiamplexicaul. Capitula radiate, 5-6 mm in diam., in terminal corymb. Involucre campanulate, 7-7.5 mm long; involucre bracts linear, 7-7.5 mm long, obtuse or subacute, glabrous except at the tip. Receptacle flat, naked, smooth. Ray florets ca 10.5 mm long; ray elliptic-oblong, ca 6.5 x 3 mm, 4-nerved with two central nerves forking near the apex. Disc florets ca 5 mm long; limb 5 lobed; lobes acute; tube slender. Achenes linear-oblong, ca 1.5 mm long, faintly ribbed. Pappus ca 5 mm long, of white hairs.

Fl. & Fr. Sept. - Oct.

Distrib. India: S. India. Tamil Nadu; rare.

Endemic.

20. *S. ladakhensis* Chowdhery, Uniyal et R. Mathur in Ind. J. Forestry 13(4): 366-367. 1990.

Herbs, dwarf, annual, 5-10 cm high, glabrous; stems erect, branched from the middle. Leaves blackish green, elliptic or oblong-lanceolate, entire, pinnately few dentate or lobulate or subentire, 0.5-2 x 0.1-0.3 cm., glabrous; middle cauline leaves dilated and semiamplexicaule at the base; uppermost linear, bract like. Capitula yellow, radiate, narrowly cylindrical, few in terminal, lax corymb, 6 x 1-2 mm, pedunculate; peduncle pale, shining, slender upto 10 mm long, glabrous, bracteolate; bracteoles 2, linear-lanceolate. Involucre cylindrical, 6 x 2-2.5 mm; bracts, 7-8, slender, linear lanceolate, acuminate, 6 x 1 mm, often reflexed, glabrous, herbaceous. Ray florets 3-4; ray elliptic-oblong, entire, 1.5 mm; tube 2.5 mm long. Disc florets yellow, 4 mm long; corolla limb 1-2 mm long. Achenes white, 2-2.5 mm long.

Fl. & Fr. July - Aug.

Distrib. India : N.W. Himalayas. Jammu & Kashmir (Ladakh, by the side of river Dras).

21. *Senecio laetus* Edgew. in Trans. Linn. Soc. Bot. 20: 74. 1846. *S. chrysanthemoides* DC., Prodr. 6: 365. 1838; Hook.f., Fl. Erit. India 3: 339. 1881. *S. sisymbriiformis* DC., Prodr. 6: 366. 1838. *S. spectabilis* Wallich ex DC., Prodr 6: 366. 1838.

Herbs, perennial, erect, sparsely arachnoid tomentose, rhizomatous; stems simple or branched towards the inflorescence. Leaves both radical and cauline; radical leaves ovate-lanceolate or oblanceolate, obtuse, lyrate-pinnatifid into a large terminal and few lateral lobes, 8-15 x 3-8 cm, glabrous to sparsely arachnoid, especially beneath, base attenuate into a 6-10 cm long petiole; cauline leaves small, ovate-lanceolate, sessile, with auricled base; auricles amplexicaul. Capitula radiate, in terminal, simple or compound corymb, bracteolate; peduncle 4.5-20 cm long, fulvous puberulous to arachnoid tomentose, 2-3 bracteate. Involucre campanulate, 3-4 mm in diam.; bracts brownish black at the apex, 10-12, oblong to oblong-lanceolate, 3-4 x 1.2 mm, acute, herbaceous with broad scarious margins. Ray florets oblong, 5.5-6.5 mm long, 4-veined, 3-dentate at the tip. Disc florets numerous, 5-5.5 mm long. Achenes pale-brown, cylindrical, 2.5 mm long, strongly ribbed, puberulous or glabrous.

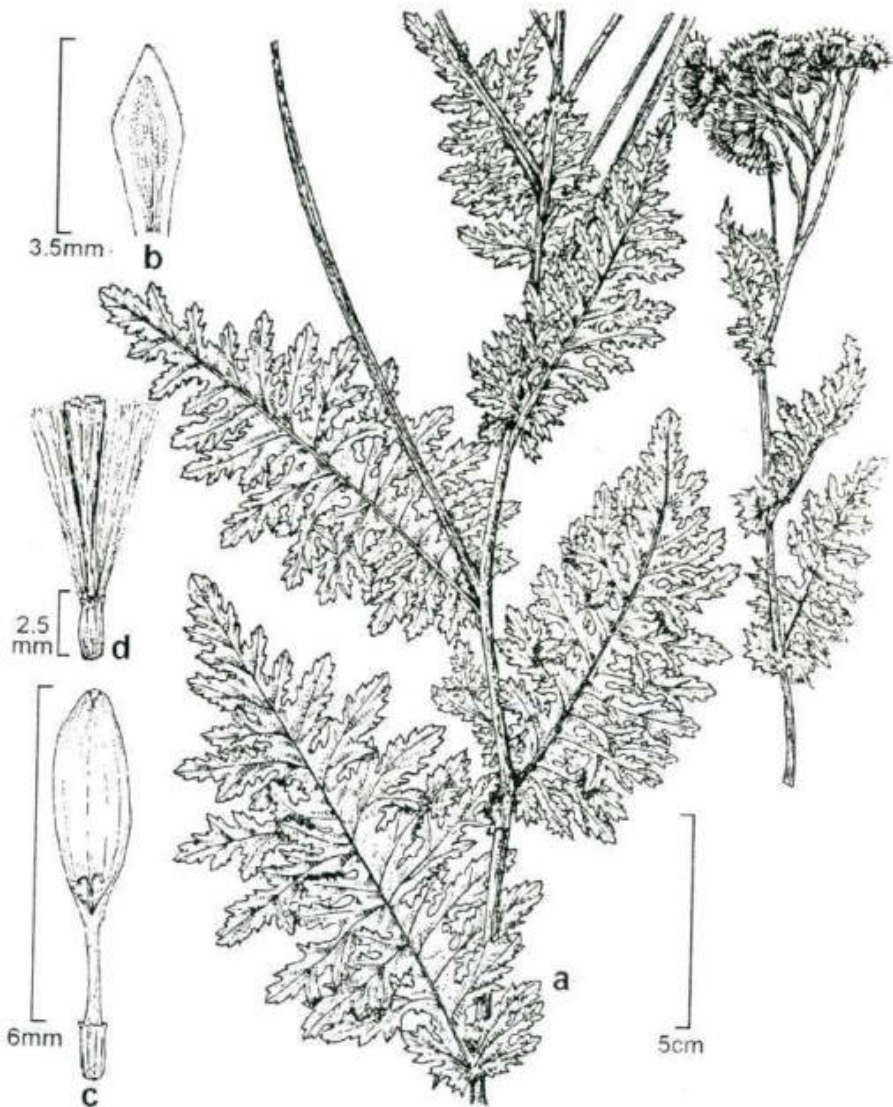


Fig. 81. *Senecio laetus* Edgew. var. *laetus* : a. Habit; b. Involucral bract; c. Ray floret; d. Achene with pappus.

Pappus ca 4 mm long, stramineous in disc florets; ray achenes epappose or with scanty pappus.

KEY TO THE VARIETIES

- 1a. Leaves smooth, glabrous to sparsely puberulous or arachnoid on the lower surface; achenes of ray florets epappose **21.2. var. laetus**
 b. Leaves rough, crumpled, densely to sparsely white floccose tomentose on the lower surface; achenes of ray florets pappose **21.1. var. analogus**

21.1. var. analogus (Hook.f.) R. Mathur in R.R. Rao *et al.*, Fl. Ind. Enum. Astera. 69. 1988. *S. chrysanthemoides* var. *analogus* Hook.f., Fl. Brit. India 3: 339. 1881. *S. analogus* DC., Prodr. 6: 366. 1838.

Fl. & Fr. April - Nov.

Distrib. India: W. Himalayas, between 1100-3700 m, in forests on open grassy places and margins of fields and road sides. Jammu & Kashmir.

Pakistan.

21.2. var. laetus

Fig. 81.

Fl. & Fr. April - Nov.

Distrib. India: Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Pakistan, Nepal and Bhutan.

22. Senecio lawsoni Gamble in Kew Bull. 1920: 342. 1920. **Fig. 82.**

Herbs, perennial, 30-35 cm high, slender; stems simple, erect, villous, leafy. Leaves acute, margins reflexed, 1.5-2 cm long, glabrous except the villous midrib, arranged uniformly on the stem from base to inflorescence,

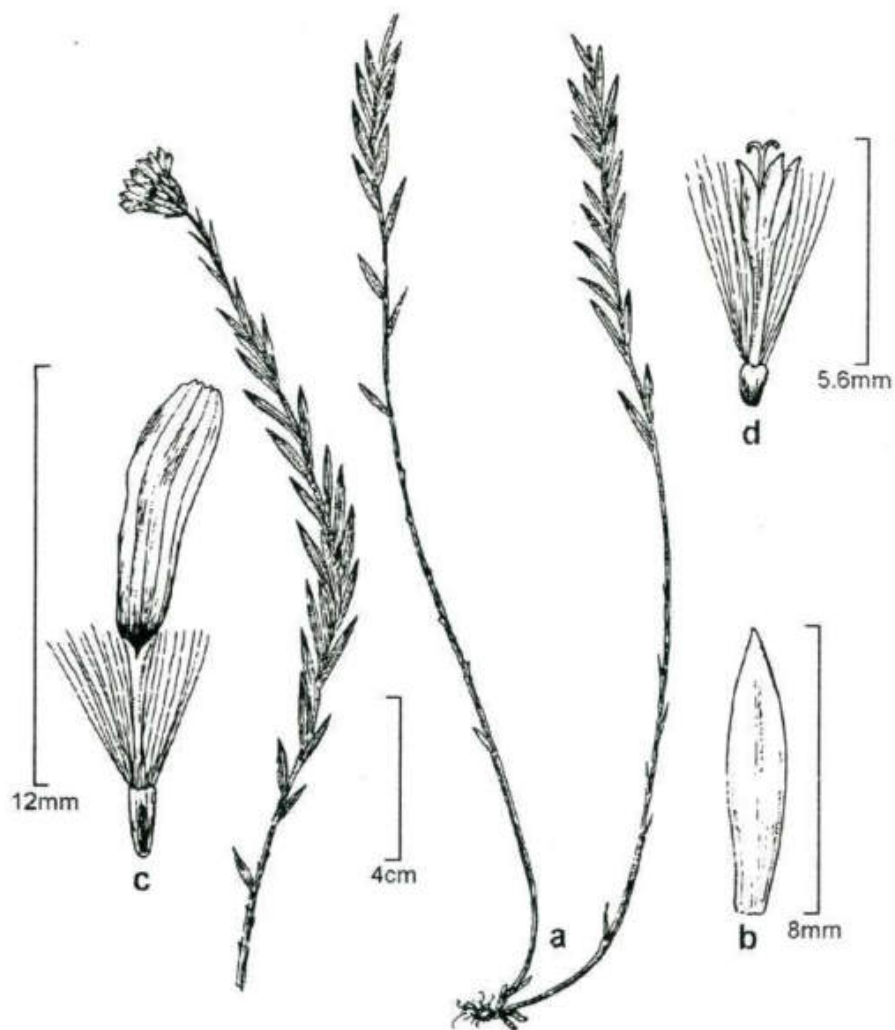


Fig. 82. *Senecio lawsoni* Gamble : a. Habit; b. Involucral bract; c. Ray floret; d. Disc floret.

sessile, capitula radiate, 1-6 in terminal lax corymbs, 10-15 mm in diam., many bracteolate; bracteoles linear-lanceolate. Involucre broadly campanulate, 7.5-8 mm long, sparsely white villous, red pigmented; bracts linear-lanceolate, 7.5-8 x 2-2.5 mm, obscurely 2-3 veined acute, ciliate, herbaceous with narrow scarious margins. Ray florets ca 16, ca 12 mm long; ray oblong, 8 mm long, 5-7-veined. Disc florets ca 5.6 mm long; limbs 5-lobed; lobes minutely apiculate at the tip. Achenes 2.5 mm long, glabrous, ribbed. Pappus of unequal, white hairs, 4-5 mm long.

Fl. & Fr. Nov. - Dec.

Distrib. India: Tamil Nadu.

Endemic.

23. *Senecio lessingianus* C.B. Clarke, *Comp. Ind.* 198. 1876; *Hook.f., Fl. Brit. India* 3: 344. 1881. *Doronicum lessingianum* Wight & Arn. in *Arn. Pugill.* 106. 1836.

Herbs, perennial, hispid; stems ascending, villously hispid, brownish on drying. Leaves elliptic-oblong, deeply and coarsely toothed, 2.5-5 x 1.5-1.9 cm, reddish brown on drying, hairy on both the surfaces, sessile, closely set on the stems. Capitula radiate, 1.5-2.5 cm in diam., bracteolate. Involucre broadly campanulate, 5-6 mm long, hispid; bracts 10-15, oblong-lanceolate, 5-6 x 2-2.2 mm, obtuse, herbaceous with broad, scarious margins, with purplish tip. Ray florets 8-10, 11-11.5 mm long; ray broadly oblong, ca 9 mm long, 9-12-veined; tube ca 2.5 mm long. Disc florets ca 4.2 mm long; limb 5-lobed; lobes slightly apiculate; tube ca 2 mm long. Achenes cylindrical, ca 5 mm long, ribbed, pubescent on ribs. Pappus hairs red, scabrid, ca 5 mm long.

Fl. & Fr. Sept. - Dec.

Distrib. India: S. India, on exposed hill slopes above 2000-2700 m. Tamil Nadu (Nilgiri Mts.)

Endemic.

24. *Senecio linifolius* C.B. Clarke, *Comp. Ind.* 202. 1876; *Hook.f., Fl. Brit. India* 3: 343. 1881. *Doronicum linifolium* DC., *Prodr.* 6: 322. 1838.

Herbs, perennial, 20-45 cm high, glabrous; stems smooth, branched from the base, glabrous. Leaves dark green, linear-lanceolate, acute, margins thickened, brown, distantly serrate, 1-7.5 x 1 cm, glabrous, one nerved, base cuneate, exauriculate. Capitula radiate, few in lax corymbs, bracteolate. Involucre broadly campanulate, ca 4.5 mm long, rusty brown on drying; bracts 15-20, linear-oblong, ca 4.5 mm long, acuminate, herbaceous with broad scarious margins. Ray florets ca 7 mm long; ray broadly elliptic-oblong, 5.5 x 3 mm, much longer than the style. Disc florets ca 3.2 mm long; tube 1.9 mm long. Achenes deeply ribbed, glabrous, shining. Pappus of slender, reddish hairs, ca 3 mm long.

Fl. & Fr. Sept. - Oct.

Distrib. India: N.E. region, between 1300-1960 m, on river beds. Meghalaya (Khasi Hills).

Endemic.

25. *Senecio ludens* C.B. Clarke, *Comp. Ind.* 199. 1876; *Hook.f., Fl. Brit. India* 3: 345. 1881. *Doronicum walkeri* Arn. in *Nova Acta phys. Med. Acad. Caes. Leop. Carc. Nat. Cur.* 18: 349. 1836. **Fig. 83.**

Herbs, perennial, glandular hispid, rhizomatous; stems decumbent to erect, 15-30 cm high, slender to robust, branched. Leaves brownish green, sometimes pinnatisect into ovate, terminal lobe and 1-3 pairs of lateral lobes, ovate to subrotund, margins thick, dark coloured, dentate, mucronate 2.5-7 x 1.5-4 cm, densely adpressed glandular hispid on the upper surface; lower surface pale green with prominent venation; veins pubescent; petiole 1.5-3.5 cm long, auriculate to exauriculate. Capitula radiate, few in lax corymb, bracteolate. Involucre broadly campanulate, ca 3 mm in diam.; bracts brown, 12-16, lanceolate, ca 4.5 mm long, herbaceous with scarious margins. Ray florets 6-8, ca 9 mm long; ray oblong, 5 x 2.5-3 mm. Disc florets 3-3.5 mm long; limb 5-lobed; lobes ovate, acute. Achenes 2 mm long, 5-ribbed, greyish villous mainly on the ribs. Pappus hairs of disc florets brownish, ca 2.5 mm long; ray florets epappose.

Fl. & Fr. April - June.

Distrib. India: S. India, between 1100-1800 m, commonly found in moist situations on road sides, on patanas and in scrub forest on rock-crevices and grassy slopes. Kerala and Tamil Nadu.

Sri Lanka.

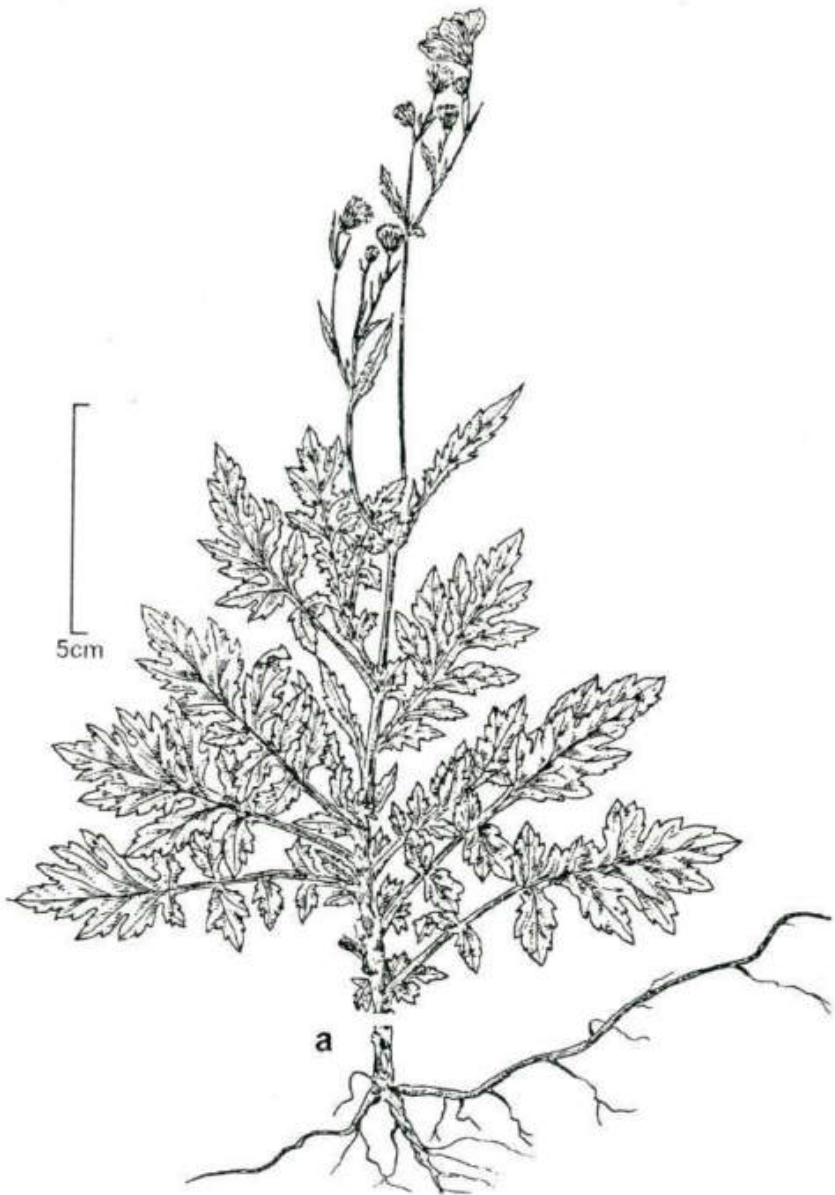


Fig. 83. *Senecio ludens* C.B. Clarke

26. *Senecio mayurii* C. Fischer in Kew Bull. 1939: 250. 1939. Fig. 84.

Herbs or undershrubs; roots fibrous; stems pale brown, smooth, shining on the basal portion, upper portion dark-brownish, flexuous, pubescent. Leaves lanceolate, acute or acuminate, coarsely dentate or lobulate at the base, 2.5-6 x 7-8 mm, blackish brown; above and densely white tomentose beneath; lower leaves with slender, 6-15 mm long, brown pubescent petiole; uppermost leaves sessile, with broad, lobed auricles at the base. Capitula radiate, ca 5-8 mm in diam, bracteolate; bracteoles linear, 7 mm long; peduncle 1.5-3 cm long, brown pubescent, bracteate. Involucre campanulate, 2.5-3.5 mm long, brown-pubescent; involucre bracts dark brown with thick brown hairs, ca 12-20, lanceolate, ca 2.5-3.5 x 1 mm, acuminate, margins broad, scarious. Ray florets 5-6, 4.5 mm long; ray oblong, 2.2 mm broad, 4-veined. Disc florets ca 3.5 mm long. Achenes slightly widened at the apex, 2 mm long, 8-ribbed, with short bristles on the ribs. Pappus of brownish white, unequal, barbed hairs, longer than the achenes.

Fl. & Fr. Nov. - Dec.

Distrib. India: Karnataka; rare.

Endemic.

Notes. So far known only from its type locality.

27. *Senecio mishmi* C.B. Clarke, Comp. Ind. 203. 1876; Hook.f., Fl. Brit. India 3: 344. 1881.

Herbs; stems erect, slender, reddish brown on drying, glabrous, angular. Leaves broadly oblong, acuminate, denticulate or subentire, 5 x 1.5-2 cm, glandular pubescent on both surfaces; sessile with broad auricled bases; auricles amplexicaul, produced backwards. Capitula radiate, in terminal, axillary corymb, bracteolate, long pedunculate; peduncle 1.5-2.5 cm long. Involucres broadly campanulate, glabrous; involucre bracts 5-6, narrowly oblong, 10-14 x 1 mm, acute, herbaceous with narrow, white scarious margins. Ray florets long, flat, epappose. Disc florets 5-6 mm long, tubular. Achenes narrowly oblong, small, 5-angled, glabrous. Pappus white, longer than the achenes, ca 5 mm long.

Distrib. India: E. Himalayas. Arunachal Pradesh (Mishmi hills); rare.

Endemic.

Notes. So far known by type collection only.

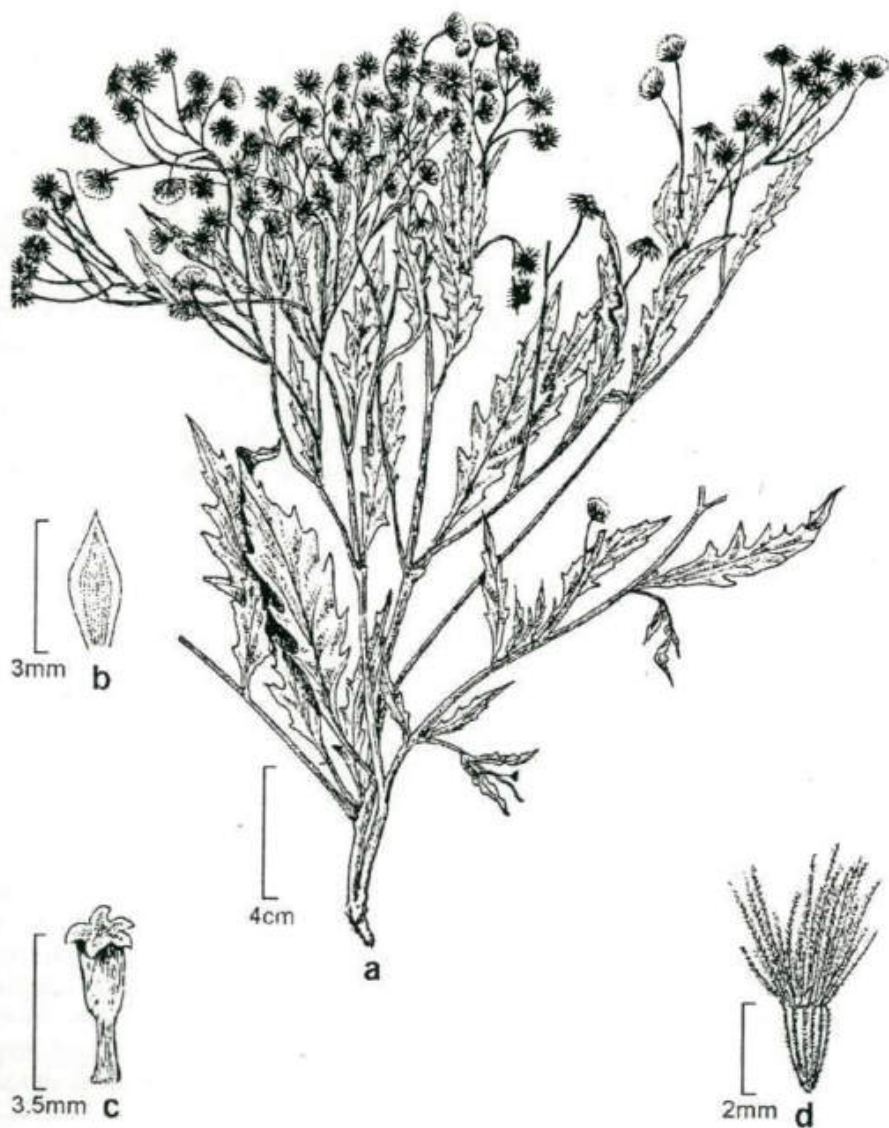


Fig. 84. *Senecio mayurii* C. Fischer : a. Habit; b. Involucral bract; c. Disc floret; d. Achene with pappus.

28. *Senecio multiceps* Balakr. in J. Bombay Nat. Hist. Soc. 67: 57. 1970. *S. polycephalus* (DC.) C.B. Clarke, Comp. Ind. 197. 1876; Hook.f., Fl. Brit. India 3: 344. 1881, non Ledeb. 1830. *Madaractis polycephala* DC., Prodr. 6: 440. 1838. *Doronicum arnottii* DC. in Wight, Contrib. Bot. Ind. 23. 1834.

Herbs, perennial, rhizomatous, glandular hispid; stems creeping, 25-45 cm high, corymbosely branched from the base or below the inflorescence. Leaves obovate-oblong to linear-lanceolate, margins thick, crenate, 1.5-8.5 x 0.2-4 cm, dark brown on drying, prominent veined on the lower surface, sessile, with dilated auricled base. Capitula radiate, few, in terminal corymb, 1.5 cm in diam., 4-5-bracteolate; bracteoles linear-lanceolate; peduncle 1-5.5 mm long. Involucre broadly campanulate, ca 10.5 mm long; bracts 10-15, linear-oblong, 5.5 mm long, acuminate, herbaceous with narrow scarious margins. Ray florets broadly oblong; tube 3.5 mm long. Disc florets ca 5 mm long; limb 3 mm long; tube 2 mm long. Achenes golden yellow, slender, ca 4 mm long. Pappus stramineous, of unequal, scabrid hairs, ca 4.5 mm long.

Fl. & Fr. Aug. - Oct.

Distrib. India: On the exposed slopes of mountains at 2000-2500 m. Tamil Nadu (Nilgiri Hills).

Endemic.

29. *Senecio neelgherryanus* DC. in Wight, Contrib. Bot. Ind. 23. 1834; Hook.f., Fl. Brit. India 3: 341. 1881.

Herbs, greenish white, perennial, stout, villous; stems 30-50 cm high, terete. Leaves greyish green, oblong to lanceolate, obtuse, serrate, 7-12.5 x 1-1.5 cm, scabrid on the upper surface; white tomentose beneath, 1-nerved, auricled. Capitula radiate 1.2 cm in diam., bracteolate, many on long peduncle. Involucre greyish green, campanulate, 10-10.2 mm long, hairy; bracts 30-40, subacute with broad, scabrid nerve. Ray florets 10-15, linear-oblong, spreading. Disc florets numerous. Achenes cylindrical, 2.5-3 mm long, strongly ribbed, scabrid. Pappus of white hairs.

Fl. & Fr. May - Dec.

Distrib. India: S. India, between 2000-2400 m. Kerala and Tamil Nadu.

Endemic.

30. *Senecio nudicaulis* Buch-Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825; Hook.f., Fl. Brit. India 3: 340. 1881. **Fig. 85.**

Herbs, perennial, scapigerous; stems solitary or branched, erect, 20-70 cm high, simple, glabrous or sparsely arachnoid tomentose. Leaves both radical and cauline; radical leaves obovate-oblong to obovate-spathulate, obtuse, irregularly serrate, 2.5-15 x 1-4 cm, pubescent above and arachnoid tomentose beneath, pinnately veined, base cuneate into petiole; cauline leaves oblong-lanceolate, obtuse, 2-9 x 0.5-1.5 cm, dentate to lobulate with auricled base; auricles amplexicaul. Capitula radiate, in terminal corymb, 0.4-1 cm broad, bracteolate; peduncle 1-2.5 cm long, puberulous, bracteate. Involucre broadly campanulate, 5-6 x 3-5 mm; bracts 12-14, linear-oblong, 5-6 x 1-2 mm, acuminate, conspicuously 3-veined, herbaceous, arachnoid tomentose with brown scarios margins. Ray florets oblong, 10 mm long, 3-4-veined, 3-dentate at the tip. Disc florets numerous, tubular, 6 mm long. Achenes pale-brown, elliptical, 1-1.5 mm long, deeply grooved. Pappus of white hairs, ca 5.5 mm.

Fl. & Fr. March - Oct.

Distrib. India: Throughout, in forests and grassy slopes.

Pakistan, Nepal, Bhutan and China.

31. *Senecio obtusatus* Wallich ex DC., Prodr. 6: 367. 1838; Hook.f., Fl. Brit. India 3: 340. 1881. *S. khasianus* Balakr. in J. Bombay Nat. Hist. Soc. 67: 62. 1970. (*nom. illegit.*)

Herbs, perennial, erect, glabrous, 30-60 cm high; stems very slender, almost naked. Leaves both radical and cauline, subsulate; radical leaves elliptic to elliptic-lanceolate, acute, denticulate 3-12 x 1-4 cm, glabrous on both the surfaces; base cuneate into petiole; cauline leaves very few, elliptic to linear-lanceolate, 0.5-1.5 cm. Capitula radiate, in terminal corymb, campanulate, long peduncled, bracteolate; bracteoles 2-3, linear; peduncle 2-2.5 cm long. Involucre narrowly campanulate, glabrous; bracts dark green, 10-13, oblong, 3-4 x 1 mm, acute, obscurely 3-nerved, shortly ciliated at the apex, herbaceous with broad, scarios margins. Ray florets 9-10 mm long; rays elliptic-oblong, 6.5 x 2 mm, 4-veined, 3-denticulate at the apex; tube ca 3 mm long. Disc florets tubular, ca 4.5 mm long. Achenes cylindrical, ca 3.5 mm long, scabrid. Pappus of slender, white hairs.

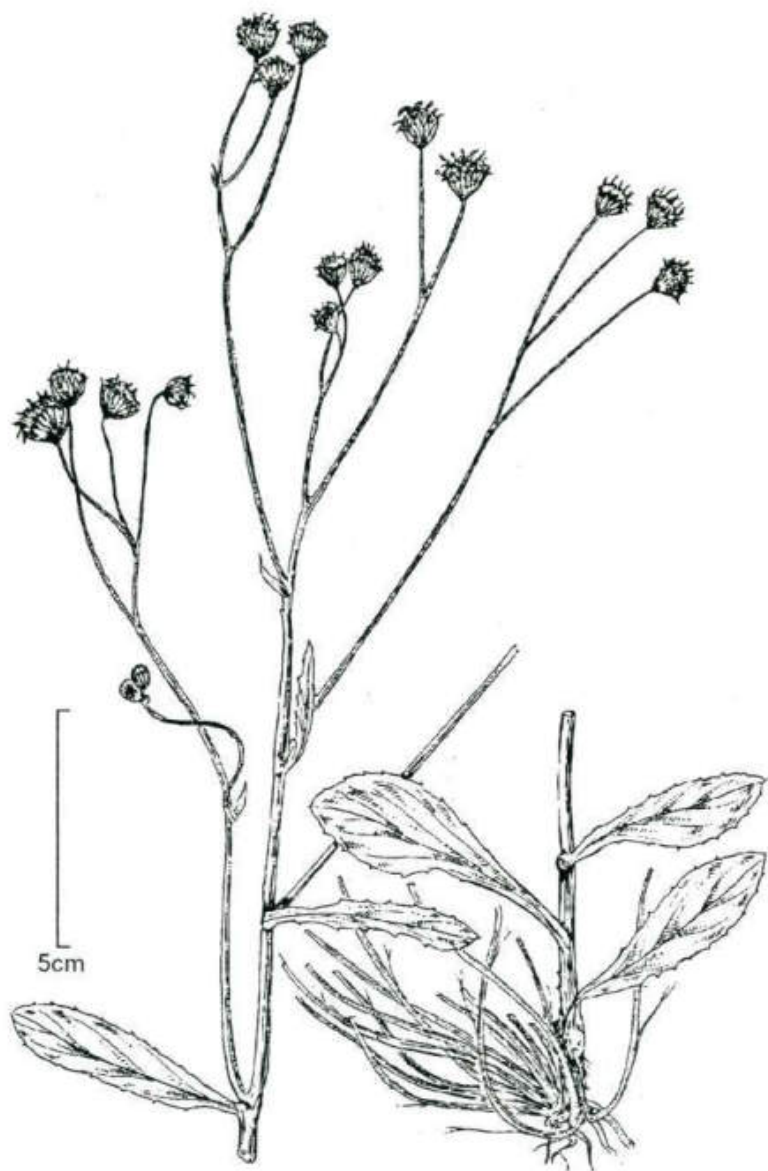


Fig. 85. *Senecio nudicaulis* Buch.-Ham. ex D. Don

Fl. & Fr. June - July.

Distrib. India: Meghalaya (Khasi Hills).

Bangladesh, Myanmar.

32. *Senecio ramosus* Wallich ex DC., Prodr. 6: 365. 1838; Hook.f., Fl. Brit. India 3: 342. 1881.

Herbs, annual, erect or decumbent, 25-60 cm high, glabrous; stems simple or branched, terete. Leaves linear-oblong, pinnatifid into irregular lobes, 2.5-7 cm long, sessile, with simple or dilated semiamplexicaul base. Capitula minutely radiate, 4-6 mm in diam., subbracteolate; peduncle 3-5 cm long. Involucre campanulate, 4 x 2-3 mm; bracts 12-15, lanceolate, ca 4 mm long, acuminate, slender, herbaceous with scarious margins. Ray florets 6-8, 2-2.2 mm long; ray very minute; tube 1.5-1.8 mm long. Disc florets numerous, ca 2.5 mm long. Achenes cylindrical, 1.5 mm long, slender pubescent. Pappus of white hairs.

Fl. & Fr. Feb. - March.

Distrib. India: Arunachal Pradesh (Mishmi Hills) and Sikkim; rare.

Bangladesh.

33. *Senecio raphanifolius* Wallich ex DC., Prodr. 6: 366. 1838. *Senecio diversifolius* Wallich ex DC., Prodr. 6: 366. 1838; Hook.f. Fl. Brit. India 3: 340. 1881. *S. chrysanthemoides* DC. var. *khasiana* (C.B. Clarke) Hook.f., Fl. Brit. India 3: 339. 1881.

Herbs, perennial, robust, rhizomatous, arachnoid tomentose, up to 1.5 m tall. Leaves both radical and cauline; radical leaves oblanceolate, lyrate pinnatifid into a large terminal lobe and few lateral lobes, dentate 8-30 x 2-5 cm, glabrous above, sparingly arachnoid beneath; petiole 5-8 cm long, expanded at the base; cauline leaves oblong, pinnatifid, 8-15 x 2.5-4 cm, sessile, base auriculate; auricles amplexicaul. Capitula radiate, broadly campanulate, 1.2-1.4 cm in diam., bracteolate; bracteoles 2-3, linear; peduncle stout, 1-3 cm long, fulvous pubescent. Involucre broadly campanulate 5-7 x 4-10 mm; bracts blackish brown, oblong, 1.5-2 mm broad, acuminate, puberulous at the apex, herbaceous with scarious margins. Ray florets ca 14, ca 11 mm long, 4-veined;

ray 8 x 2.5 mm; tube 3 mm. Disc florets numerous, 5 mm long. Achenes ca 3 mm long, glabrous. Pappus reddish, ca 5 mm long.

Fl. & Fr. Jul. - Sept.

Distrib. India: E. Himalayas and N.E. region, between 2700-4400 m. Sikkim and Meghalaya.

Bhutan, Myanmar and China.

34. *Senecio rhabdos* C.B. Clarke in J. Linn. soc. 25: 40.t. 19. 1889.

Shrubs, perennial, erect, densely brownish pubescent; stems terete. Leaves blackish, elliptic-lanceolate to linear-lanceolate, acute or acuminate, mucronulate toothed, 6-7 x 2.5-3 cm, scabrid with reddish pubescence, on the veins on the upper surface, lower surface pale green with dense reddish pubescence, prominently veined, base cuneate into 1-8 cm long petiole; petiole biauriculate at the base. Capitula radiate, in dense, terminal corymbs, many bracteolate; peduncle 2-2.5 mm long, bracteate. Involucre narrowly campanulate, ca 3.5 mm long, subglabrous; bracts linear-oblong, 3.5 x 1.5 mm, 5-6, herbaceous with broad, scarious margins. Ray florets oblong, 5 mm long; ray 2.5 mm long, 9-veined, 3-lobed at the apex. Disc florets ca 5 mm long; tube 1.5-1.8 mm long. Achenes cylindrical, 1.2 mm long, pubescent. Pappus of yellowish, scabrid hairs, 3.5 mm long.

Fl. & Fr. Nov. - Feb.

Distrib. India: India: N.E. India, Nagaland; rare.

Endemic.

35. *Senecio royleanus* DC., Prodr. 6: 367. 1838. *S. graciliflorus* DC. var. *hookeri* C.B. Clarke, Comp. Ind. 180. 1876; Hook.f., Fl. Brit. India 3: 339. 1881.

Fig. 86.

Herbs, perennial; stems erect, flexuous, yellowish pubescent in young parts. Leaves ovate-oblong, acuminate, pinnatipartite into a triangular, lanceolate, terminal lobe and 5-12, ovate-lanceolate lateral lobes, margins mucronate, serrate, 7-15 x 6-10 cm, sparsely puberulous on the upper surface and pubescent on the prominent veins on the lower surface; petiole 1.5-3.5 cm long, pubescent, exauriculate or with small auricles; uppermost leaves linear-



Fig. 86. *Senecio royleanus* DC.

lanceolate, acuminate, irregularly serrate, sessile or subsessile. Capitula radiate, in axillary, terminal corymb 0.5-1 cm in diam., bracteolate; bracteoles 5-6, linear, unequal, 1-3 mm long. Involucral bracts linear, 4-7 x 1 mm, obtuse, puberulous at the apex with narrow, scarious margins. Ray florets 4-5, 7.5 mm long; ray linear-oblong, ca 4 x 1 mm; tube ca 3.5 mm long. Disc florets ca 5-6 mm long; limb 5 lobed; lobes triangular ovate, apically papillose. Achenes 2.5 mm long, glabrous. Pappus white, ca 4.5 mm long.

Fl. & Fr. July - Sept.

Distrib. India: N.W. Himalayas, between 2500-3000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

Bhutan and China.

36. *Senecio tenuifolius* Burm.f., Fl. Ind. t. 60.f.4. 1768; Hook.f., Fl. Brit. India 3: 345. 1881. *S. multifidus* Willd. Sp. Pl. 3. 1986, 1800. *Doronicum tenuifolium* Wight, Ic. t. 1129. 1846.

Herbs, annual, slender, 15-25 cm high, much branched, glabrous. Leaves ca 5 cm long, shining, glabrous, pinnatifid into many slender, irregular, spreading, linear lobes sessile, auriculate and semiamplexicaul. Capitula radiate, ca 8 mm in diam., 5-6 bracteolate; peduncle slender, 1.5-3 cm long, glabrous with 4-5 small bracts; bracts blackish, acute. Involucre campanulate, ca 4 mm long, pubescent; bracts 10-12, oblanceolate, ca 4 x 1.2 mm, acute to acuminate, herbaceous with broad scarious margins and with yellow pubescence on nerves. Ray florets 6-10, ca 6.5 mm long; ray oblong, ca 4.5 mm long. Disc florets ca 4.5 mm long; limb cylindrical, narrowed at the base, 2 mm long, faintly ribbed, white pubescent on the ribs. Pappus of yellowish, copious hairs, equalling the achenes, ca 3.5 mm long.

Fl. & Fr. July - Sept.

Distrib. India: Peninsular India, between 340-1075 m. commonly found in scrub forests and hills across plains. Andhra Pradesh and Tamil Nadu.

Indonesia.

37. *Senecio tetrandrus* Buch.-Ham. ex DC., Prodr. 6: 365. 1838; Hook.f., Fl. Brit. India 3: 342. 1881. (*tetrandus*)

Herbs, annual, slender, glabrous, 8-16 cm high, straggling; stems subangular or terete, sometimes winged, flexuous, simple or branched. Leaves narrowly oblong, irregularly pinnatifidly lobed; lobes subacute, irregularly sparingly toothed; sessile, auricled. Inflorescence subcorymbose. Capitula subcampanulate, ca 4.5 mm in diam., many flowered, bracteolate. Involucral bracts linear-lanceolate, densely hairy. Pappus of reddish unequal, barbed, hairs, ca 4 mm long.

Fl. & Fr. Jan. - Sept.

Distrib. India: E. Himalayas. Sikkim and W. Bengal (Darjeeling); rare.

Endemic.

38. *Senecio tibeticus* Hook.f., Fl. Brit. India 3: 340. 1881.

Herbs, perennial, erect, rhizomatous, 13-40 cm high, greyish tomentose; stems solitary or 2-3 branched. Leaves both radical and cauline; radical leaves lanceolate, obtuse, pinnatifid into irregularly dentate terminal lobe and several short lateral lobes, 8-10 x 1-1.5 cm, greyish on the upper surface, white tomentose beneath, long petioled; cauline leaves oblanceolate, pinnatifid, sessile, auriculate; auricles semiamplexicaul; uppermost leaves linear-lanceolate, small. Capitula radiate, 2-6, in lax corymb; bracteolate; bracteoles linear. Involucre campanulate, ca 8 x 6-8 mm, densely greyish tomentose; bracts linear-lanceolate, ca 8 x 1.5 mm, acuminate, pubescent at the tip, herbaceous, 3-veined, with broad, scarious margins. Ray-florets 10 x 1 mm; ray oblong, 2.5 mm broad, 4-5-veined, 3-dentate at the apex. Disc florets numerous. Achenes 2.5 mm long, glabrous. Pappus white, 6-7 mm long.

Fl. & Fr. June - Oct.

Distrib. India: N.W. Himalayas, in alpine meadows between 3000-3900 m. Jammu & Kashmir.

39. *Senecio vestitus* Berg., Descrip. Pl. Cap. 282. 1767.

Undershrubs, glabrous; stems terete. Leaves oblong or obovate, obtuse, serrate, membranous, broadly amplexicaul at base, capitula radiate in much branched corymbs, 20 to 30-flowered. Involucral bracts scaly. Achenes striate, hispidulous.

Fl. & Fr. Feb. - March.

Distrib. India: Rajasthan.

S. Africa.

Note. Native of S. Africa. Rare in the Waste land forests.

40. *Senecio vulgaris* L., Sp. Pl. 867. 1753; Gamble, Fl. Pres. Madras 2: 724. 1921. **Fig. 87.**

Herbs or shrubby herbs, annual or perennial, erect to suberect, 12-45 cm high; stems slender, branched from the middle, sparsely pubescent. Leaves oblanceolate or oblong, pinnately divided into lateral lobes, coarsely toothed, 3-10 x 0.5-2 cm, glabrous to arachnoid tomentose on both the surfaces, mainly on the lower surface, base of lower leaves attenuated; middle cauline leaves sessile, amplexicaul. Capitula discoid, conical, 4-5 mm in diam., bracteolate; peduncle 0.5-2 cm long. Involucre conical or narrowly campanulate, 5.5-7 x 2-3.5 mm; bracts 18-22, uniseriate, linear, 5.5-7 x 1 mm, acute, tip black, subequal, herbaceous with narrow scarious margins, glabrous. Ray florets absent. Disc florets ca 5-6 mm long; limb narrowly campanulate, 5-lobed. Achenes cylindrical, 2-2.5 mm long, 5-10-ribbed, appressed hairy between the ribs. Pappus white, pale yellow or brown, persistent or sometimes deciduous, ca 5-6 mm long.

Fl. & Fr. April - Dec.

Distrib. India: 300-2300 m. (Nilgiri Hills). Weed of waste lands and also on sand-dunes. Jammu & Kashmir, Assam and Tamil Nadu.

Note. This species is known to be toxic to men and animals. It is also used in medicines in amenorrhoea, dysmenorrhoea and as diaphoretic, diuretic. The infusion of plant is reported to be used in chronic mastitis (Umrao *et al.*, Dict. Econ. Pls., Ind. 1983).

41. *Senecio wightianus* DC. ex Wight, Contrib. Bot. Ind. 22. 1834. *S. scandens* Hook.f., Fl. Brit. India 3: 353. 1881, non Buch.-Ham. ex D. Don, pp. **Fig. 88.**

Herbs, scandent, perennial, glabrous, stems divaricately branched, flexuous, ca 2-5 m long. Leaves pale green, elliptic-lanceolate or hastate, acuminate,



Fig. 87. *Senecio vulgaris* L.

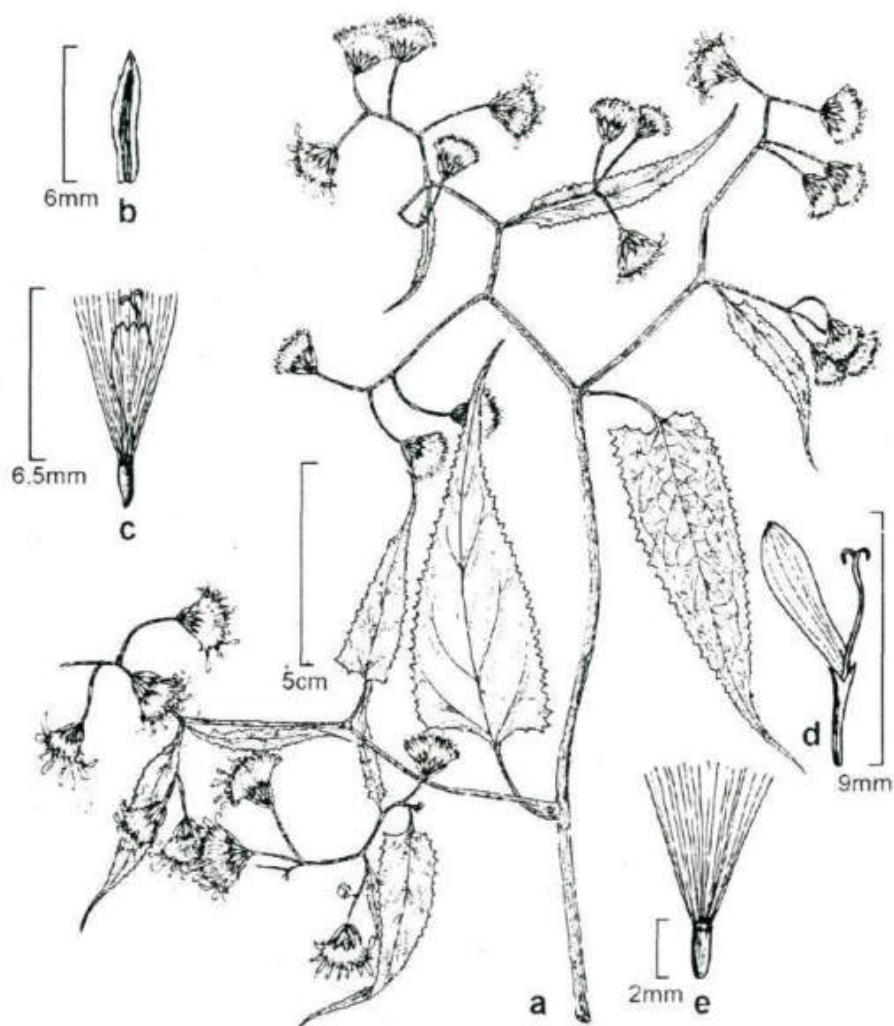


Fig. 88. *Senecio wightianus* DC. : a. Habit; b. Involucral bract; c. Disc floret; d. Ray floret; e. Achene with pappus.

truncate or cordate, deeply dentate or pinnatifid into 1-6 lateral lobes, 2.5-14 x 2.5-5 cm, glabrous; petioles 0.5-2.5 cm, exauriculate. Capitula radiate, bracteolate, ca 1.5 cm in diam., many in divaricately branched corymbose panicle. Involucre broadly campanulate, 5-9 mm in diam., glabrous; bracts 10-13, linear-lanceolate acuminate, 5-8 x 1.2 mm, membranous with broad, scarious margins. Ray florets yellow, 8-10, ca 9 mm long; ray linear-oblong. Disc florets yellow, 6-7 mm long. Achenes ca 2 mm long, ribbed, pubescent. Pappus hairs white, ca 7.5 mm long, minutely barbed.

Fl. & Fr. Sept. - Dec.

Distrib. India: Himachal Pradesh, Uttar Pradesh, Meghalaya and Tamil Nadu.

Nepal, Bhutan, Myanmar, China, Thailand, Japan and Philippine.

42. *Senecio wightii* (DC.) Benth. & Hook., Gen. Pl. 2: 248. 1873. *Doronicum wightii* DC. in Wight, Contrib. Bot. Ind. 23. 1834. *Senecio saxatilis* Sensu Hook.f., Fl. Brit. India 3: 344. 1881. *Madaractis glabra* DC., Prodr. 6: 440. 1838. *Senecio rabani* C.B. Clarke, Comp. Ind. 202. 1876. *S. pilosiusculus* C.B. Clarke, Comp. Ind. 203. 1876; Hook.f. Fl. Brit. India 3: 344. 1881.

Herbs, perennial, 60-120 cm tall with creeping rootstock; stem solitary, ascending, slender, simple or branched, glabrous. Leaves green or greenish brown, linear-oblong or oblong-lanceolate, acute, serrate, 5-10 x 0.5-1.5 cm, sparsely adpressed pilose and pubescent on the veins on the lower surface, pinnately veined; petiole of lower leaves very short; upper leaves sessile with broad auricled base; auricles amplexicaul. Capitula radiate, bracteolate; bracteoles 2-3, linear, acute. Involucre campanulate, 3-4 x 3.5-4 mm; bracts oblong-lanceolate, 3-4 mm long, acuminate, distinctly 3-veined, sparsely pubescent. Ray florets 7-8 mm long; ray oblong, 4-veined. Disc florets 3.5 mm long. Achenes cylindrical, ca 3 mm long, glabrous. Pappus stramineous or brownish red, ca 3 mm long, absent in ray florets.

Fl. & Fr. July - Nov.

Distrib. India: In moist pastures on rocks between 830-2300 m. Manipur, Meghalaya (Khasi hills) and Tamil Nadu.

Myanmar and China.

43. *Senecio zeylanicus* DC., Prodr. 6: 365. 1838; Hook.f., Fl. Brit. India 3: 340. 1881. *S. gracilis* Arn. in Nova. Acta. Phys. Med. Acad. Caes. Leop. Carol. Nat. Cur. 18: 249. 1836.

Herbs, Annual, 30-60 cm high; stems very slender, terete, subglabrous. Leaves dark green, linear-oblong, dilated upwards, subacute, entire to obscurely toothed, recurved, 10-15 x 3-5 mm, glabrous or sparsely pubescent, 1-nerved, sessile. Capitula radiate, in terminal and axillary, lax corymb, ca 8 mm in diam., bracteolate; peduncle 0.5-2.5 cm long, bracteate. Involucre campanulate, glabrous; bracts 16-20, linear-oblong acuminate, 1-3 nerved, herbaceous with scarious margins, puberulous at the tip. Ray florets ca 7.5 mm long; ray elliptic-oblong, ca 4.6 mm long, 3-4-veined; tube 3 mm long. Disc florets 5.5 mm long; limb 2 mm long; tube 3.5 mm long. Achenes dark brown, cylindrical, 2.5-3 mm long, faintly ribbed, minutely pubescent. Pappus of white hairs.

Fl. & Fr. Oct. - Jan.

Distrib. India: W. Ghats, on high grassy hill slopes. Tamil Nadu.

Myanmar and Sri Lanka.

EXCLUDED SPECIES

Senecio lancifer J.R. Drumm. in Kew Bull. 6: 270. 1911.

This species was known to occur in Sikkim and Tibet. A study of the syntypes housed at CAL bear the localities of Tibet (i.e. 1882 *Kings' collector*, 1904 Cap. H.J. Walton). Therefore, it is concluded that this species does not occur in India.

The study further reveals that the species is intermediate between *Senecio* and *Ligularia*, but differs from both in having pappus of a peculiar nature, i.e. pappus hairs wavy with the thickened plumose tips. Hence it may have to be accommodated under a new genus.

Senecio korshianskyi Krasch. in Acta Inst. Bot. Acad. Sci. U.R.S.S. Ser. 1, 3: 352. 1937.

The above species was described from Kashmir, but neither the specimen nor the literature is available with us.

12. *Synotis* (C.B. Clarke) C. Jeffrey & Y.L. Chen

Herbs or undershrubs, perennial, rhizomatous, erect or scrambling; stems both vegetative and flowering, usually leafless in the lower part during flowering time. Leaves rosulate or subrosulate at the base of the flowering stems, simple, broadly ovate, cordate or narrow oblong-lanceolate, mucronulate, serrate, petioled or sessile, usually auricled at the base. Inflorescence terminal and axillary, lax to dense, simple or compound corymb. Capitula heterogamous, and radiate or homogamous disciform and discoid, cylindrical to campanulate, bracteolate or rarely ebracteolate, peduncled or sessile. Involucral bracts 2-15, free, herbaceous, with scarious margins. Ray florets yellow, absent or 1-20, conspicuous or inconspicuous, 1-6-veined, 3-5-dentate. Disc florets yellow, numerous, tubular; corolla 5-6-lobed. Anthers linear-oblong with tailed auricles. Style arms truncate or convex with short to long marginal papillae and often with a central tuft of longer papillae. Achenes cylindrical, ribbed, pubescent. Pappus stramineous or rufescent, white, capillary, simple or barbellate.

Endemic to Sino-Himalayan region; ca 50 species, 19 in India.

KEY TO THE SPECIES

- | | |
|---|-----------------------------|
| 1a. Climbing herbs | 16. <i>S. tetrantha</i> |
| b. Erect herbs, undershrubs or shrubs | 2 |
| 2a. Capitula homogamous, discoid | 3 |
| b. Capitula heterogamous, radiate | 6 |
| 3a. Glabrous to sparsely pubescent herbs or shrubs | 4 |
| b. Floccose tomentose herbs or shrubs | 5 |
| 4a. Leaves elliptic to elliptic-oblong, caudate-acuminate; capitula 2-3-bracteolate | |
| | 6. <i>S. borii</i> |
| b. Leaves broadly elliptic, acute; capitula ebracteolate | 15. <i>S. simonsii</i> |
| 5a. Densely fulvous white tomentose shrubs; leaves coriaceous; pappus ca 5 mm long, copious | 12. <i>S. nagensium</i> |
| b. Thinly floccose tomentose herbs; leaves membranous; pappus 2-2.5 mm long, scanty | 7. <i>S. brevipappa</i> |
| 6a. Ray florets inconspicuous and filiform | 14. <i>S. saluenensis</i> |
| b. Ray florets conspicuous | 7 |
| 7a. Leaves subrosulate at the base of the inflorescence | 8 |
| b. Leaves distributed all along the stem | 10 |
| 8a. Leaves not winged | 19. <i>S. wallichii</i> |
| b. Leaves winged | 9 |
| 9a. Involucral bracts 5; ray florets 2.5-5.5 mm long | 3. <i>S. alata</i> |
| b. Involucral bracts 8; ray florets 5-5.5 mm long | 2. <i>S. ainsliaeifolia</i> |
| 10a. Ray floret only one | 1. <i>S. acuminata</i> |
| b. Ray florets more than one | 11 |

- 11a. Leaves coriaceous 9. *S. jowaiensis*
 b. Leaves not coriaceous 12
- 12a. Glandular pubescent, reddish brown herbs; ray florets 2 4. *S. auriculata*
 b. Glabrous to sparsely pubescent or loosely to densely white tomentose or reddish hairy
 herbs or shrubs; ray florets more than 2 13
- 13a. Capitula on long, slender, filiform peduncle 18. *S. vagans*
 b. Capitula on short, stout peduncle 14
- 14a. Sparcely pubescent, scrambling to erect, flexuous, slender shrubby herbs; involucre
 cylindrical 17. *S. triligulata*
 b. Loosely to densely white tomentose or reddish hairy, erect, stout shrubs;
 involucre campanulate 15
- 15a. Reddish hairy undershrubs; capitula deep yellow 11. *S. lushaensis*
 b. Loosely to densely white tomentose or glandular pubescent undershrubs or shrubs;
 capitula yellow 16
- 16a. Leaves sessile, glabrous 5. *S. bhut*
 b. Leaves petioled, not glabrous 17
- 17a. Glandular pubescent undershrubs; leaves, ovate-elliptic to linear-lanceolate
10. *S. kunthiana*
 b. Tomentose shrubs; leaves oblong-ovate, elliptic, broadly obovate, lanceolate or
 elliptic-oblong 18
- 18a. Greenish white tomentose and reddish pubescent shrubs; leaves oblong-ovate to elliptic;
 achenes sparsely pubescent 13. *S. rufiaervis*
 b. Densely white tomentose shrubs; leaves broadly to narrowly obovate; achenes glabrous
8. *S. cappa*

1. *Synotis acuminata* (Wallich ex DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 332. 1984. *Senecio acuminatus* Wallich ex DC., Prodr. 6: 368. 1838; Hook.f., Fl. Brit. India 3: 354. 1881.

Herbs, perennial, erect, 0.6-1.2 cm tall; young branches and inflorescence densely fulvous pubescent. Leaves narrowly lanceolate, caudate-acuminate, distantly mucronulate, 7-20 x 1.5-3.5 mm, membranous, black on drying, glabrous on both the surfaces, prominently reticulately veined on the lower surface, base slightly oblique, toothed; petiole ca 3-5 mm long, fulvous pubescent, exauriculate. Capitula radiate, bracteolate; bracteoles 2-3, linear. Involucral bracts linear-oblong, 4.5-6 x ca 1 mm, obtuse, glabrous on margins. Ray floret solitary, 5-6 mm long; ray linear, 1.5-2.5 mm long; tube 3-3.5 mm. Disc florets 2-3, ca 6 mm long; limb 4 mm long, 5-lobed; lobes oblong-lanceolate, acute. Achenes cylindrical, ca 2.5-3 mm long, glabrous. Pappus long, stramineous, 4-4.5 mm.

Fl. & Fr. July - Sept.

Distrib. India: E. Himalayas, between 3000-4000 m. Sikkim.

Nepal, Bhutan and China.

2. *Synotis ainsliaeifolia* C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 307. 1984.

Herbs, perennial, rhizomatous 30-90 cm high, densely brown villous; flowering stems subscapiform, solitary, erect, densely ferruginous pubescent. Leaves mostly rosulate or crowded at the base of the flowering stems, ovate, dentate or lacerate, 15-25 x 8-14 cm, hispid above, densely brownish villous (especially on the veins), truncate to cordate at base; petiole 4-9 cm long, densely brownish villous, broadly or narrowly winged, expanded or amplexicaul at the base; upper most leaves few, ovate to lanceolate, shortly petiolate or sessile. Capitula heterogamous, radiate, in spreading, paniculoid thyrses, 1-2-bracteolate; peduncle 1-2 mm long, densely pubescent, bracteate. Involucre 5-6 x 2-2.5 mm, densely setulose; involucre bracts linear-lanceolate, 5-6 x 1-1.5 mm, obtuse or acute, herbaceous with broad scarious margins. Ray florets 5-5.5 mm long; ray oblong, elliptic, 2.5 x 1 mm, 4-veined, 3-dentate; tube 3 mm long. Disc florets ca 7 mm long; corolla limb 4 mm long, 5-lobed; lobes ovate-lanceolate, 1-1.2 mm long, acute, apically papillose; tube 3 mm long. Anthers 2 mm long. Style arms 7 mm long, fringed. Achenes cylindrical, ca 1.5 mm long, glabrous. Pappus white, 5-6 mm long.

Fl. & Fr. Sept. - Oct.

Distrib. India: Arunachal Pradesh (Delai valley).

Endemic.

3. *Synotis alata* (Wallich ex DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 308. 1984. *Senecio alatus* Wallich ex DC., Prodr. 6: 368. 1838; Hook.f., Fl. Brit. India 3: 353. 1881.

Fig. 89.

Hindi: *Ghunidhool*

Herbs, perennial, rhizomatous; rhizome thick, woody; vegetative stems 5-30 cm long, stout, creeping, ascending, leafy at the apex, greyish yellow tomentose; flowering stem solitary, 20-40 cm, unbranched, villous. Leaves subrosulate at the base of flowering stem, ovate to oblong-lanceolate, acute-acuminate, mucronulate, 10-30 x 5-15 cm, sparsely hairy on the upper surface, lower surface densely hairy, mainly on the veins, cordate or broadly cuneate at base; petiole 5-10 cm long, broadly winged; wing straight or expanded in the middle, toothed, densely hairy, semi amplexicaul, subauriculate at the base;



Fig. 89. *Synotis alata* (Wallich ex DC.) C. Jeffrey & Y.L. Chen

uppermost leaves smaller, oblong-lanceolate, semi amplexicaul at the base, sessile. Capitula inconspicuously radiate, 1-2-bracteolate. Involucre cylindrical, 7.5-8 x 1.5 mm, densely hairy; bracts 5-7, linear-oblong, 7.5-8 x 1-1.2 mm, obtuse, herbaceous with narrow, scarious margins. Ray florets 1-3, 2.5-5.5 mm long, unequal, minutely radiate, shorter than the styles. Disc florets 2-4, ca 7.5 mm long. Achenes greyish, ca 1.5 mm long, pubescent. Pappus of pale, scabrid hairs, 5.5 mm long.

Fl. & Fr. July - Oct.

Distrib. India: Himachal Pradesh and Uttar Pradesh.

Nepal, Bhutan, Myanmar and China.

4. *Synotis auriculata* C. Jeffrey & Y.L. Chen in Kew Bull. 39 (2): 330. f. 19. 1984. R. Mathur in J. Econ. & Taxon. Bot. 8(2): 464. 1986.

Herbs, reddish brown, shrubby, 1.8 m tall; stems slender, branched, glandular pubescent. Leaves narrowly elliptic-oblong, acuminate, mucronately serrate, ca 17 cm x 2.5 cm, membranous, setulose on the upper surface, lower surface sparingly pubescent with prominent pinnate venation; petiole ca 5 mm long, pubescent, auriculate; auricles small and semicircular. Capitula yellow, radiate, in lax, axillary and terminal, rounded corymb; peduncle 1-3 mm long, glandular pubescent, 1-2-bracteate. Involucre narrowly campanulate, 3-3.5 x 1 mm; bracts 5, oblong-linear, 3-3.5 x 0.8 mm, obtuse and puberulous at the apex, margins scarious. Ray florets ca 4.5 mm long; ray oblong, ca 2.5 mm long, 2-3-veined, 3-denticulate. Disc florets 3, 5-5.5 mm long; corolla limb 5-lobed. Anthers ca 2 mm long. Style arms 1-1.2 mm long. Achenes cylindrical, 1.5 mm long, slightly pubescent. Pappus white, ca 4 mm long.

Fl. & Fr. Nov. - Dec.

Distrib. India: E. Himalayan and N.E. region, in mixed forest between 2100-2400 m. Arunachal Pradesh, Nagaland.

China.

5. *Synotis bhot* (C.B. Clarke) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 288. 1984. *Senecio bhot* C.B. Clarke, Comp. Ind. 187. 1876; Hook.f., Fl. Brit. India 3: 355. 1881; Sikdar & Ghose in Geobios 5: 86. 1978.

Shrubs, perennial; stems pale brown, deeply grooved; young branches and inflorescence loosely white tomentose. Leaves lanceolate, acuminate, 7-15 x 2.5-6 cm, membranous, glabrous, dark brown on the upper surface, lower surface pale brown with prominent venation. Capitula radiate, 1.5 cm in diam., bracteolate; bracteoles green, broad; peduncle stout, 1-1.5 cm long, ribbed, white tomentose. Involucre broadly campanulate, ca 10 mm long, loosely white tomentose; bracts 8-10, linear-oblong, 10 x 2.5 mm, obtuse. Ray florets very short. Disc florets ca 20. Achenes cylindrical, 3 mm long, 5-ribbed, glabrous. Pappus dirty white, longer than the achenes.

Distrib. India: West Bengal and Meghalaya (Khasi Hills).

Bhutan.

6. *Synotis borii* (Raiz.) R. Mathur in J. Econ. & Taxon. Bot. 8(2): 482. 1986. *Senecio borii* Raiz. in J. Ind. Bot. Soc. 27: 206. 1948.

Shrubs, perennial, glabrous to sparsely pubescent; stems and branches reddish-brown, terete. Leaves elliptic to elliptic-oblong, caudate-acuminate, sharply serrate, 12.5-18 x 3-6-5.9 cm, glabrous on the upper surface, lower surface sparsely pubescent mainly on the veins; venation reticulate, prominent; petiole short, 0.8-1.3 cm long, glabrous, exauriculate. Capitula discoid, bracteolate; bracteoles 2-3; peduncle 2-2.2 mm long, densely or sparsely pubescent, 1-2-bracteate. Involucre; dark brown, campanulate, 2.5-3 mm long, glabrous; bracts dark brown, linear-lanceolate, 2.5-3 x 1 mm, subequal, apex deltoid, ciliate, obscurely 3-veined, herbaceous with broad scarious margins, imbricate. Disc florets 11-12, 2.5-3 mm long. Achenes blackish, obconic, ca 5 mm long. Pappus white, barbed, 2.5-3 mm long.

Fl. & Fr. Nov. - Jan.

Distrib. India: E. Himalayas and N.E. region, between 1500-2000 m. Arunachal Pradesh and Nagaland (Naga Hills); rare.

Endemic.

7. *Synotis brevipappa* C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 300. 1984.

Herbs, perennial, erect, rhizomatous; rhizomes short, woody; vegetative stems 1-2, ca 50 cm, erect, thinly floccose tomentose with short, brownish black pubescence; flowering stem 10-40 cm high, solitary, scapiform, few branched.

Leaves subrosulate at the base of the flowering stem, obovate, lanceolate or oblanceolate, elliptic, acuminate, sharply serrate, 12-25 x 3-8 cm, shortly scattered hairy above, thinly arachnoid mainly on the veins beneath, base cuneate into short petiole; petiole 0.3-15 cm long, arachnoid tomentose; cauline leaves few, smaller, sessile. Capitula discoid, in terminal, rounded corymb, 1-2-bracteolate; bracteoles linear; peduncle 2-10 mm long, yellowish tomentose, 1-2-bracteate. Involucre subcylindrical, 3-4 x 2-3 mm; involucre bracts oblong-lanceolate, 3-4 x 2 mm, triangular, subacute, glabrous, puberulous and slightly spreading at the apex, subcoriaceous, margins narrow scarious. Disc florets pale yellow, ca 20, ca 7 mm long; corolla limb ca 4 mm long; tube ca 2.7 mm long. Anthers ca 3 mm long. Style arms 0.7 mm long, fringed with long papillae. Achenes cylindrical, 1.5 mm long, glabrous. Pappus white, scanty, deciduous, 2-2.5 mm long.

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas, in open forests on dry slopes between 2400-2700 m. Arunachal Pradesh (Delai valley).

8. *Synotis cappa* (Buch.-Ham. ex D. Don) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 319. 1984. *Senecio cappa* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 179. 1825. *S. densiflorus* Wallich ex DC., Prodr. 6: 369. 1838; Hook.f., Fl. Brit. India 3: 355. 1881. *S. densiflorus* Wallich ex DC. var. *lobbii* Hook.f., Fl. Brit. Ind. 3: 355. 1881.

Punj.: *Chitawala*.

Shrubs, perennial, rhizomatous, erect, stout, densely white tomentose; stems branched in the inflorescence. Leaves brownish black, broadly to narrowly obovate-lanceolate or elliptic-oblong, acuminate, mucronulate toothed; teeth black, hooked; ca 10-25 x 4-9 cm, scabrid, densely to sparsely fulvous pubescent on the veins on upper surface, lower surface densely white tomentose; petiole 0.3-3 cm long, stout, densely white tomentose, auriculate at the base. Capitula radiate, bracteolate; bracteoles ca 8, densely white tomentose; peduncle 4.5-10 mm long, 2-3-bracteate, densely white tomentose. Involucre campanulate, 5-7 x 2-4 mm; bracts 8-12, 5-7 x 1-1.5 mm, linear-lanceolate, subacute, densely white tomentose with broad scarious margins. Ray florets 8-10, 6-6.5 mm long; ray elliptic-oblong, 4-4.5 x 1.5 mm; tube ca 2 mm long. Disc florets 11-17, ca 5 mm long; limb 5-lobed; lobes acute. Achenes 1.2 mm long, glabrous. Pappus white, 4.5 mm long.

Fl. & Fr. Oct. - Jan.

Distrib. India: E. Himalaya and N.E. region, between 1500-2300 m. West Bengal (Darjeeling) and Meghalaya.

Nepal, Bhutan, Myanmar and China.

9. *Synotis jowaiensis* (Balakr.) R. Mathur in J. Econ. & Taxon. Bot. 8(2): 482. 1986. *Senecio jowaiensis* Balakr. in Ind. For. 101: 703. 1975. **Fig. 90.**

Shrubs, perennial, glabrous 3-4 m tall; stems terete, branched and spreading. Leaves oblong-lanceolate, caudate-acuminate, mucronulate, serrate, 9-13 x 3-6 cm, sub coriaceous, glabrous; venation prominently raised on the lower surface; petiole 10-15 mm long. Capitula radiate, 5-6-bracteolate; peduncle 1-3 mm long. Involucre campanulate, 2.5-3 mm long, puberulous; bracts pinkish tinged in bud, 5-6, obovate-oblong, 2.5-3 x 0.5-1 mm, obtuse, unequal with 3 broader and 2-3 narrower ones, herbaceous with broad scarious margins. Ray florets yellowish white, 2-3, ca 3 mm long; ray 1.8-2.2 x 0.8-1.1 mm, 4-fid at the apex. Disc florets white, 2-3, ca 4 mm long; corolla 5-cleft almost up to the base; lobes linear-oblong. Achenes 2 mm long, ribbed, glabrous. Pappus greyish white, ca 3 mm long, barbellate, equalling the disc florets.

Fl. & Fr. Oct. - Nov.

Distrib. India: N.E. region, India, In shady, moist situations. Meghalaya (Jowai).

Endemic.

10. *Synotis kunthiana* (Wallich ex DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 29(2): 288. 1984. *Senecio kunthianus* Wallich ex DC., Prodr. 6: 369. 1838; Hook.f., Fl. Brit. India 3: 354. 1881. **Fig. 91.**

Undershrubs, perennial, glandular pubescent; stems erect, stout, corymbosely branched, reddish brown on drying. Leaves blackish green, ovate-elliptic to linear-lanceolate, acute, coarsely mucronulate toothed, 1-7 x 1-3 cm, glabrous on the upper surface, puberulous on the veins on lower surface; petiole 0.5-1 cm long. Capitula blackish, radiate, 1.2 cm in diam., bracteolate; bracteoles 3-5, linear, subulate; peduncle 3.5-5 mm long. Involucre broadly campanulate, 5-7 mm long, glandular pubescent; bracts oblong-lanceolate, 5.5-7 x 1-1.5 mm, subacute, herbaceous, with broad margins, apex puberulous. Ray florets 5-7, 8 mm long; ray linear-oblong, 5 x 1.5 mm, 3-4-veined, 3-dentate at the apex; limb 5-lobed; lobes acute. Achenes pale brown, flat, 1.3 mm long, glabrous to minutely pubescent, ribbed. Pappus yellowish white, scabrid, 6 mm long.

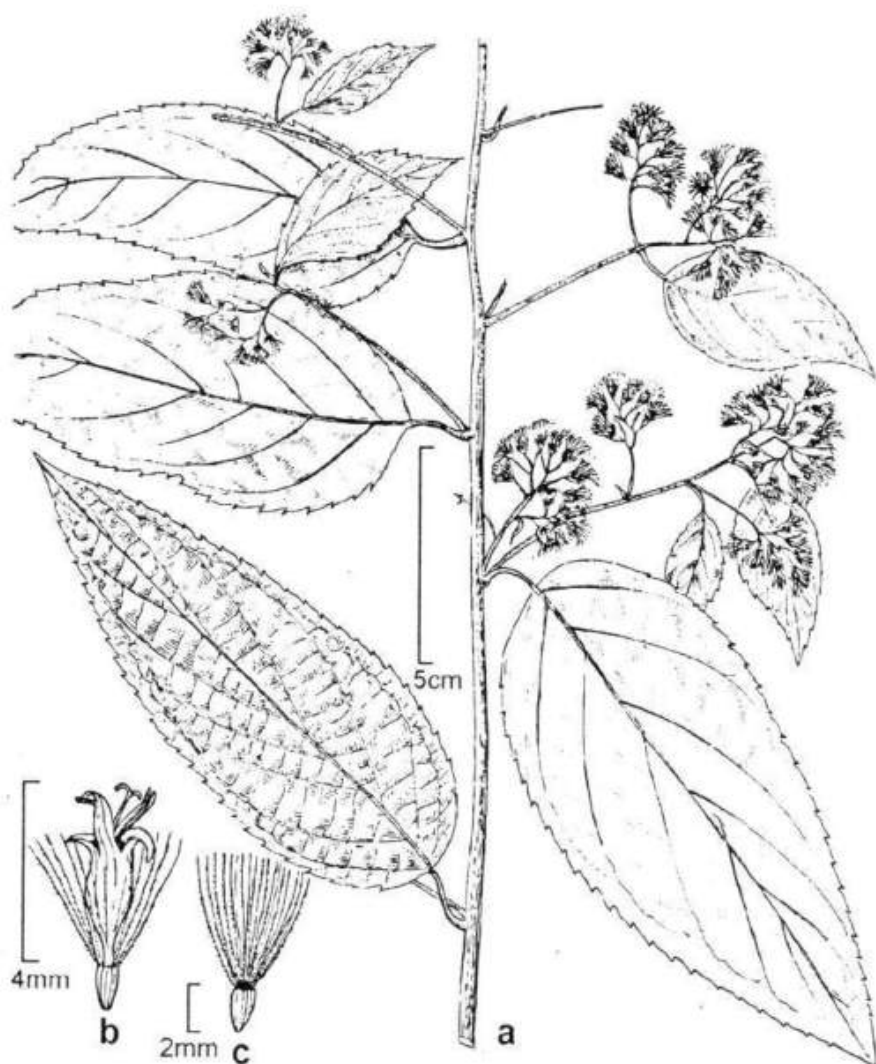


Fig. 90. *Synotis jowaiensis* (Balakr.) R. Mathur : a. Habit; b. Disc floret; c. Achene with pappus.

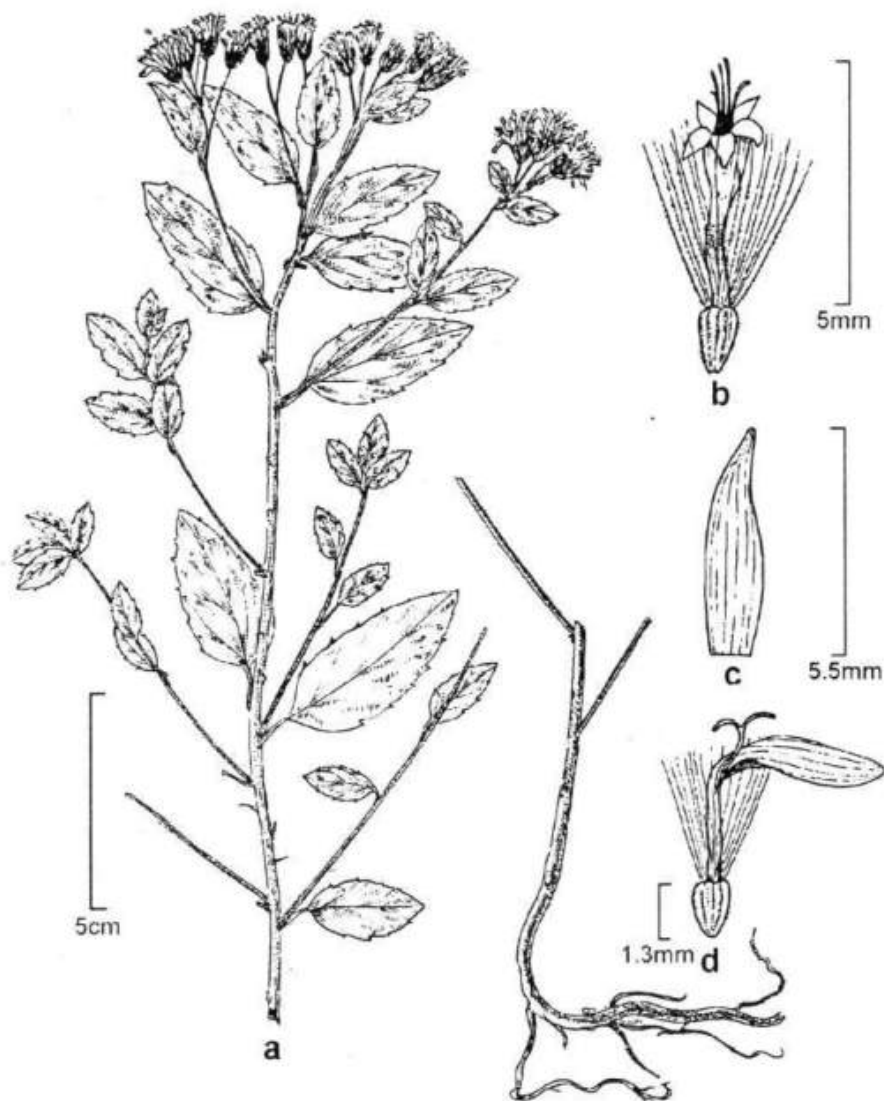


Fig. 91. *Synotis kunthiana* (Wallich ex DC.) C. Jeffrey & Y.L. Chen :
 a. Habit; b. Disc floret; c. Involucral bract; d. Ray floret with
 achene.

Fl. & Fr. July - Dec.

Distrib. India: W. Himalayas. Himachal Pradesh, Jammu & Kashmir and Uttar Pradesh.

Pakistan and Nepal.

11. *Synotis lushaensis* (C. Fischer) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 288. 1984. *Senecio lushaensis* C. Fischer in Kew Bull. 1929: 6. 1929.

Undershrubs. Leaves elliptic-lanceolate, acuminate, serrate, 7-10 x 2-3 cm, covered with short, reddish, crisp hairs on the veins; petiole ca 1 cm long or very short, covered with dense reddish, crisp hairs. Capitula deep yellow, radiate, 7 mm in diam., bracteolate; lower bracteoles leaf like; upper minute. Involucre campanulate, 4-5 cm long; bracts 8, linear-lanceolate, 4-5 cm long, subacute, free. Ray florets long, narrow, oblong. Disc florets 6 mm long. Achenes cylindrical, 5-ribbed, glabrous. Pappus white, barbed, 5 mm long.

Fl. & Fr. Jan. - Feb.

Distrib. India: N.E. region. Mizoram (Lushai Hills); rare.

Endemic.

12. *Synotis nagensium* (C.B. Clarke) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 321. 1984. *Senecio nagensium* C.B. Clarke in J. Linn. Soc. Bot. 35: 39. 1898. *S. densiflorus* Wallich ex DC. var. *mishmiensis* Hook.f., Fl. Brit. India 3: 355. 1881. **Fig. 92.**

Shrubs, perennial, rhizomatous; stems erect, up to 1.8 m tall, densely fulvous white tomentose, branching in the inflorescence. Leaves obovate-elliptic, shortly acuminate, coarsely mucronulate-serrate, 10-15 x 2.5-7.5 cm, coriaceous, greenish black on the upper surface, sparsely arachnoid-tomentose, lower surface densely fulvous tomentose with glandular, brownish hairs, especially on the raised prominent veins; petiole 5-25 mm long, densely tomentose. Capitula discoid or minutely radiate, bracteolate; bracteoles ca 6-8, linear, equalling or exceeding the involucre; peduncle 5-12 mm long, densely fulvous tomentose. Involucre obconic or campanulate, 7-8 x 4-6 mm, densely fulvous tomentose; bracts ca 13, linear-lanceolate, 7-8 x 1-1.5 mm,

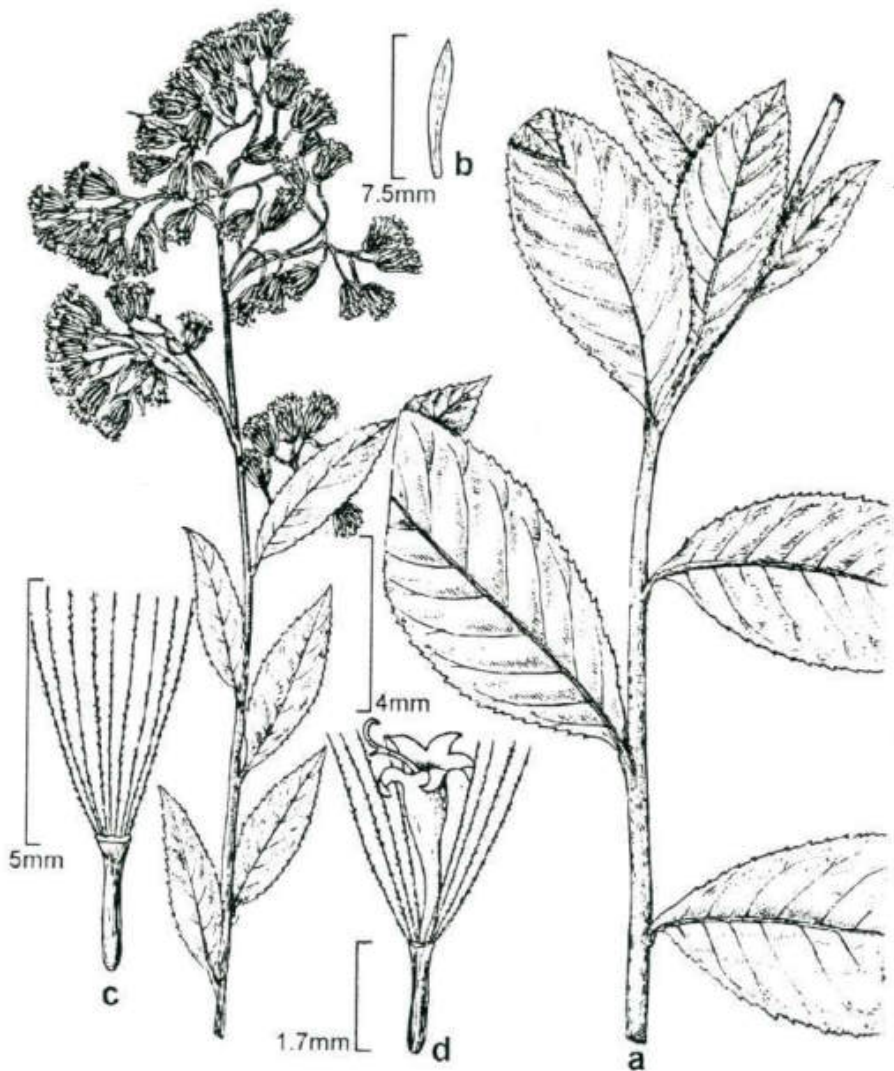


Fig. 92. *Synotis nagensium* (C.B. Clarke) C. Jeffrey & Y.L. Chen. : a. Habit; b. Involucre bract; c. Achene with pappus; d. Disc floret with achene.

acute, herbaceous with scarious margins. Ray florets absent. Disc florets ca 6 mm long; tube 3 mm long; limb 5-lobed; lobes acute. Achenes ca 1.7 mm long, sparsely pubescent. Pappus white, ca 5 mm long.

Fl. & Fr. Aug. - March.

Distrib. India: N.E. region, between 900-1100 m. Assam and Manipur.

N. Burma and China.

Note. Closely allied to *Synotis cappa*.

13. *Synotis rufinervis* (DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 288. 1984. *Senecio rufinervis* DC., Prodr. 6: 369. 1838; Hook.f., Fl. Brit. India 3: 355. 1881. **Fig. 93.**

Shrubs, perennial, erect, rhizomatous, up to 1.5 m tall, erect, stems branches and young corymb greyish white tomentose with brownish pubescence. Leaves oblong-ovate or elliptic, acuminate, sharply mucronulate toothed; teeth black, hooked; 4-18 x 2-10 cm, upper surface green with scattered bristles, lower surface densely greyish white tomentose with reddish brown pubescence on the prominent venation; petiole 2-8 mm long, densely pubescent, biauriculate at the base; auricles elliptic-ovate, foliaceous. Capitula radiate, bracteolate; bracteoles 4-5, linear, often black tipped. Involucre 4.5 mm long, campanulate, sparsely white tomentose; bracts linear-oblong, 4.5 x 2 mm, acute, herbaceous with scarious margins. Ray florets 3-4, 7 mm long; ray 3.5 x 2 mm, elliptic-oblong, 3-4, conspicuous. Disc florets 6.5 mm long; tube 2.5 mm long; corolla 5-lobed; lobes acute. Achenes dark brown, 1.5 mm long, ribbed, sparsely pubescent. Pappus of ray florets 4.5 mm long, of disc florets 6.5 mm long, barbed.

Fl. & Fr. July - Nov.

Distrib. India: W. Himalayas, abundant, in forest undergrowth. Himachal Pradesh and Uttar Pradesh.

Pakistan and Nepal.

14. *Synotis saluenensis* (Diels) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 330. 1984. *Senecio saluenensis* Diels in Notes Roy. Bot. Gard. Edinb. 5: 193. 1912.

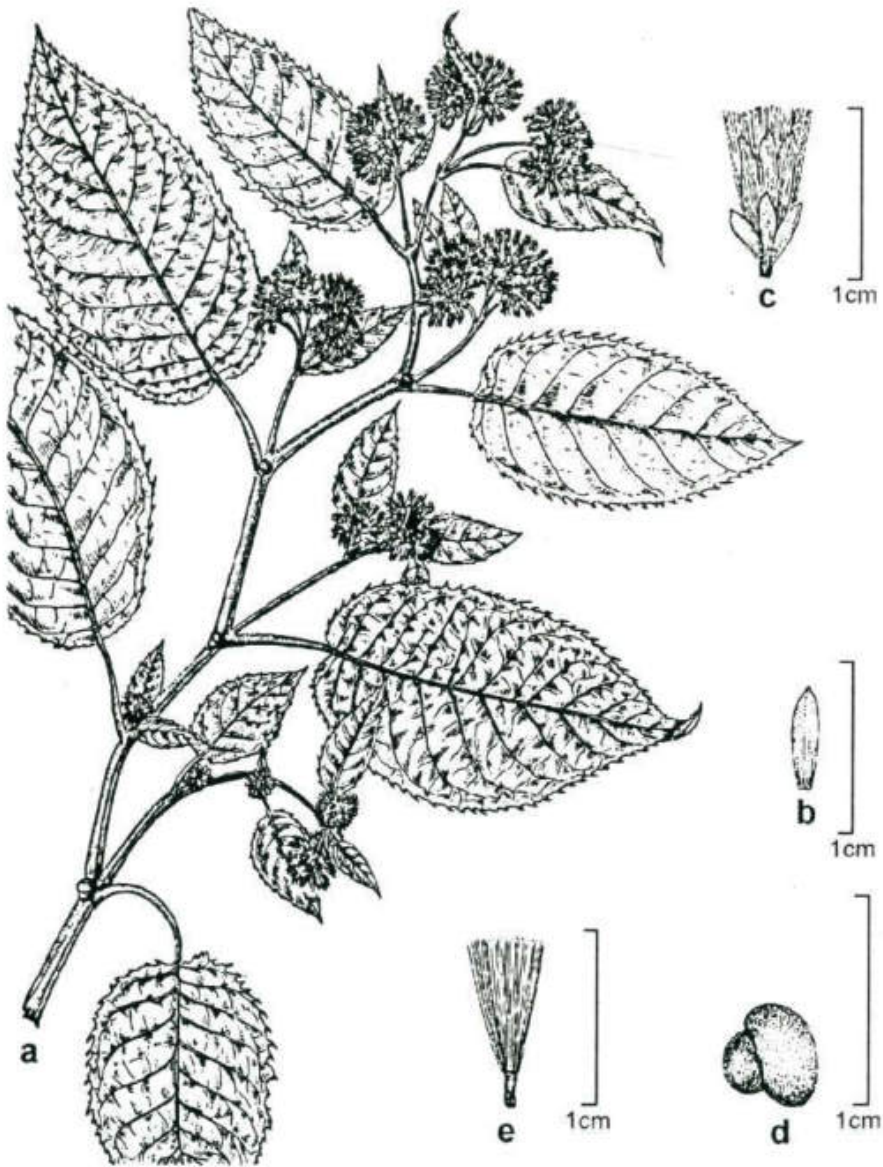


Fig. 93. *Synotis rufinervis* (DC.) C. Jeffrey & Y.L. Chen : a. Habit; b. Involucral bract; c. Capitula; d. Auricle; e. Achene with pappus.

Herbs or subshrubs, scrambling or erect, up to 3 m tall; stems densely glandular, fulvous pubescent, branched in the inflorescence. Leaves elliptic or elliptic-lanceolate, broadly cuneate to rounded, acuminate, coarsely and irregularly mucronate, serrate; 10-22 x 4.5-6.5 cm, glabrous; venation pinnate, prominent on lower surface; petiole 5-10 mm long, pubescent, exauriculate. Capitula heterogamous, conspicuously radiate, in terminal rounded corymb, bracteolate; bracteoles linear, subulate. Involucre narrowly campanulate, 4 x 2-2.5 mm; bracts 8, linear-lanceolate, 4 x 1-1.2 mm, acute, puberulous. Ray florets filiform, inconspicuous, 3 mm long, 2-3-fid at the apex, shorter than the style. Disc florets 3.5 mm long; corolla limb 1.5 mm long, 5-lobed; lobes oblong, acute; tube 2 mm long. Anthers ca 2 mm long. Style arms 1.5 mm long, fringed with short papillae within distinct apical tuft. Achenes cylindrical, 2.5 mm long, glabrous. Pappus white, ca 4 mm long.

Fl. & Fr. Oct. - Feb.

Distrib. India: E. Himalayas. Arunachal Pradesh (Lohit Valley).

Yunnan.

15. *Synotis simonsii* (C.B. Clarke) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 288. 1984. *Senecio simonsii* C.B. Clarke, Comp. Ind. 188. 1876; Hook.f., Fl. Brit. India 3: 356. 1881. **Fig. 94.**

Shrubs, glabrous; stems and branches terete, flexuous. Leaves broadly elliptic, acute, dentate, 10-12.5 cm long, glabrous, shining; venation reticulate, prominent on lower surfaces; petiole very short, ca 5-7 mm long. Capitula discoid, in axillary, small, corymbose panicles, 8-16-flowered ebracteolate; peduncle ca 2 mm long. Involucre campanulate; bracts 7-10, oblong, acute, glabrous. Disc florets 8-16. Achenes 5-ribbed, glabrous. Pappus white.

Fl. & Fr. April - May.

Distrib. India: N.E. region. Assam; rare.

Note. An endangered species, known only from its type collection.

16. *Synotis tetrantha* (DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 308. 1984. *Senecio tetranthus* DC., Prodr. 6: 370. 1838; Hook.f., Fl. Brit. India 3: 352. 1881.



Fig. 94. *Synotis simonsii* (C.B. Clarke) C. Jeffrey & Y.L. Chen

Herbs, perennial, scandent, sparsely pubescent or glabrous; stems branched, terete and leafy. Leaves brownish green, ovate, lanceolate, cordate to truncate, acute-acuminate, irregularly mucronulate, serrate, 4.5-12 x 3-9 cm, sparsely hairy on the upper surface, lower surface pale green, pubescent on the prominent veins; petiole 1.5-3 cm long, yellowish pubescent, exauriculate. Capitula radiate, small, bracteolate; peduncle densely pubescent. Involucre narrowly cylindrical, 5-5.2 x 1-1.2 mm, glabrous; bracts; 4-5, oblong, obtuse, herbaceous with scarious margins. Ray florets yellow, 2, ca 5 mm long; ray linear-oblong, shorter than the style; tube 2.5 mm long. Disc florets yellow, 2-3, ca 7.5 mm long, exserted. Achenes cylindrical, 2-2.5 mm long, puberulous. Pappus reddish brown, 4.5-5 mm long, shorter than the disc florets.

Fl. & Fr. Aug. - Nov.

Distrib. India: E. Himalayas, in mixed forests between 2300-2700 m. Sikkim.

Nepal and China.

17. *Synotis triligulata* (Buch.-Ham. ex D. Don) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 329. 1984. *Senecio triligulatus* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825; Hook.f., Fl. Brit. India 3: 356. 1881.

Herbs, shrubby; stems up to 1.5 m tall, scrambling to erect, flexuous, slender, branched, sparsely pubescent. Leaves elliptic-lanceolate to broadly elliptic-oblong, cuneate, caudate-acuminate, margins irregularly mucronulate-serrate, 10-20 x 4-6.5 cm, blackish on drying, glabrous on both the surfaces, venation prominent on the lower surface; petiole 1.5-2.5 cm long, glabrous, exauriculate. Capitula minutely radiate, bracteolate; peduncle 3-5 mm long, pubescent, bracteate. Involucre cylindrical, 3-4 mm long; bracts linear-lanceolate, 3-4 x 1 mm, subacute, puberulous at the apex, glabrous with scarious margins. Ray florets yellow, 4.5 mm long; ray linear-oblong, 2.5 mm long, shorter than the style; tube 2 mm long. Disc florets 3-4, ca 5 mm long; tube 2 mm long, exserted. Achenes 1.5 mm long, glabrous. Pappus white, ca 5 mm long.

Fl. & Fr. Oct. - May.

Distrib. India: E. Himalayas, 1200-2100 m. Arunachal Pradesh (Mishmi Hills) and Sikkim.

Nepal, Bhutan, Myanmar, Thailand and China.

18. *Synotis vagans* (Wallich ex DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 288. 1984. *Senecio vagans* Wallich ex DC., Prodr. 6: 368. 1838; Hook.f., Fl. Brit. India 3: 355. 1881.

Herbs, perennial, glabrous, erect; stems and branches terete, pale brown. Leaves blackish brown or green, ovate to elliptic-lanceolate, caudate-acuminate, 2.5-10 x 0.5-4 cm, glabrous on the upper surface, lower surface paler with prominent venation; petiole short, 3-5 mm long, glabrous, auriculate at the base. Capitula radiate, ebracteolate; peduncle filiform, 5 mm long, minutely bracteate. Involucre campanulate glabrous; bracts linear-oblong, 5-5.5 x 0.1 mm, acute with purplish tip, herbaceous with narrow scarious margins. Calyculate bracts setaceous at the forks of the corymbs. Ray florets ca 11 mm long; ray linear-oblong; tube 4.2 mm long. Disc florets 7-8 mm long, tube 3 mm long. Achenes pale brown, 2.2 mm long, slender, glabrous. Pappus pale white, 6 mm long.

Fl. & Fr. April - May.

Distrib. India: E. Himalayas. Sikkim; rare.

Nepal.

19. *Synotis wallichii* (DC.) C. Jeffrey & Y.L. Chen in Kew Bull. 39(2): 305. 1984. *Senecio wallichii* DC., Prodr. 6: 364. 1838; Hook.f., Fl. Brit. India 3: 353. 1881.

Herbs, perennial, dwarf, rhizomatous; rhizomes thick, short, woody; vegetative stems ca 1.5-6 cm long, erect, ascending, leafless except at the apex; flowering stems ca 25 cm long, slender, scapiform, greyish pubescent. Leaves broadly ovate, acuminate, coarsely sinuate toothed, 2-10 x 1.5-9 cm, greyish green, with scattered hairs on the upper surface, lower surface greyish pubescent, particularly on the prominent veins; petiole 4-6 cm long, slender, pubescent. Capitula minutely radiate, bracteolate, on short peduncle. Involucre narrowly cylindrical, 6-7 x 1.5 mm, pubescent; bracts 5, oblong, 6-7 x 2 mm, subacute, puberulous at the apex, herbaceous with narrow scarious margins. Ray florets yellow, 2, filiform, 7-8 mm long; ray oblong, 2 mm long, 4-5-lobed at the tip; tube 5.5-6 mm long. Disc florets 3, ca 8 mm long; limb ca 4.5 mm long, 5-lobed; lobes triangular-ovate, acute. Achenes cylindrical, 2.2 mm long, glabrous. Pappus pale white, much shorter than the disc florets, ca 7 mm long.

Fl. & Fr. Aug. - Oct.

Distrib. India: E. Himalayas. Sikkim.

Nepal, Bhutan and China.

Subtribe 2. PSEUDOJACOBINEAE R. Mathur, subtrib. nov.

Subtribe Eusenecioneae affines sed bracteis involucribus multiseriatis et imbricatis differt.

Herbs, densely leafy. Capitula heterogamous, radiate. Involucri bracts multiseriata, imbricata, unequal. Anthers obtuse, not tailed. Style arms bifid with prominent apical tuft of papillae.

Type. *Pseudojacobaea* (Hook.f.) R. Mathur.

Pseudojacobaea (Hook.f.) R. Mathur in R. R. Rao *et al.*, Fl. Ind. Enum. Aster. 59. 1988. *Senecio* Sect. *Pseudojacobaea* Hook.f., Fl. Brit. India 3: 343. 1881.

Herbs, perennial, erect, rigid, 15-45 cm high; stems densely leafy. Leaves dense, imbricate, uniformly arranged on the stems, smaller upwards, linear-oblong to elliptic, acute, coriaceous, hispid, margins entire or rarely toothed, recurved, pinnately veined, sessile; uppermost leaves distinctly one-nerved. Inflorescence of lax corymbs. Capitula pale white, campanulate, pedunculate, bracteolate. Involucre campanulate; bracts 20-40, multiseriata, imbricate. Receptacle flat, naked. Anthers obtuse, not tailed. Achenes cylindrical, slender, strongly ribbed, glabrous to pubescent. Pappus pale white, minutely scabrid.

A monotypic genus.

Note. Hooker (l.c.) described the section *Pseudojacobaea*, under the genus *Senecio* L., However, based on the presence of imbricate, multiseriata involucri bracts, an anomalous feature for the true *Senecio* (sensu stricto), a new status as above was proposed (Mathur, l.c.) and a new subtribe has been proposed to accommodate it.

Pseudojacobaea lavandulaefolius (DC.) R. Mathur in R.R. Rao *et al.*, Fl. Ind. Enum. Aster. 59. 1988. *Senecio lavandulaefolius* DC., Prodr. 6: 367. 1838; Hook.f., Fl. Brit. India 3: 343. 1881. **Fig. 95.**

Herbs, erect, 15-45 cm high, fulvous tomentose; stems strict, unbranched or branched. Leaves linear-oblong to ovate-elliptic, acute, entire or rarely toothed, 1-4 x 0.3-1 cm, coriaceous, densely imbricate, hispid on both the surfaces, lowermost with pinnate venation, uppermost distinctly one-nerved, sessile with broad auricled base. Capitula radiate, in terminal, lax corymbs; bracteolate; bracteoles linear; peduncles 1-15 cm long. Involucre broadly campanulate, glabrous to white tomentose; bracts lanceolate, acuminate, herbaceous with scarious margins, tip slightly ciliate. Ray florets yellow, 10-16, 10-11.2 mm long; ray linear-oblong, ca 7 mm long, 4-nerved, 3-dentate at the tip; tube ca 4 mm long. Disc florets yellow, ca 3.5 mm long; limb 5-lobed, 1.5 mm long; tube 2 mm long. Anthers ca 2 mm long. Achenes slender, 1-3 mm long, strongly ribbed, glabrous to pubescent. Pappus pale white, ca 4 mm long, minutely barbed.

Fl. & Fr. Feb. - June.

Distrib. India: C. and S. India, between 1950 - 2000 m. Rajasthan, Kerala and Tamil Nadu.

Subtribe 3. TUSSILAGINEAE Hook.f.

Herbs, dwarf to medium sized, erect to scapigerous; stems glabrous to white tomentose or greyish tomentose with black glandular pubescence. Leaves all basal or both radical and cauline; radical leaves long petioled; cauline leaves small, linear, bractiform to large, ovate-oblong, orbicular-cordate to sagittate to reniform, dentate or deeply lobed to pinnatifid. Capitula yellow, purple or white or greenish yellow, heterogamous, radiate or homogamous, discoid, large, terminal, small and few in simple lax or dense raceme or corymb, cernuous or erect on long or short peduncle. Involucral bracts 1-2-seriate, subequal, free, nearly to the base. Ray florets uniseriate to multiseriate. Anthers subtire to small auricled. Style arms flattened or narrowly clavate, papillose, not hairy all round. Achenes oblong, angular, narrowly cylindrical, ribbed, glabrous. Pappus of white to dull brown to reddish, minutely barbellate hairs, copious scanty.

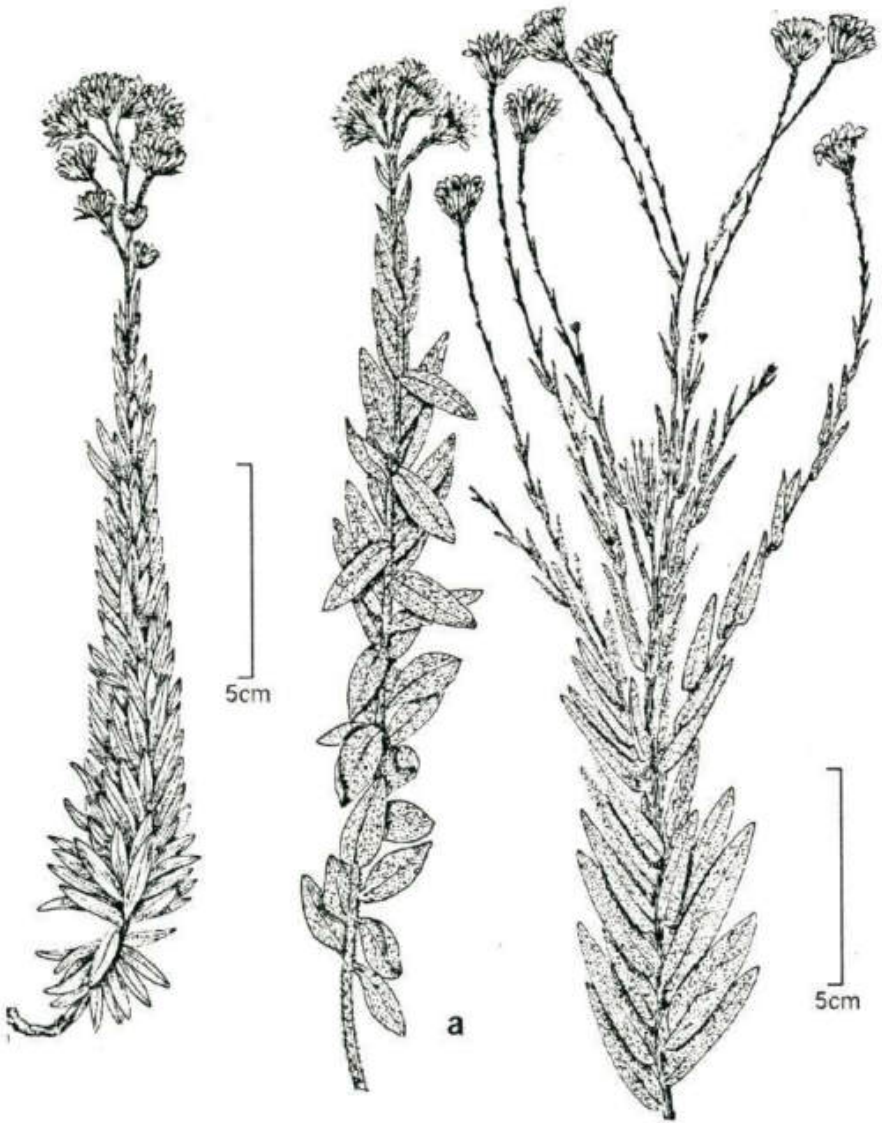


Fig. 95. *Pseudojacobaea lavandulaefolius* (DC.) R. Mathur

Nepal, Tibet, China, N. America, Africa, Europe, Vietnam; 3 genera and 18 species in India.

KEY TO THE GENERA

- | | |
|--|-------------------------|
| 1a. Capitula radiate or discoid, mostly drooping; peduncles not scaly; involucre bracts 2-or few-seriate | 1. <i>Cremanthodium</i> |
| b. Capitula radiate, never discoid, erect, terminating the long, scaly peduncles; involucre bracts 1-2-seriate | 2 |
| 2a. Capitula solitary; | 3. <i>Tussilago</i> |
| b. Capitula many; | 2. <i>Petasites</i> |

1. *Cremanthodium* Benth. emend R. Good

Herbs, perennial, dwarf to medium sized, rhizomatous; stems erect, simple, densely greyish tomentose with black glandular hairs or glabrous. Leaves both radical and cauline; petiole glabrous to sparingly black-glandular pubescent, slender to stout, winged or simple with broad sheathing base; cauline leaves alternate, small, linear, bractiform, or large, ovate-oblong, overlapping, covering most part of the scape, glabrous to densely greyish or white tomentose with black glandular pubescence on the lower surface, shortly petioled or sessile with large vaginate base. Capitula heterogamous, radiate or discoid, yellow to pale pink, large, solitary terminal, or small and few in simple, lax or dense raceme or corymb, cernuous or semicernuous, rarely erect, suburceolate, hemispheric or campanulate, fragrant. Involucre broadly campanulate, densely greyish tomentose with black glandular hairs; bracts sub 2-seriate, overlapping, unequal. Receptacle flat, subconvex, naked and pitted. Ray florets conspicuous, uniseriate, elliptic, equally cuneate at both ends or very long, gradually tapering, broader at the base or obtuse and broadest above, prominently nerved, entire to 3-4-toothed at the apex. Disc florets numerous, tubular. Anther base subentire or small auricled. Style arms short or long, flattened, obtuse or acute, papillose. Achenes oblong, angular, narrowed above, 5-10-ribbed, glabrous, all pappose. Pappus hairs white, dull bronze, or reddish, copious, slender, rough, barbellate.

Distributed in Nepal, Tibet and China; ca 55 species, 14 in India.

Literature. GOOD, R. (1929). The Taxonomy and geography of the Sino-Himalayan genus *Cremanthodium* Benth. *J. Linn. Soc. Bot.* 48: 259-316. HOFMAN, (1894). *Pflanzenfamilien* 4(5): 301. LUDLOW, F. (1976). *Cremanthodium*. Reliquiae Botanicae Himalaica. *Bull. Brit. Mus. Nat. (Bot.)* 5(5): 278-279.

KEY TO THE SPECIES

- 1a. Capitula discoid 5. *C. discoideum*
 b. Capitula radiate 2
 2a. Leaves pinnatifid 10. *C. pinnatifidum*
 b. Leaves dentate, crenate, lobed or subentire 3
 3a. Leaves linear, oblanceolate-linear or rotundate 2. *C. bhutanicum*
 b. Leaves oblong-ovate, elliptic-oblong, reniform or palmately divided or roundly reniform 4
 4a. Leaves reniform or palmately divided or roundly reniform 5
 b. Leaves oblong-ovate to elliptic-oblong 10
 5a. Leaves pubescent or tomentose beneath 6
 b. Leaves glabrous beneath 8
 6a. Leaves palmately lobed or roundly reniform with dense purple hairs beneath 9. *C. palmatum*
 b. Leaves reniform, pubescent or tomentose beneath 7
 7a. Herbs upto 25 cm high; radical leaves whitish-brown tomentose beneath 4. *C. decaisnei*
 b. Herbs upto 90 cm high; radical leaves crispate pubescent beneath 13. *C. retusum*
 8a. Capitula orange-yellow, nodding 14. *C. thomsoni*
 b. Capitula yellow, not nodding 9
 9a. Herbs upto 90 cm high; capitula always solitary and terminal; ray florets oblanceolate 12. *C. reniforme*
 b. Herbs upto 50 cm high; capitula one to many arranged in corymb or umbel, ray florets elliptic 3. *C. cremanthodioides*
 10a. Medium sized herbs 11
 b. Dwarf herbs 13
 11a. Involucral bracts connate at the base 1. *C. arnicoides*
 b. Involucral bracts free at the base 12
 12a. Leaves broadly elliptic; apex rotundate; capitula nodding 8. *C. oblongatum*
 b. Leaves oblong-elliptic; apex subacute; capitula not nodding 11. *C. pseudooblongatum*
 13a. Densely steel grey lanate herbs; capitula 4-7 cm ind diam., nodding 6. *C. ellisii*
 b. Densely white woolly herbs; capitula ca 2.5 cm in diam., not nodding 7. *C. nanum*

1. *Cremanthodium arnicoides* (Wallich) R. Good in J. Linn. Soc. Bot. 48: 288. 1929. *Senecio arnicoides* Wallich, Cat. 3138. 1831; Hook.f., Fl. Brit. India 3: 351. 1881. *Ligularia arnicoides* DC. ex Royle, Ill. Bot. Himalaya. 251. t. 60. f. 2. 1835. *Senecio connatus* Balakr. in J. Bombáy Nat. Hist. Soc. 67: 61. 1970. Fig. 96.

Herbs, stout, erect, sparingly hairy or white tomentose, ca 1 m high. Leaves oblong-ovate or elliptic-oblong, obtuse, coarsely dentate to entire, 2-20 x 1.5-10 cm, coriaceous, glabrous to floccose tomentose; lower leaves narrowed into a stout petiole; petiole ca 16-18 cm long, winged above; upper leaves sessile with amplexicaul base. Capitula bright yellow, broadly campanulate, many in simple or branched raceme, drooping, ca 5 cm in diam., ebracteolate. Involucre broadly campanulate, black glandular-pubescent; involucral bracts black, oblong-ovate, obtuse, 7-8 x 1.2-2 mm, connate at the base. Ray florets



Fig. 96. *Cremanthodium arnicoides* (Wallich) R. Good

many, ca 15 mm long; ray broadly elliptic; ca 12 mm long, 3-4-dentate at the tip; 5-9-veined; tube ca 5.3 mm long. Achenes pale brown, broader upwards, ca 6 mm long, strongly ribbed. Pappus of dirty white, scabrid hairs, ca 3-5 mm long.

Fl. & Fr. July - Sept.

Distrib. India: N. W. Himalayas between 3500-5000 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

2. *Cremanthodium bhutanicum* Ludlow in Bull. Brit. Mus. (Nat. Hist.) Bot. 5(5): 278. 1976.

Herbs, perennial; stems erect, 8-25 cm high, striate, arachnoid tomentose above and glabrous with many long fibrous remains of petioles of old leaves at the base. Radical leaves linear to oblanceolate-linear, rotundate, cuneate, obtuse, entire with reflexed margins, 6-10, 2-10 x 0.2-0.9 cm, glabrous, pale green above glaucous beneath; petiole 1-5 cm long, slightly winged; cauline leaves 4-9, lower linear, 2-3 cm long, base amplexicaul; upper 1-1.5 cm long. Capitula radiate, solitary, nodding, 2.5-3.5 cm in diam., bracteolate; bracteoles many, subulate. Involucre 8-12 mm long; bracts narrowly lanceolate or lanceolate, acute, 8-12 x 1.5-3 mm, margins pale; upper surface green, glabrous, lower surface distinctly veined. Ray florets 12-13, female, 10-22 mm long; rays 10-20 x 2.5-5 mm, obtuse, rarely subacute, 4-7-nerved, tridentate; tube 1.5-2 mm long. Disc florets ca 30-40, hermaphrodite; corolla limb 6-6.5 mm long, 5-lobed; lobes 0.75-1 mm long, acute; tube cylindrical. Anthers 2.5-3 mm long. Ovary glabrous. Stigma lobes papillose. Achenes broadly to narrowly oblong, 2-2.5 x 0.5-0.75 mm, glabrous. Pappus hairs white, longer than the corolla.

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas, at 4570 m. Arunachal Pradesh (Ze la).

Bhutan.

3. *Cremanthodium cremanthodioides* (Hand.-Mazz.) R. Good in J. Linn. Soc. 48: 279. 1929. *Ligularia cremanthodioides* Hand.-Mazz. in Anz. Acad. Wiss. Wien. Math. Nov. 62. 1925.

Herbs; stems up to 50 cm high, erect, glabrous below, short, black, glandular hairy above. Radical leaves reniform, glabrous, closely and acutely

dentate, long petioled; cauline leaves reniform to linear, with broad sheathing base. Capitula radiate, one to many, arranged in corymb or umbel. Involucre campanulate; bracts dark brown or black, narrow, acute, more or less covered with short, dark, glandular hairs. Ray florets yellow, long; rays elliptic, ca 5-nerved, 2-3 times longer than the tube. Disc florets tubular. Pappus white.

Distrib. India: E. Himalayas, in wet places and open rocky alpine pastures between 3600-4500 m. Sikkim; rare.

S.E. Tibet and N.W. Yunnan.

4. *Cremanthodium decaisnei* C.B. Clarke, Comp. Ind. 168. 1876; Hook.f., Fl. Brit. India 3: 331. 1881. **Fig. 97.**

Herbs, brown, perennial, brownish black pubescent, up to 25 cm high; stems erect, simple, glabrous below, brownish black pubescent above, grooved. Radical leaves reniform, mucronately dentate, 2.5 x 3-4 cm, glabrous above, appressed brownish white tomentose beneath; petiole ca 3-5 cm long; cauline leaves few, much reduced, lanceolate with sheathing base, densely pubescent, sessile. Capitula, broadly campanulate, solitary, nodding, ca 2.5 cm in diam., bracteolate; bracteoles black, 2-3, linear, subulate. Involucre campanulate, pubescent; bracts 10-15, in two series, overlapping; outer narrower, linear-lanceolate, 11.5 x 2 mm, acute; inner bracts elliptic-oblong, 11 x 3 mm, faintly 3-5-ribbed. Ray florets yellow, linear-oblong, ca 16-19 mm long; tube distinct or very obscure. Disc florets ca 8 mm long; limb ca 6 mm long; tube ca 2 mm long. Achenes of ray florets linear-oblong, 3.5 mm long, glabrous to sparingly pubescent; those of disc florets blackish brown, linear-oblong, 6 mm long, pubescent. Pappus of white, scabrid hairs, 5-6 mm long; those of disc florets ca 9-10 mm long.

KEY TO THE FORMA

- | | |
|------------------------------------|--------------------------|
| 1a. Ray florets with distinct tube | 4.2. f. <i>decaisnei</i> |
| b. Ray florets with obsolete tube | 4.1. f. <i>clarkei</i> |

4.1. f. *clarkei* R. Good in J. Linn. Soc. Bot. 48: 275. 1929.

Fl. & Fr. June - Oct.

Distrib. India: E. Himalayas. Sikkim.

4.2. f. decaisnei

Fl. & Fr. June - Oct.

Distrib. India: Himalayas. Jammu & Kashmir, Uttar Pradesh and Sikkim.

5. *Cremanthodium discoideum* Maxim. in Bull. Acad. Sci. St. Petersb. 27: 483. 1882. *C. cuculliferum* W.W. Smith in Rec. Bot. Surv. Ind. 4: 209. 1911.

Herbs, small, dwarf; stems glabrous below, white cottony mixed with black glandular hairs above. Leaves both radical and cauline; radical leaves blackish brown, elliptic to ovate-oblong, obtuse, subentire, thick, recurved; 1-2 x 0.5 cm, blackish brown, glabrous above, pale below with prominent venation, glabrous; petiole 2 cm long; cauline leaves 1-2, small, linear-oblong, obtuse, upper surface blackish villous. Capitula discoid, hemispherical, solitary, 2-2.5 cm in diam. Involucre densely white cottony mixed with black hairs; bracts oblong, ca 12 mm long, acuminate, black villous. Disc florets 7 mm long; corolla limb ca 4.5 mm; tube ca 2.5 mm long. Achenes elliptic-oblong, ca 1.5 mm, glabrous. Pappus of white, slender hairs, ca 7 mm long.

Distrib. India: E. Himalayas. Sikkim.

Nepal and China.

6. *Cremanthodium ellisii* (Hook.f.) Kitam. in Hara *et al.*, Enum. Fl. Pl. Nepal 3: 22. 1982. *Werneria ellisii* Hook.f., Fl. Brit. India 3: 357. 1881. *Senecio arnicoides* var. *frigida* Hook.f., Fl. Brit. India 3: 351. 1881; *Cremanthodium plantagineum* Maxim. in Bull. Acad. Sci. Peters. 27: 482. 1881. *C. plantagineum* f. *ellisii* (Hook.f.) R. Good in J. Linn. Soc. Bot. 48: 293. 1929. *Senecio kunawarensis* Nair, Fl. Bashahr Himalaya 164. 1977.

Herbs, dwarf; stems erect, simple, steel grey lanate above, glabrous and stramineous below. Radical leaves elliptic, subacute, subentire to dentate, 3-7 x 1.5-3 cm, glabrous; petiole 3-5 cm long; cauline leaves linear, smaller, densely greyish black tomentose, sessile, amplexicaul. Capitula radiate, hemispherical, solitary, terminal, nodding, 4-7 cm in diam. Involucre densely greyish tomentose with black glandular hairs; bracts linear-lanceolate to ovate-lanceolate, acute to acuminate, densely greyish tomentose with black, glandular hairs. Ray florets yellow, ca 15-16, 10-14 x 2.5-3 mm; rays elliptic oblong, 5-7-nerved, 2-3-toothed. Disc florets numerous, 6-7 mm long; corolla limb narrowly

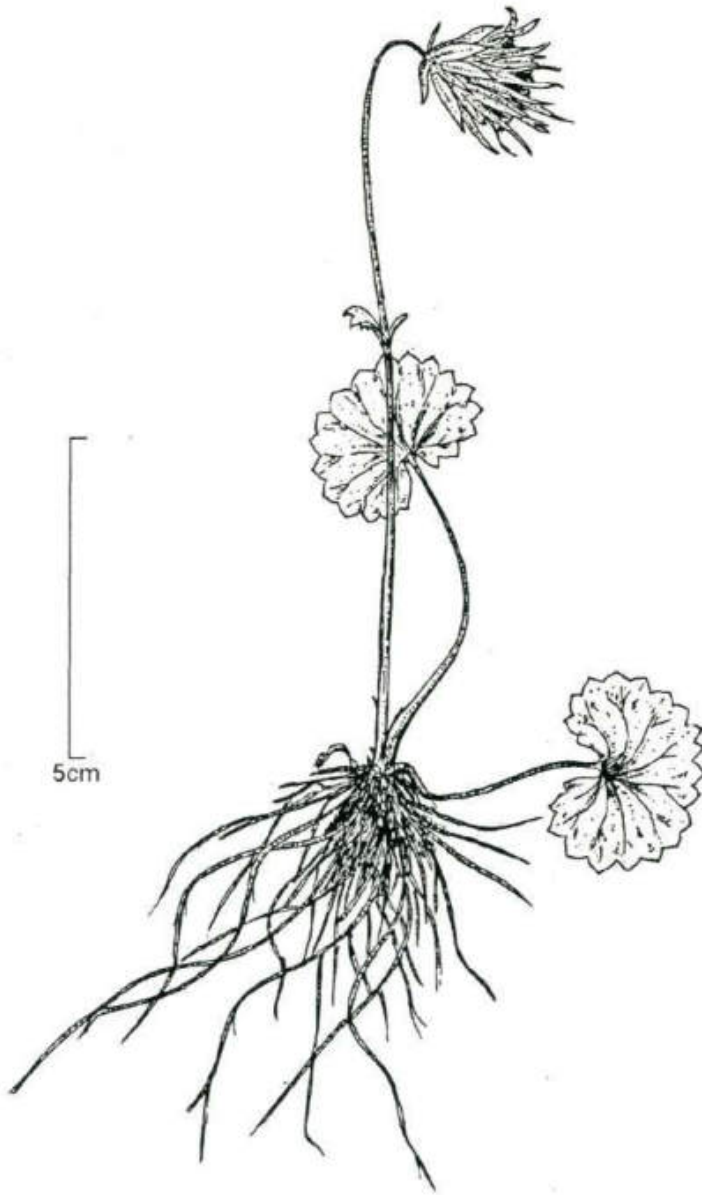


Fig. 97. *Cremanthodium decaisnei* C.B. Clarke f. *decaisnei*

campanulate, ca 4 mm long. Achenes elliptic-oblong, ca 1.5 mm long, terete. Pappus of ray florets white, 4.5-6 mm long, scabrid, scanty; of disc florets white, 6 mm long, scabrid, copious.

Fl. & Fr. June - Sept.

Distrib. India: W. Himalayas, on screes and open slopes between 3000-4800 m. Jammu & Kashmir and Himachal Pradesh.

Nepal.

7. *Cremanthodium nanum* (Decne.) W.W. Smith in Notes Roy. Bot. Gard. Edinb. 14: 118. 1924. *Ligularia nana* Decne. in Jacquem. Voy. (Bot.) 4. 91. t. 99. 1844. *Werneria nana* (Decne.) Benth., Gen. Pl. 2: 451. 1873; Hook.f., Fl. Brit. India 3: 357. 1881. *Senecio clarkeanus* Franch. in Bull. Soc. Bot. Fr. 39: 22. 1892.

Herbs, dwarf; rootstock creeping; stems erect, 6-13 cm high, densely white woolly. Radical leaves elliptic-ovate to orbicular, obtuse, entire, 10 x 5 mm, glabrous, long petioled; cauline leaves serrate, densely woolly beneath, amplexicaul. Capitula yellow, radiate, solitary, ca 2.5 cm in diam., on stout peduncle. Involucre hemispherical; bracts linear, oblong, ca 16 mm long, obtuse, connate below into a cup, densely covered with long, black, curled hairs. Ray florets yellow, elliptic-ovate, ca 10 mm, 3-5-veined, 3-dentate at the apex; ray ca 7 mm; tube ca 3 mm long. Style arms linear. Disc florets yellow; corolla limb conical, ca 7 mm long; tube very obscure. Achenes of ray florets elliptic-oblong, 1.5-2 mm, glabrous; those of disc florets dark brown, grooved. Pappus white, ca 3 mm long; those of disc florets, 5-6 mm long, scanty.

Fl. & Fr. June - Aug.

Distrib. India: W. Himalayas. Uttar Pradesh.

Nepal and China.

8. *Cremanthodium oblongatum* C.B. Clarke, Comp. Ind. 16. 1876; Hook.f., Fl. Brit. India 3: 331. 1881. *Senecio oblongatus* (C.B. Clarke) Franch. in Bull. Soc. Bot. Fr. 39: 286. 1892.

Herbs; stems ca 30 cm high, striate, glabrous below, slightly araneose above, leafy at the base; upper part subscapiform. Radical leaves broadly

elliptic, rotundate at apex, truncate or cuneate at base, irregularly; coarsely dentate, 7-13 x 4.5-7 cm, glabrous on both the surface, petiole ca 3-7 cm long, gradually widened above; cauline leaves oblong, 3-6 cm long, obtuse, mucronately denticulate or subentire, glabrescent or sparsely araneose on the lower surface, base broad, sheathing, amplexicaul, overlapping and covering most part of the scape; upper most cauline leaves linear, bractiform. Capitula radiate, solitary, or few, 4-5 cm in diam., nodding. Involucre hemispherical, 0.1-2 x 3 cm, blackish green araneose, ebracteolate; bracts linear-lanceolate, ca 10 mm long acute-acuminate, araneose below, margins white ciliated; outer lanceolate, 2-3 mm broad; inner oblong, ca 5 mm broad. Ray florets yellow, 18-20 x 4.5-5.5 mm; ray 7-8-veined; tube 1.5 cm long. Disc florets 6.5 mm long; corolla lobes ca 1 mm long. Anthers 2 mm long. Style arms obtuse. Achenes glabrous. Pappus of white, minutely scabrid hairs.

Distrib. India: Himalayas, 3600-5000 m. Uttar Pradesh and Sikkim.

Nepal, Tibet and China.

9. *Cremanthodium palmatum* Benth. in Hook., Ic. Pl. 17: 1142. 1873; Hook.f., Fl. Brit. India 3: 331. 1881.

Herbs, small, rhizomatous, up to 20 cm high; stems simple, purple hairy above. Leaves palmately divided or roundly reniform, 1-2.5 cm in diam., glabrous above or with few scattered hairs on the margins, lower surface purple hairy. Radical leaves petioled; petiole 3-3.5 cm long; cauline leaves reniform to linear, petiolate; petiole without sheathing base. Capitula radiate, campanulate, usually solitary, rarely 2-3, ca 2.5 cm in diam. Involucre campanulate; bracts ovate to lanceolate, ca 10 mm long, acute. Ray florets rose pink, ca 18 mm long; rays obtuse, ca 14.5 mm long, deeply 2-3-lobed at the apex; tube ca 3.5 mm long, Disc florets rose purple, ca 10 mm long; limb ca 8 mm long. Style much exserted. Achenes elliptic-oblong, flattened. Pappus white, ca 7 mm long, scabrid.

KEY TO THE SUBSPECIES

- | | |
|--|----------------------------------|
| 1a. Leaves roundly reniform | 9.2. subsp. <i>palmatum</i> |
| b. Leaves palmately lobed | 2 |
| 2a. Margins of leaves distinctly dentate | 9.3. subsp. <i>rhodocephalum</i> |
| b. Margins leaves not as above | 9.1. subsp. <i>benthamii</i> |

9.1. subsp. *benthamii* R. Good in J. Linn. Soc. Bot. 48: 271. 1929.

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas. Sikkim.

Bhutan and Tibet.

9.2. subsp. *palmatum*

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas, between 4000-4500 m. Sikkim (Kankola valley).

Bhutan, Tibet and China.

9.3. subsp. *rhodocephalum* R. Good in J. Linn. Soc. Bot. 48: 271. 1929.

Fl. & Fr. Aug. - Sept.

Distrib. India: N.E. region. Assam.

Myanmar, S.E. Tibet and China.

10. *Cremanthodium pinnatifidum* Benth. in Hook., Ic. Pl. 17: 1142. 1873; Hook.f., Fl. Brit. India 3: 332. 1881. *Senecio himalayensis* Franch. in Bull. Soc. Bot. Fr. 39: 281. 1892.

Herbs, dwarf, ca 15 cm high; stems simple, erect, black hairy above, glabrous below. Leaves both radical and cauline; radical leaves oblong, pinnatifid, 3 x 1 cm, glabrous on both surfaces, lower surface pale yellow with prominent venation; petiole dark brown, 1.5-2 cm, with sheathing base; cauline leaf only one, bract like, sessile, amplexicaul. Capitula solitary, ca 3 cm in diam. Involucre broadly campanulate, ebracteolate, black pubescent; bracts 3-5, elliptic-lanceolate, 10 x 3.5 mm, obtuse, black hairy at the apex, obscurely nerved on the dorsal surface, margins narrow, scarious. Ray florets oblong 10-20 mm long; tube obscure; ray 3-5-veined, deeply 3-dentate at the tip. Disc florets tubular; ca 7.5 mm long; tube very short. Anthers ca 3 mm long.

Achenes dark brown, broadly oblong-elliptic, ca 2 mm long, glabrous, faintly ribbed. Pappus white, ca 3 mm long. Achenes of disc florets elliptic-oblong, ca 1.5 mm long. Pappus of white, simple hairs, 4.5 mm long.

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas, between 4000-5000 m. Sikkim.

Nepal, Bhutan and S.E. Tibet.

11. *Cremanthodium pseudo-oblongatum* R. Good in J. Linn. Soc. Bot. 48: 299. 1929.

Herbs, up to 45 cm high; rootstock thick; stems striate, glabrous, covered with fibrous remains of the petioles at the base. Radical leaves oblong-elliptic, truncate, subacute, entire to subdentate, 6 x 3.5 cm, glabrous; petiole ca 3 cm long, slightly winged and sheathing at the base. Cauline leaves yellow, 4-5, elliptical to linear, sessile. Capitula radiate, hemispherical, mostly solitary, 6 cm in diam. Involucral bracts linear-lanceolate, ca 10 mm long. Ray florets yellow, ca 22 mm long; ray narrowly lanceolate, ca 20 mm, 3-dentate at the apex, ca 8-veined; tube ca 2 mm long. Disc florets numerous, tubular, upper 3/4 part sub cylindrical. Pappus of white hairs, ca 7 mm long.

Distrib. India: E. Himalayas, between 900-2600 m. Sikkim.

S. Tibet.

12. *Cremanthodium reniforme* (DC.) Benth. in Hook. Ic. Pl. 17: 1141. 1873; Hook.f., Fl. Brit. India 3: 330. 1881. *Ligularia reniformis* DC., Prodr. 6: 315. 1838. *Senecio reniformis* Wallich, Cat. 3141. 1831.

Herbs, rhizomatous, up to 90 cm high; stems simple, erect, blackish with dense black hairs above, glabrous and shining below. Leaves both radical and cauline; radical leaves reniform, dentate, ca 5 x 7 mm, glabrous on both the surfaces, pale below with prominent veins; petiole 10-18 cm long, straw like; cauline leaves reniform, mucronate dentate, 4.5-7 cm, glabrous, paler below; petiole stramineous, 17-18 cm long, slender, with broad sheathing, amplexicaul base. Capitula radiate, terminal, ca 5 cm in diam., bracteolate. Involucre broad, hemispherical, black glandular pubescent; bracts 9-10, broadly oblong-lanceolate, 10-11 x 5-6 mm, densely black glandular pubescent on the dorsal surface, margins broad and scarious. Ray florets yellow, ca 25 mm long; rays

oblanceolate, 3-5-veined, 3-dentate at the tip; tube obscure. Disc florets campanulate, ca 10 mm long; tube obscure. Style very long, exerted. Achenes of ray florets; dark brown, broad, conical, ca 3 mm long, ribbed. Pappus bronze, 6-7 mm long. Achenes of disc florets conical, narrow, 3 mm long. Pappus of unequal, scabrid hairs, ca 10 mm long.

Fl. & Fr. Aug. - Sept.

Distrib. India: Himalayas. Himachal Pradesh, Uttar Pradesh and Sikkim.

Nepal and Bhutan.

13. *Cremanthodium retusum* (DC.) R. Good in J. Linn. Soc. Bot. 48: 278. 1929. *Ligularia retusa* DC., Prodr. 6: 314. 1838. *Senecio retusus* (Wallich ex DC.) C.B. Clarke, Comp. Ind. 206. 1876; Hook.f., Fl. Brit. India 3: 350. 1881. *Ligularia nigropilosa* Kitam. in Act. Phyt. Geobot. 15: 107. 1954.

Herbs; rhizome short; stems stout, up to 90 cm high, 3-4 mm in diam., striate, glabrous below, araneose above with blackish crisp hairs. Radical leaves reniform, retuse, acutely dentate, 7.5-9 x 5-6 cm, upper surface green, minutely white pubescent, lower surface paler, crispate pubescent on the veins; petiole ca 18-20 cm long, covered with dilated blackish hairs at the base; cauline leaves reniform to linear, mucronately dentate; 5-10 x 2.5-5 cm; petiole 3.5-8 cm long, sheathing at the base. Capitula radiate, broadly campanulate, solitary or in a lax 3-8-headed receme, nodding, 2.5 cm in diam., bracteolate; bracteoles 1-4, linear, 3-6 mm long. Involucre green, hemispherical, 11 x 19-20 mm, bracts biseriata, subequal, minutely crispate pilose on the dorsal surface; outer ones lanceolate, acute, margins ciliate; inner ones oblong. Ray florets orange yellow, 11-14, 3-dentate at the apex, 11 x 2.5-3 mm; tube ca 4 mm long. Disc florets ca 5.5 mm long; tube 2 mm long. Style arms truncate. Achenes linear, ca 4.5 mm long, smooth. Pappus hairs white, ca 5 mm long, unequal, minutely scabrid.

Distrib. India: E. Himalayas. Sikkim.

Nepal.

14. *Cremanthodium thomsoni* C.B. Clarke, Comp. Ind. 169. 1876; Hook.f., Fl. Brit. India 3: 331. 1881.

Herbs, small, erect, up to 20 cm high; stems simple, slender, minutely scattered black hairy throughout or only above. Leaves all radical or subradical; radical leaves reniform, dentate, 1.5-3 cm in diam., glabrous on both the surfaces; lower surface paler with prominent venation; petiole ca 2-6 cm long with sheathing base. Capitula radiate, hemispherical, solitary, terminal, nodding. Involucre broadly hemispherical, ca 1.5 cm broad, black pubescent; bracts dark brown, lanceolate, ca 11 mm long, acute, black hairy pubescent mainly on the vein; veins in two pairs on the dorsal surface; margins scarious. Ray florets orange yellow, ca 18 mm long; ray cuneate, deeply 3-4-lobed, many-veined; tube 2.2 mm long. Disc florets ca 7.5 mm long. Styles much exserted, bifid. Achenes of ray florets linear-oblong, 3.5 mm long. Pappus brown, 6-7 mm long, minutely scabrid. Achenes of disc florets elliptic-oblong, ca 3 mm long, ribbed. Pappus of unequal, brownish hairs, ca 7.5 mm long.

Fl. & Fr. Aug. - Sept.

Distrib. India: E. Himalayas, between 4000-4200 m. Sikkim.

Nepal, Bhutan, Tibet and China.

2. *Petasites* Miller

Herbs, perennial, white tomentose, subdioecious, rhizomatous; rhizome often creeping; scapes with few to numerous scale leaves. Leaves all basal, sagittate to reniform, dentate or deeply lobed or toothed, long petioled. Inflorescence corymbose or racemosely paniculate. Capitula purple white or greenish yellow, radiate or discoid, narrowly campanulate, 1-many, terminating the scapes. Involucre campanulate; bracts in 1-2 rows, equal. Receptacle flat, epaleaceous. Male capitula with numerous tubular, hermaphrodite florets; corolla limb of tubular florets elongate, 5-lobed, usually with a marginal ring of 1-10 sterile, filiform, truncate or minutely radiate, female florets. Anther base entire or subauricled. Female capitula with numerous fertile, minutely radiate, filiform florets. Styles long, undivided, apex obtuse. Achenes cylindrical, glabrous, 5-10-ribbed. Pappus hairs white, minutely barbellate, copious in female florets, few in male florets.

Distributed in Nepal, Tibet, China, Vietnam, Taiwan, Europe and Indonesia; 3 in India.

Literature. OMAN, J. (1972). A Taxonomic Survey of the genera *Petasites* and *Endocellion*. *Folia Geobot. Phyt.* 7: 381-406.

KEY TO THE SPECIES

- | | |
|--|--------------------------|
| 1a. Capitula homogamous | 1. <i>P. albus</i> |
| b. Capitula heterogamous | 2 |
| 2a. Female florets surrounding only one disc floret | 2. <i>P. kamengicus</i> |
| b. Female florets surrounding more than one disc florets | 3. <i>P. tricholobus</i> |

1. *Petasites albus* (L.) Gaertn., Fruct. et Sem. 2: 406. 1791; Panigrahi & Kar in Bull. Bot. Surv. India 8: 234. 1966. *Tussilago alba* L., Sp. Pl. 356. 1753.

Herbs, perennial, rhizomatous; rhizome creeping, thick, fibrous; stems brownish, simple, 20-30 cm high, faintly grooved, sparsely arachnoid tomentose throughout, bracteate; bracts linear-oblong, 1.5-3.5 cm long, obtuse, sparsely to densely brownish arachnoid, faintly 3-5-veined; veins dark brown. Leaves subrosulate, long petiolate; lowermost leaves smaller, rounded or reniform, mucronate dentate, 2-6 x 3-7 cm, upper surface pale green, almost glabrous to sparsely pubescent, lower surface densely appressed greyish tomentose; venation reticulate, prominent on both the surfaces; petiole 6-13 cm long, sparsely arachnoid. Inflorescence corymbose. Capitula (female) white, radiate, campanulate, ca 1 cm in diam., bracteolate, on 1.5-3 cm long sparsely to densely arachnoid tomentose peduncle. Involucre campanulate; bracts brownish, uniseriate, lanceolate, 7.5 x 1.2 mm, obtuse, subequal, scarious. Florets minutely radiate, numerous, ca 5.5 mm long, very slender. Styles very long; style arms blackish, short. Achenes dark brown, ca 2.2 mm long, minutely scabrid on the ribs. Pappus of white, minutely scabrid hairs, 4-10 mm long.

Fl. & Fr. May. - June.

Distrib. India: E. Himalayas, in damp shady places. Arunachal Pradesh.

S. Norway, S.C. France, S. Italy, Bulgaria, W. Asia, Europe and C. Russia.

2. *Petasites kamengicus* Deb in Ind. For. 93(4): 255. 1967.

Herbs, perennial, acaulescent; rootstock tuberous, ca 1.5 cm thick, woolly above densely covered with fibrous wiry roots below; scapes ca 1 m high. Leaves all radical, rosulate, reniform, cordate, acute, coriaceous, callose-denticulate, 6-7 x 8-9 cm, densely woolly beneath, glabrescent above, long petioled; petiole pilose, flattened, sheathing at the base. Inflorescence lax,

thyrsoid, of 10-20 capitula. Capitula subdioecious, pedunculate; peduncle 1.5-4.5 cm long, bracteate; bracts ovate-lanceolate, up to 6 cm long, acuminate. Female capitula of 100-125 ligulate florets surrounding one central disc floret. Involucre subcylindric, 4-5 x 10 mm; bracts violet, uniseriate, subulate, subacute, glabrous, free, margins scarious. Receptacle thin, slightly concave. Ray florets 3-5 ca 12 mm long, violet lanate; tube 7-8 mm long. Disc floret one, bisexual, ca 10 mm long, tubular; corolla limb 1 mm long, 5-lobed; tube 7-9 mm long. Anthers ca 1.5 mm long, obtuse, sagittate at the base; filaments ca 1.5 mm long. Ovary turbinate, 1-1.5 mm long; style filiform, conical at the apex; stigma bifid, much exerted from corolla. Achenes cylindrical, ca 3.5 mm long, 10-ribbed. Pappus hairs white, ca 12 mm long, capillary, minutely barbellate.

Fl. & Fr. March - April.

Distrib. India: E. Himalayas, ca 1875 m. Arunachal Pradesh (Thengiri, Kameng Dist.).

Endemic.

3. *Petasites tricholobus* Franch. in Nouv. Arch. Mus. Hist. Nat. Paris. Ser. 2, 6: 52. 1883. *Petasites himalaicus* Kitam., in Acta. Phyt. Geobot. 15: 108. 1954.

Herbs, dioecious; rhizomes creeping, thick, fibrous, 3-4 mm in diam.; scapes 25-30 cm long, simple, sparsely brownish pubescent and arachnoid tomentose, many bracteate; bracts 2.5-3 cm long, lanceolate, acuminate, sparingly greyish tomentose, sessile. Leaves, reniform, cordate, mucronately serrate, 6-7 cm in diam., membranous, upper surface densely crispate pilose mixed with arachnoid tomentum, lower surface sparsely crispate pilose; petiole 6-9 cm long. Inflorescence corymbose. Capitula heterogamous; peduncle 2-4 cm long, bracteate; bracts linear, 1-1.5 mm long. Receptacle pitted. Involucre 10 x 15-20 mm on drying; bracts biseriate; subequal; outer ones lanceolate; inner oblong, obtuse, glabrous, distinctly veined, margins membranous. Male florets few, narrow, 7 mm long; corolla limb 4.5 mm long, 5-lobed; lobes 1 mm long. Female florets very slender, disciform, 8.5-9 mm long, 2-lobed. Style apex short, bifid, obtuse. Achenes cylindrical, ca 3 mm long. Pappus hairs very slender, subequal, minutely scabrid.

Distrib. India: W. Himalayas and N.E. region. Jammu & Kashmir, Uttar Pradesh and Meghalaya.

Nepal, Tibet, China, Vietnam and Taiwan.

3. *Tussilago* L.

Herbs, perennial, white tomentose, scapigerous, stoloniferous, 8-20 cm high; scapes numerous, densely white tomentose, scaly. Leaves all radical, orbicular, cordate, toothed, cobwebby above and white tomentose beneath, long petioled. Capitula yellow, radiate, heterogamous, solitary, terminating the long scape. Ray florets female, multiseriate, ligulate. Disc florets hermaphrodite, sterile, few tubular. Involucre narrowly campanulate; bracts uniseriate, equal or with a few, outer shorter. Receptacle slightly convex, without scales. Anther base entire to sub auricled. Style arms of disc florets entire, obtuse. Achenes of ray florets narrowly cylindrical, 5-10-ribbed. Pappus white, scanty, of short hairs.

A monotypic genus distributed in China, N. Africa, Europe, Asia and N. America.

Tussilago farfara L., Sp. Pl. 865. 1753; Hook.f., Fl. Brit. India 3: 330. 1881. Fig. 98.

Hindi: *Watpana*, Punjb.: *Watpan*; Urdu: *Fungiwn*

Herbs, perennial, scapigerous, greyish white, woolly; rootstock stoloniferous; stems 1 or 2-3, 4-10 cm long, whitish tomentose, covered with purplish, foliaceous scales. Leaves only radical, appearing after the flowering, orbicular to broadly ovate, cordate, acute, mucronately dentate, 4-5 x 5-7 cm, upper surface brownish green, pubescent, lower surface densely greyish tomentose; petiole up to 12 cm long, glabrous to greyish tomentose. Capitula yellow, radiate, solitary, ca 2 cm in diam., few bracteolate. Involucre campanulate, white tomentose at the base; involucral bracts linear-lanceolate, ca 10 mm long, equal. Ray florets yellow, linear, ca 12 mm long, 1-seriate. Disc florets ca 6-7 mm long; limb 3.5 mm long; tube 4 mm long. Anther base entire; filaments ca 2 mm long. Style arms entire, obtuse. Achenes brownish, oblong, 1-1.2 mm long, flat, faintly ribbed. Pappus white, of scanty hairs, ca 2.5 mm long.

Fl. & Fr. March - Oct.

Distrib. India: W. Himalayas, between 1700-1900 m. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.



Fig. 98. *Tussilago farfara* L.

N. Africa, Europe, Asia eastwards to China and N. America.

Note. The leaves are smoked like tobacco.

CULTIVATED SPECIES

Arnica montana L. Sp. Pl. 884. 1753; Rao *et al.*; Fl. Ind. Enum. Aster. 6. 1988. L,

Herbs, aromatic; stems 20-60 cm high, stout. Leaves both radical and cauline. Radical leaves in rosette, oval, lance shaped, glandular hairy; cauline leaves opposite, few. Capitula orange yellow, radiate, large ca 4-8 cm in diam., solitary or 4 on stout peduncles. Involucre broadly campanulate; bracts 2-serrate, equal. Ray florets conspicuous in one row. Disc florets orange yellow. Achenes cylindrical, hairy and aromatic. Pappus of single row of hairs.

Fl. & Frt. May - July.

Distrib. India: W. Himalayas. Jammu & Kashmir.

Europe.

Ligularia tussilaginea Makino Ill. Fl. Japan 39. 1924.

Native to Japan, introduced into Indian Gardens.

Senecio cruentus (Masson ex L'Herit) DC. Prodr. 6: 410. 1838; Bailey, Man. Cult. Pl. 1019. 1940. *Cineraria cruenta* Masson ex L'Herit, Ser. Angl. 26. 1789. L,

Herbs, perennial, 30-40 cm high; stems short. Leaves cordate-ovate to cordate-triangular, undulate, sinuate toothed, dark green above and white tomentose beneath. Capitula purple, white, scarlet, red and blue, radiate, 2-3 cm in diam.

Tribe 11. TAGETEAE Cass.

(R.R. Rao)

Herbs or subshrubs, strongly scented. Leaves mostly opposite, simple, compound or pinnatifid, dotted or glandular. Heads radiate or discoid, few to many flowered. Involucre campanulate, fusiform or cylindrical; involucre bracts in 1-3-series, often fused, punctate. Receptacle flat or convex, naked. Florets yellow, white or orange red, all fertile. Anthers cordate at base, appendaged. Style branches elongate, smooth or papillate, appendaged or not. Achenes slender, cylindrical, clavate or angled; carpodium short. Pappus of scales, awns or bristles.

The tribe Tageteae includes ca 240 New World species belonging to 16-18 genera. The geographic centre of diversity for the tribe is in the xeric highlands of Mexico; 2 genera and 4 species in India.

The group has commonly been treated as a subtribe in Helenieae. The relationship of Tageteae to other Compositae is obscure, although some primitive members of Tageteae have achene types similar to those of Senecioneae. Bentham & Hooker (1873) included this taxon under the tribe Helenioideae subtribe Tagetineae (or Pectidinae).

Literature. BENTHAM, G. (1873). Notes on the classification, history and geographical distribution of Compositae. *J. Linn. Soc. Bot.* 13: 335-577. BENTHAM, G. & J.D. HOOKER (1873). Compositae: *Genera plantarum* 2: 163-533. KEIL, DAVID, J. (1975). Tageteae in Flora Panama. *Ann. Miss. Bot. Gard.* 62: 1220-1241.

KEY TO THE GENERA

- | | |
|---|--------------------|
| 1a. Leaflets filiform, eglandular; involucre bracts connate at base only | 1. <i>Dyssodia</i> |
| b. Leaflets lanceolate, having glands near the margins; involucre bracts connate near to apex | 2. <i>Tagetes</i> |

1. *Dyssodia* Cav.

Herbs, erect or diffuse. Leaves opposite or alternate, more or less pinnatisect. Heads heterogamous, radiate. Ray florets uniseriate, female. Disc florets hermaphrodite, fertile. Involucre cylindrical-campanulate or hemispheric; bracts uniseriate, subequal. Receptacle shortly fimbriate. Anther base rounded or minutely 2-dentate. Style branches of hermaphrodite florets appendaged, hirtellous. Achenes linear-obconic, 3-5-angled, striate, pilose. Pappus of 10 setae.

Mexico and C. America; ca 50 species, 1 in India, naturalized.

Dyssodia tenuifolia Loes. in Bull. Herb. Boiss. Ser. II, 6: 866. 1906.
Hymenatherum tenuifolium Cass., Dict. 22: 313. 1821-22; *Randeria* in J.
Bombay Nat. Hist. Soc. 53: 216. 1956. **Fig. 99.**

Herbs, annual, erect, 15-20 cm high; stems finely pubescent. Leaves 2-5 x 1-3 cm, deeply pinnatisect; lobes opposite, somewhat filiform. Heads ca 2 cm across, peduncled; peduncles 5-9 cm long, naked or bracteate; bracts subulate-lanceolate, 2-3 cm long. Involucral bracts oblong-cuneate, 3-lobed at the apex, ciliate on the margins, partially connate at base. Corolla yellow, of hermaphrodite florets tubular; tube 2-3 mm long, uniformly dilated upwards; lobes 5, ovate, ca 1 mm long; of female florets ligulate, 6.9 x 1.5-2.5 mm, 3-lobed. Achenes black, oblong-obconical, 3-4 mm long, angled and ribbed. Pappus uniseriate, setose, unequal.

Distrib. India: Delhi, Rajasthan, Madhya Pradesh, Maharashtra and Karnataka.

Native of C. America.

2. *Tagetes* L.

Herbs, annual or perennial, erect or procumbent; branches leafy, herbaceous. Leaves opposite, decussate or sometimes the upper ones alternate, pinnatifid or pinnately compound, conspicuously gland dotted. Heads heterogamous, radiate, cymose or solitary, pedunculate. Involucre cylindric, fusiform or campanulate; bracts uniseriate, connate, variously punctate with oil glands. Ray florets few, female, fertile; ligules yellow or orange, 3-lobed. Disc florets yellow, infundibuliform, 5-lobed. Anther base rounded or weakly sagittate, apically appendaged. Style branches thin, acute. Achenes linear, subcompressed, several angled, variously pubescent. Pappus scales 3-10, unequal, slightly united.

Mainly an American genus with ca 40 species, mostly garden plants (marigolds); 3 in India, of which *Tagetes minuta* is fairly naturalized.

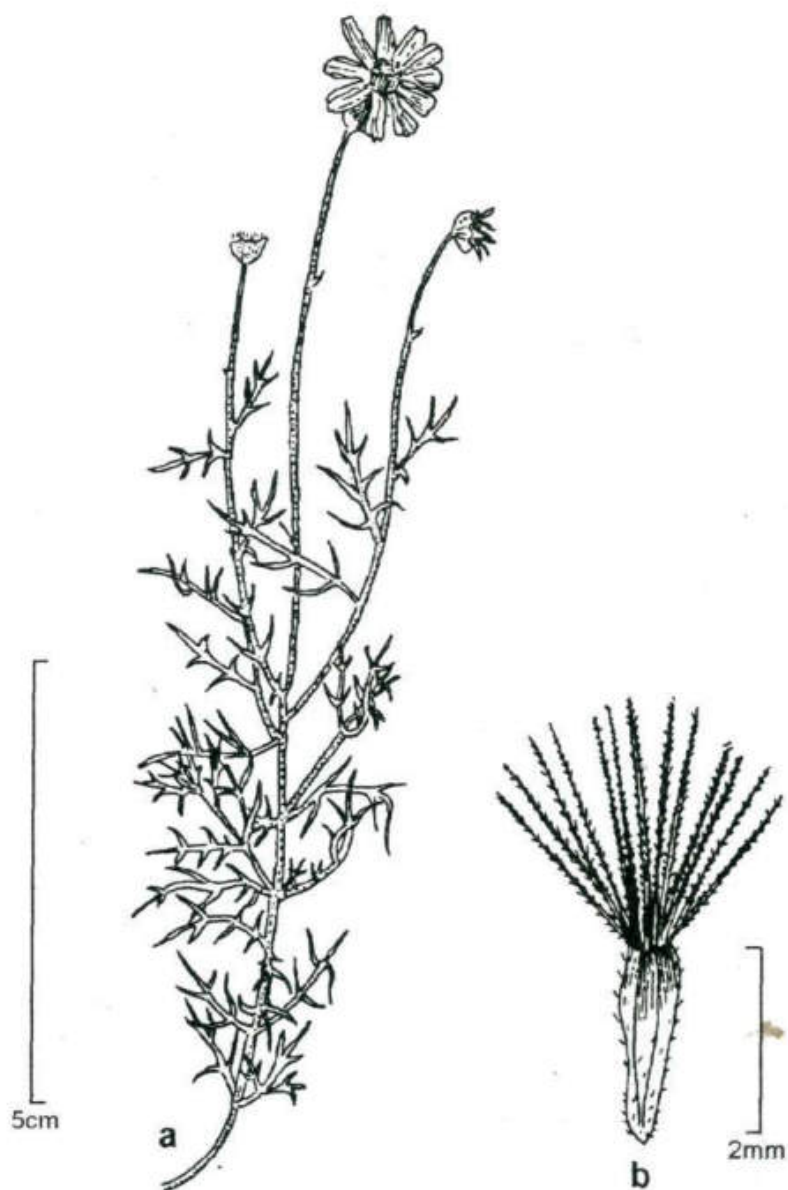


Fig. 99. *Dyssodia tenuifolia* Loes. : a. Habit; b. Achene.

KEY TO THE SPECIES

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|--|---------------------|
| 1a. Heads many, in corymbs, few flowered; involucre cylindric; naturalized | 2. <i>T. minuta</i> |
| b. Heads solitary, many flowered; involucre campanulate; mostly cultivated | 2 |
| 2a. Heads 6-8 cm across; involucre 1.5-2.5 cm long; bracts 8-13. | 1. <i>T. erecta</i> |
| b. Heads 3-4 cm across; involucre 1-2 cm long; bracts 5-7 | 3. <i>T. patula</i> |

1. *Tagetes erecta* L., Sp. Pl. 887. 1753.

Herbs, erect, sparingly branched, strongly aromatic; branches angular, ribbed. Leaves opposite, decussate or upper ones alternate, pinnate; leaflets lanceolate-oblong, acute, base cuneate, decurrent, remotely dentate, 2-5 x 0.6-1.2 cm, glandular near the base of the teeth; petiole up to 5 cm long. Heads heterogamous, radiate, solitary, terminal on 4-15 cm long peduncle, 6-8 cm across; peduncle swollen below the head. Receptacle convex, pitted. Involucre 2-2.5 cm long, glabrous; bracts 1-seriate, connate, glandular. Florets orange yellow. Ray florets female, ligulate, 1.5-2.5 cm long. Disc florets bisexual, tubular, 5-toothed. Stamens 5, included. Anthers linear, flat, shortly tailed. Ovary linear-lanceolate, compressed, angled; style shortly 2-fid; stigma hairy. Achenes blackish, 8-10 mm long, scabrous on the angles. Pappus scales united, 4-4.5 mm long, unequal, with one or two long ones and 2 or 3 short ones.

Fl. & Fr. Almost throughout the year, more during cold season.

Distrib. India: Major part of India, cultivated as well as weed of cultivated fields, roadsides, etc. Cultivated in several parts of the world.

Note. This is the "French marigold", extremely variable comprising many cultivars. Highly scented when bruised and has medicinal properties. A native of Mexico, introduced and fairly naturalized in Tropical and subtropical regions of the world.

2. *Tagetes minuta* L., Sp. Pl. 887. 1753; Maheshwari in J. Bombay Nat. Hist. Soc. 69: 451. 1972. Fig. 100.

Herbs, annual, 0.3-1 m high, strongly scented. Leaves pinnate; leaflets linear-lanceolate, sharply serrate, 2-4.5 cm long, conspicuously gland-dotted, glabrous. Heads numerous, in crowded cymes at the ends of branches, 0.3-0.5 cm across. Involucre ca 10 x 3 mm. Florets only little exceeding the involucre. Ray florets yellow, 3-4; ligules 2-toothed. Disc florets also yellow, tubular,

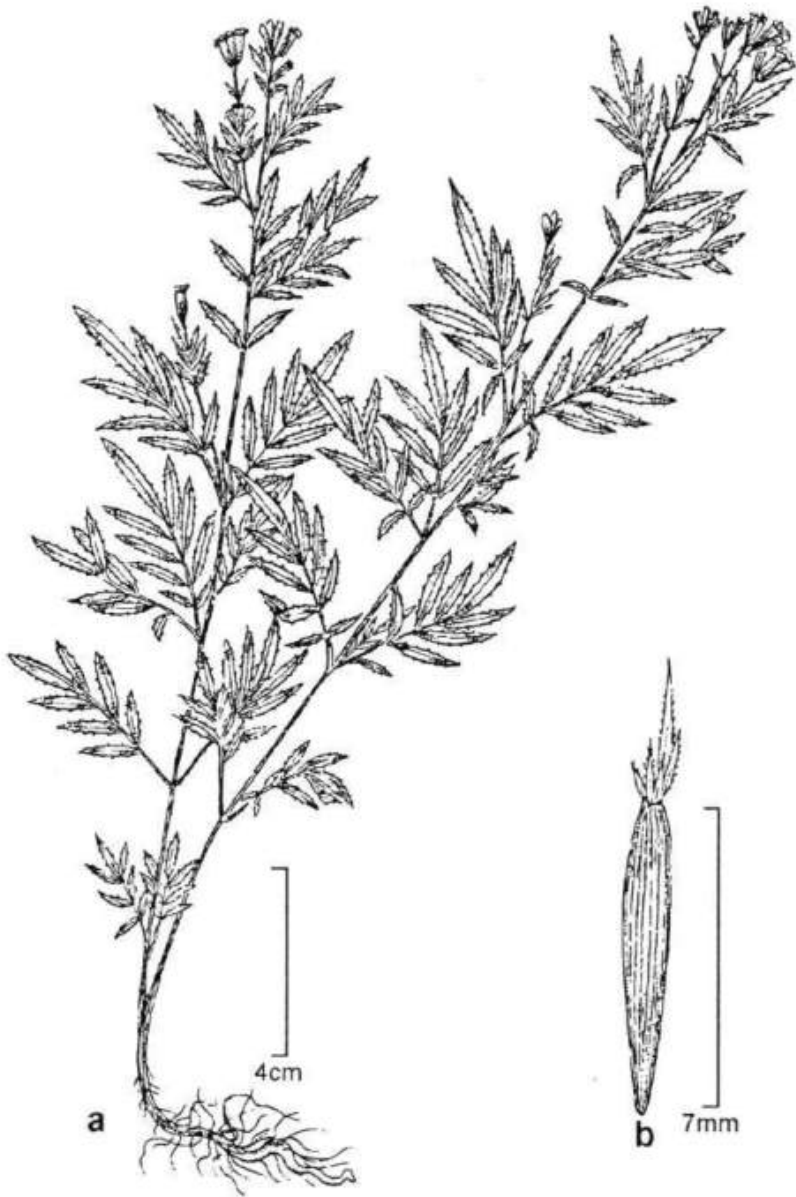


Fig. 100. *Tagetes minuta* L. : a. Habit; b. Achene.

5-toothed. Achenes black, subcompressed, angular, 6-7 mm long, densely shiny hairy. Pappus scales 5, unequal, with one much longer than the others.

Fl. & Fr. Sept. - Nov.

Distrib. India: Naturalized in Himalayan and sub Himalayan regions, waste places and roadsides, rocky hill slopes, cultivated fields, ascending up to 2000 m. Uttar Pradesh, Himachal Pradesh, Sikkim, Arunachal Pradesh, Nagaland and Meghalaya.

S. America and Nepal.

Note. A native of S. America. Suggested as fly and vermin repellent and also an effective larvicide killing maggots in wounds. Plant extracts reveal antiviral activity against Ranikhet disease virus (Maheshwari in *J. Bombay Nat. Hist. Soc.* 69: 451. 1972).

3. *Tagetes patula* L., Sp. Pl. 887. 1753.

Eng.: "*African Marigold*"

Herbs, ca 60 cm high, strongly scented, much branched. Leaves opposite, upper ones sometimes alternate, pinnate or pinnatifid; leaflets lanceolate-oblong, sharply serrate with awned teeth, glandular along the margins below the serrations. Heads solitary or cymose, 2-3 cm across, peduncled; peduncles 3-15 cm long, slightly swollen below the head. Involucre campanulate, 1-2 cm long, with 5-7, acute, linear teeth, gland dotted. Ligules of marginal flowers yellow or orange coloured, with brownish red markings, 1-1.5 cm long, emarginate. Achenes angled, somewhat compressed, hairy. Pappus of 1-2 long awned scales and 2-3, shorter, blunt ones.

Fl. & Fr. Sept. - Dec.

Distrib. India: Cultivated as well as escape in waste places, roadsides and fallows in most parts of the country; a native of Mexico, widely cultivated in many parts of the world.

Note. Very similar to *T. erecta*. Some authors (Towner, *Amer. J. Bot.* 48: 743-751. 1961) believe that *T. patula* is a tetraploid ($1n = 48$) between *T. erecta* and *T. tenuifolia* (both with $2n = 24$).

Tribe 12. VERNONIEAE Cass.

(B.P. Uniyal)

Herbs, shrubs, climbers or small trees. Leaves usually alternate, rarely opposite. Heads homogamous. Involucral bracts few-many, variously shaped. All florets bisexual; corolla reddish purple, white, blue but never yellow, tubular (except *Stokesia*). Anthers cleft at the base. Style branches subulate, hairy. Achenes ribbed, angled or terete, glabrous, pubescent or silky, glandular or eglandular. Pappus uniseriate or biseriate, usually copious, rarely few, coroniform or absent, setose, occasionally the outer pappus hairs paleaceous or very short.

Mainly distributed in Tropical America, Tropical Africa and S.E. Asia; ca 70 genera and 1500 species, 8 genera and 68 species in India.

Literature. BENTHAM, G. & J.D. HOOKER (1873). *Vernoniaceae. Genera Plantarum* 2: 165-238. ELIAS THOMAS, S. (1975). *Vernoniinae. Ann. Miss. Bot. Gard.* 62: 857-873. HENRY, A.N., G.R. KUMARI & V. CHITHRA (1987); *Flora of Tamil Nadu, India. Analysis Vol. II.* Coimbatore. RAU, M.A. & B.M. NARAYANA (1983). A review of the tribe Vernoniaceae in South India. *Bull. Bot. Surv. India* 25: 19-25.

KEY TO THE GENERA

- | | |
|---|-----------------------------|
| 1a. Pappus absent | 2 |
| b. Pappus present | 3 |
| 2a. Achenes 4-5 angled, thickened on the ribs or angles | 3. <i>Ethulia</i> |
| b. Achenes 10-ribbed | 1. <i>Adenoon</i> |
| 3a. Pappus leathery, coroniform | 7. <i>Struchium</i> |
| b. Pappus of 1-many hairs | 4 |
| 4a. Heads in glomerules; florets 1-5 | 5 |
| b. Heads distinct; florets 1-many | 6 |
| 5a. Glomerules bracteate; involucral bracts in 2-series; pappus bristles straight | 2. <i>Elephantopus</i> |
| b. Glomerules ebracteate; involucral bracts 4-seriate; 2 pappus bristles bent doubly | 6. <i>Pseudelephantopus</i> |
| 6a. Achenes smooth, shining, ecostate | 4. <i>Lanprachaenium</i> |
| b. Achenes angled, ribbed or terete, not shining or if shining then prominently nerved | 7 |
| 7a. Outer involucral bracts usually leafy; pappus fugacious (involucral bracts not leafy in <i>P. hookeri</i> but then pappus single) | 5. <i>Phyllocephalum</i> |
| b. Outer involucral bracts not leafy (except <i>V. anthelmintica</i>); pappus long, copious | 8. <i>Vernonia</i> |

1. *Adenoon* Dalz.

Herbs, erect, rigid. Leaves alternate, sessile. Heads homogamous, in corymbose panicles. Involucral bracts many-seriate, oblong-lanceolate, aristate; outer shorter, progressively increasing in length. Corolla tubular; limb narrowly 5-fid. Anther base sagittate. Style arms subulate, hairy. Achenes 10-ribbed, glandular between ribs. Pappus absent.

A monotypic genus, endemic to India.

Adenoon indicum Dalz. in Kew J. Bot. 5: 344. 1850; Hook.f., Fl. Brit. India 3: 229. 1881. **Fig. 101.**

Herbs, erect; stems terete, spreading hairy, angled. Leaves obovate-elliptic-rhomboid, margins irregularly serrate; serrations ending in mucro; ca 8.5 x 4.5 cm, thick, hairy on both the surfaces, prominently nerved beneath. Heads pedunculate, bracteate at the forks and below the heads; bracts linear-lanceolate, almost awned at the tip. Involucral bracts many-seriate, glandular-hairy on the back, aristate; outer elliptic, ovate-lanceolate, ca 5.5 mm long; inner oblong-elliptic, ca 8.5 mm long, ciliate on the margins in the upper half, thinner, distinctly nerved. Achenes ca 2.5 mm long, 10-ribbed, glandular between the ribs. Pappus absent.

Fl. & Fr. Sept. - Oct.

Distrib. India: W. Ghats. Maharashtra, Goa, Karnataka and Tamil Nadu.

Endemic.

2. *Elephantopus* L.

Herbs, erect, perennial; stems generally solitary. Leaves basal or cauline, alternate, basally attenuate, pinnately veined; petiole indistinct. Inflorescence solitary, terminal, bracteate panicle, spike or raceme. Heads many in glomerules, 2-4-flowered; glomerules subtended by 1 or more bracts. Involucral bracts 8, in 2-decussate series. Corolla tubular, funnel form; tube slender; limb 5-parted. Anthers sagittate at base, apically appendaged. Style branches slender, terete, strigulose throughout. Achenes obovoid, slightly flattened, strigulose or hispidulous, 10-ribbed or angled. Pappus in one series, occasionally scale like or usually of 5-many straight, equal, puberulent bristles.

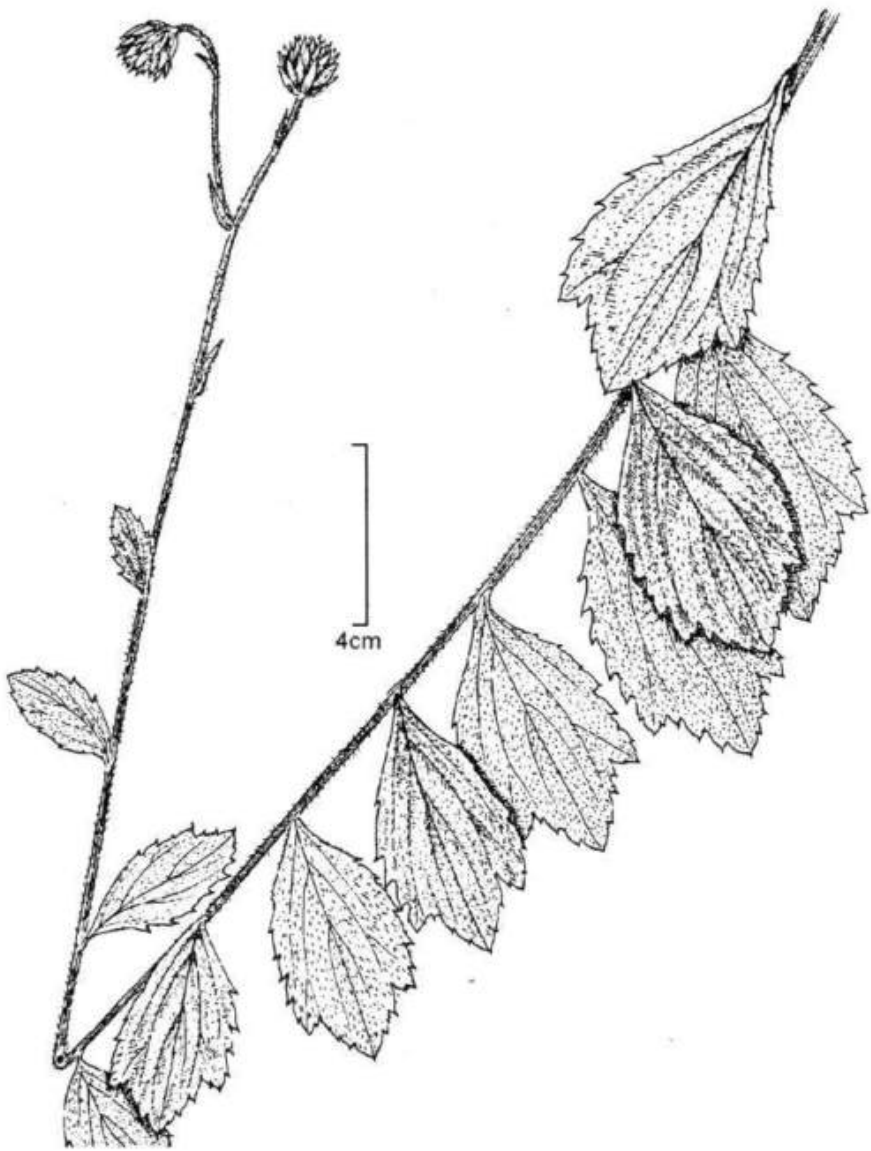


Fig. 101. *Adenoon indicum* Dalz.

Distributed throughout the tropics and warmer temperate regions of both hemispheres. Absent from Europe; 25 species, 1 in India.

Literature. BAKER, E.F. (1902). A revision of Elephantopaeae. *Trans. Acad. Sci. St. Louis* 12: 43-56. BUSEY PHILIP (1975). Elephantopodinae. *Ann. Miss. Bot. Gard.* 62: 888-1004.

Elephantopus scaber L., Sp. Pl. 814. 1753; Hook.f., Fl. Brit. India 3: 242. 1881. **Fig. 102.**

Guj.: *Bhopathri, Kharastbhopathri*; Hindi: *Gobhi*; Mar.: *Pathri*; Sans.: *Adhomukha, Darvipatrika*; Santh.: *Manjurjuti*; Tam.: *Anashovadi*; Tel.: *Eddumal, Hastikasaka, Kechettu*.

Herbs, perennial, to 60 cm high; stems strigose, usually dichotomously branched. Leaves usually in basal rosettes, obovate-oblong, spatulate, usually rounded, crenate, up to 20 x 5 cm, sparsely hairy but more on nerves beneath. Heads axillary and terminal; peduncles strigose. Bracts 3 at the top of peduncle, foliaceous, strigose, prominently nerved. Involucral bracts biseriate, enclosing 4 florets; outer shorter, 1-nerved; inner ca 1 cm long, linear, cuspidate, 3-5-nerved. Achenes ca 5 mm long, slightly pubescent, finely 10-ribbed. Pappus hairs usually 5, dilated at base.

Fl. & Fr. Throughout the year.

Distrib. India: Throughout.

Tropical Asia, Australia and America.

Note. Useful in all poisoning from bites or nails of animals. A good medicinal plant for diseases of blood, heart, urinary discharges and bronchitis [(Kirtikar & Basu, Ind. Med. Pls. 2: (ed. 2) 1328-1329. 1933). Crushed leaves and roots boiled with water is given to stop vomiting (Kumar *et al.*, in *Bull. Bot. Surv. India* 22: 163. 1980).

3. *Ethulia* L.

Herbs. Leaves alternate, serrate. Heads homogamous, small, loosely corymbose. Involucral bracts many-seriate, with scarious margins; outer ones gradually shorter. Receptacle flat or convex, naked. Corolla tubular; limb campanulate. Anthers with obtuse, basal auricles. Style branches glandular hirsute, subulate. Achenes 4-5-angled or ribbed, glandular between the prominent ribs, truncate with a callose ring at the top. Pappus absent.



Fig. 102. *Elephantopus scaber* L.

Sunda Archipelago, Malay Archipelago and E. Tropical Africa; 10 species, 1 in India.

Literature. GILBERT, M.C. & C. JEFFREY (1988). A revision of *Ethulia* (Compositae-Vernonieae) Kew Bull. 43(2): 165-193. KOSTER, JOSEPHINE, TH. (1933). Compositae of Malay Archipelago. *Blumea* 1: 373.

Ethulia conyzoides L.f., Decas Prima 1.t.1. 1762. subsp. *conyzoides*.

Fig. 103.

Herbs, upto 60 cm high; stems ribbed, glandular, appressed pubescent. Leaves lanceolate-oblong, narrowed at both the ends, subentire or dentate, up to 15 x 4 cm, glabrous or shortly pubescent above, rusty pubescent on the nerves beneath, glandular on both the surfaces. Inflorescence terminal, corymbose, glandular, rusty pubescent. Heads many-flowered, 5-7 mm wide, peduncled; peduncle to 2 cm long. Involucral bracts 3-4-seriate, 1-nerved, glandular; outer ones oblong-elliptic, 1.5-4 mm long, ciliate on margins; inner oblong, ca 6 x 1.5 mm, irregularly dentate in the upper part. Achenes obpyramidal, 2-3 mm long, 4-5-angled, thickened on the angles, reddish glandular between the angles, truncate at the tip, crowned by a rounded disc. Pappus absent.

Fl. & Fr. Feb. - Nov.

Distrib. India: W. Bengal, Sikkim, Arunachal Pradesh and Assam.

Bangla Desh, Myanmar, Laos, Cochinchina, Taiwan, China, Malay Archipelago, Africa and Australia.

Note. Distinguished by obpyramidal achenes which have reddish glands in rows between the thickened ribs. The field note on *Kanjilal 7551* (ASSAM) says, "Flowers yellow" though the tribe Vernonieae never has yellow flowers (Hooker, Fl. Brit. India 3: 220. 1881). The specimen is undoubtedly *Ethulia conyzoides* L.f.

4. *Lamprachaenium* Benth.

Herbs, erect, branched, crisped hairy. Leaves alternate, petioled. Heads homogamous. Involucral bracts many-seriate; inner acute. Receptacle flat, naked. Corolla tubular. Anthers obtusely auricled. Style arms subulate,

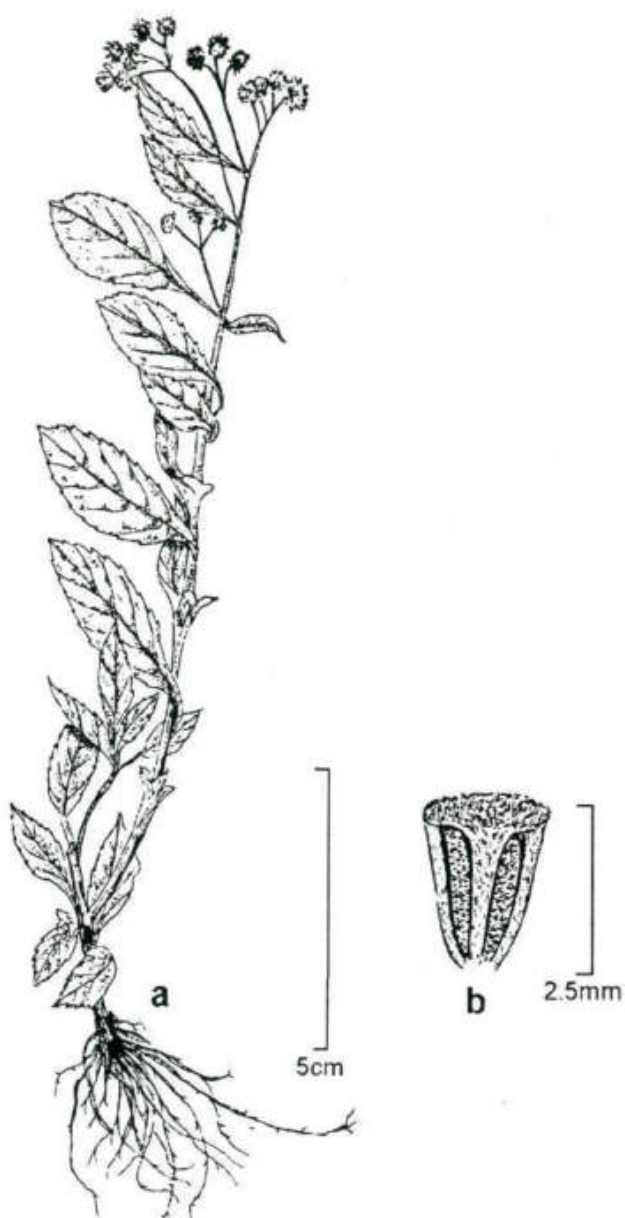


Fig. 103. *Ethulia conyzoides* L.f. subsp. *conyzoides* : a. Habit; b. Achene.

hirtellous. Achenes obovate, smooth, shining, ecostate. Pappus hairs red, few, short.

A monotypic genus, endemic to India.

Lamprachaenium microcephalum (Dalz.) Benth. in C.B. Clarke, Comp. Ind. 5. 1876; Hook.f. Fl. Brit. India 3: 229. 1881. *Decaneurum microcephalum* Dalz. in Hook., Kew J. Bot. V. 3: 231. 1851. **Fig. 104.**

Sans.: *Ajdandi*, *Brahmadandi*

Herbs, erect, ca 60 cm high; stem and branches striate, glabrous or sparsely hairy. Leaves elliptic, narrowed at both the ends, dentate, up to 8 x 3.5 cm, sparsely hairy above, white woolly beneath, punctate. Inflorescence corymbose, axillary and terminal. Heads homogamous. Involucral bracts many-seriate, elliptic-lanceolate, tomentose without, becoming almost glabrous with age; outer with foliaceous tips and ciliate margins; tips often recurved; inner gradually larger. Achenes ca 2 mm long, shining, smooth. Pappus hairs red, few, fugacious.

Fl. & Fr. Oct. - Nov.

Distrib. India: Maharashtra, Goa and Karnataka.

Endemic.

Note. The plant is bitter and used in skin diseases like Leucoderma and in "Vata" and "Kapha" inflammations.

5. *Phyllocephalum* Blume

Herbs or undershrubs; stems glabrous, hispid or woolly. Leaves alternate, elliptic-obovate, acute to acuminate at the apex, obtuse or attenuate at base, margins serrate and sometimes revolute, pubescent or rugose above, puberulous to tomentose beneath, petiolate or sessile. Inflorescence terminal or axillary (rarely spike like). Heads with numerous florets. Involucral bracts imbricate in several series, glabrous to long ciliate; the outer usually foliaceous; the inner membranaceous. Corolla reddish purple (infrequently white). Achenes obconic, ribbed. Pappus white, yellowish or reddish, of 1-many bristles.

Mainly in India and Indonesia; 10 species, 9 in India.

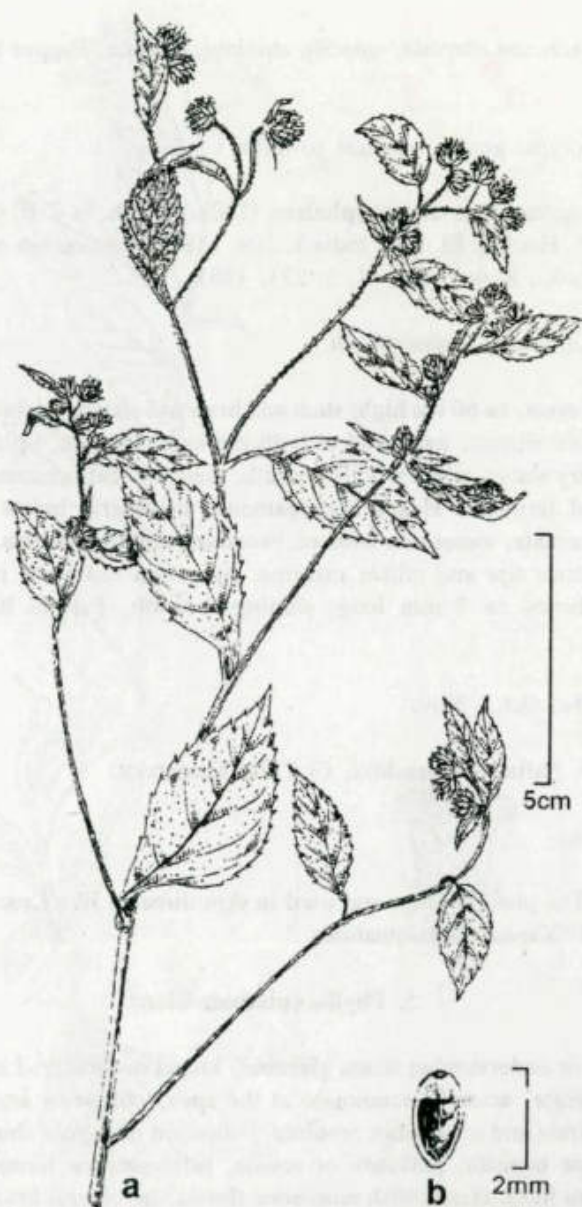


Fig. 104. *Lamprachaenium microcephalum* (Dalz.) Benth. : a. Habit; b. Achene.

Literature. KIRKMAN, KATHERINE (1981) Taxonomic revision of *Centratherum* & *Phyllocephalum* (Compositae-Vernoniae). *Rhodora* 83(833): 1-24.

Kirkman (l.c.) recognised only 3 species reducing most of the Indian species under synonymy of *P. indicum* and *P. scabridum*. Study of the Indian material, however, does not support Kirkman's treatment.

KEY TO THE SPECIES

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|---|------------------------------|
| 1a. Leaves not white beneath; outer involucre bracts shortest; pappus single | 1. <i>P. hookeri</i> |
| b. Leaves white beneath; outer involucre bracts large, foliaceous; pappus hairs 1-many | 2 |
| 2a. Outer involucre bracts cordate at base | 6. <i>P. ritchiei</i> |
| b. Outer involucre bracts not cordate at base | 3 |
| 3a. Leaves prominently reticulately veined beneath | 2. <i>P. indicum</i> |
| b. Leaves not prominently reticulately veined beneath | 4 |
| 4a. Pappus hairs reddish | 5 |
| b. Pappus hairs white or yellowish | 6 |
| 5a. Pappus involucre bracts many, spreading or deflexed; pappus hairs equalling the corolla tube; achenes distinctly ribbed | 4. <i>P. phyllolaenum</i> |
| b. Pappus involucre bracts 1-2, not spreading; pappus hairs shorter than the corolla tube; achenes faintly ribbed | 9. <i>P. tenue</i> |
| 6a. Pappus hairs copious, long | 7 |
| b. Pappus hairs 1-10, short | 8 |
| 7a. Stems covered with black banded tubercle based hairs | 3. <i>P. mayurii</i> |
| b. Stems not covered with tubercle based hairs | 4. <i>P. phyllolaenum</i> |
| 8a. Leaves petioled; peduncles stout, not long villous | 7. <i>P. scabridum</i> |
| b. Upper leaves sessile; peduncles slender, long villous | 9 |
| 9a. Pappus hairs 1-4 | 5. <i>P. rangacharii</i> |
| b. Pappus hairs 6-10 | 8. <i>P. sengaltherianum</i> |

1. *Phyllocephalum hookeri* (C.B. Clarke) Uniyal, *Comb. nov.* *Centratherum hookeri* C.B. Clarke, *Comp. Ind.* 3. 1876; *Hook.f., Fl. Brit. India* 3: 228. 1881.

Stems herbaceous, erect, up to 60 cm high, ashy pubescent, grooved. Leaves linear-lanceolate, acute, obscurely toothed, upto 5.5 x 1.2 cm, somewhat pubescent on both the surfaces. Heads subcorymbose, 1.2-1.8 cm across; peduncle hoary pubescent. Outer involucre bracts ovate-oblong, subacute, dense pubescent; intermediate linear, longer than the outer ones, tips reflexed; innermost linear, longest, scarious, tips reflexed. Corolla red. Achenes ca 3 mm long, linear-oblong, 10-ribbed. Pappus single, straw coloured, single, deciduous, equalling the corolla tube.

Distrib. India: Maharashtra; rare.

Endemic.

2. **Phyllocephalum indicum** (Less.) Kirkman in *Rhodora* 83: 12. 1981. *Amphiraphis indica* Less. in *Linnaea* 6: 686. 1831. *Centratherum reticulatum* (DC.) Benth. in Benth. & Hook.f., *Gen. Pl.* 2: 225. 1873; Hook.f., *Fl. Brit. India* 3: 227. 1881.

Herbs, stout, perennial; stems usually dark purple, branched or not, terete, scabrid with short, hard, whitish hairs on red base. Leaves ovate, broadest near the rounded base, slightly recurved at margins, upto 5 x 1.5 cm, thick, rugose above, white and prominently reticulate beneath, subsessile. Heads solitary, terminal, more than 2.5 cm in diam. Involucral bracts leafy, many-seriate, hairy; inner progressively narrower with distinct mucro; the innermost narrow-oblong, scarious. Achenes ca 3 mm long, obscurely 10-ribbed. Pappus brown or yellowish, fugacious.

Fl. May - Oct.

Distrib. India: Deccan Peninsula, between 1600-2200 m. Madhya Pradesh, Tamil Nadu and Kerala.

Sri Lanka.

Note. Leaves with prominent reticulate venation are very characteristic.

3. **Phyllocephalum mayurii** (C. Fischer) Narayana in *Curr. Sci.* 51: 438. 1982. *Centratherum mayurii* C. Fischer in *Kew Bull.* 1940: 45. 1940.

Herbs, up to 1 m high; stems striate, covered with purplish black, multicellular, tubercle based hairs. Leaves alternate, narrowly lanceolate-oblong, elliptic, acute, serrate, up to 9.5 x 1.5 cm, sparsely hairy above, white tomentose beneath. Heads solitary, axillary or terminal, peduncle ca 1.5 cm long, hairy. Involucral bracts many-seriate; outer narrowly elliptic-lanceolate, ca 3 cm long, white tomentose beneath; inner purple tipped, oblong-lanceolate, ca 6 mm long. Achenes up to 1.7 mm long, 10-ribbed. Pappus hairs white.

Fl. & Fr. Oct. - Nov.

Distrib. India: Karnataka (Kemangundi hills, Kavaledurga).

Endemic.

4. *Phyllocephalum phyllolaenum* (DC.) Narayana in Curr. Sci. 51: 438. 1982. *Decaneurum phyllolaenum* DC., Prodr. 7: 264. 1839. *Centratherum phyllolaenum* (DC.) Benth. ex C.B. Clarke, Comp. Ind. 4. 1876; Hook.f., Fl. Brit. India 3: 228. 1881. **Fig. 105.**

Herbs, up to 1 m high, variable; stems ridged, glabrous or pubescent. Leaves elliptic, acute or acuminate, serrate, upto 15 x 6 cm, scattered hairy on the upper surface, white tomentose beneath, petioled. Heads solitary, axillary and terminal; peduncle up to 9.5 cm long. Outer involucral bracts up to 4 cm long, white felted beneath; intermediate variable, tip often green and recurved, mucronate; inner purple tinged, ca 8.5 mm long, scarious. Achenes ca 3 mm long, glabrous, strongly 10-ribbed. Pappus hairs usually reddish, equalling the corolla tube.

Fl. & Fr. Sept. - Nov.

Distrib. India: Rajasthan, Goa, Karnataka, Tamil Nadu and Kerala.

5. *Phyllocephalum rangacharii* (Gamble) Narayana in Curr. Sci. 51: 438. 1982. *Centratherum rangacharii* Gamble in Kew Bull. 1920: 339. 1920.

Herbs; branches striate, furfuracious villose. Leaves lanceolate, acute, mucronate, crenate, up to 7 x 2 cm, strigosely hirsute above, white tomentose beneath except on the nerve; lower ones short petioled; ultimate leaves sessile. Heads solitary, long pedunculate. Receptacle areolate. Outer 1-2 involucral bracts foliaceous; bracts of next row scarious at base, glabrous, upper part foliaceous, ovate, strigosely hirsute; inner ones gradually longer; innermost scarious. Achenes glabrous, 10-ribbed. Pappus white, hairs 1-4.

Fl. & Fr. Aug. - Dec.

Distrib. India: South India, 1000-2000 m. Tamil Nadu and Kerala.

Endemic.

6. *Phyllocephalum ritchiei* (Hook.f.) Narayana in Curr. Sci. 51. 438. 1982. *Centratherum ritchiei* Hook.f., Fl. Brit. India 3: 228. 1881. **Fig. 106.**

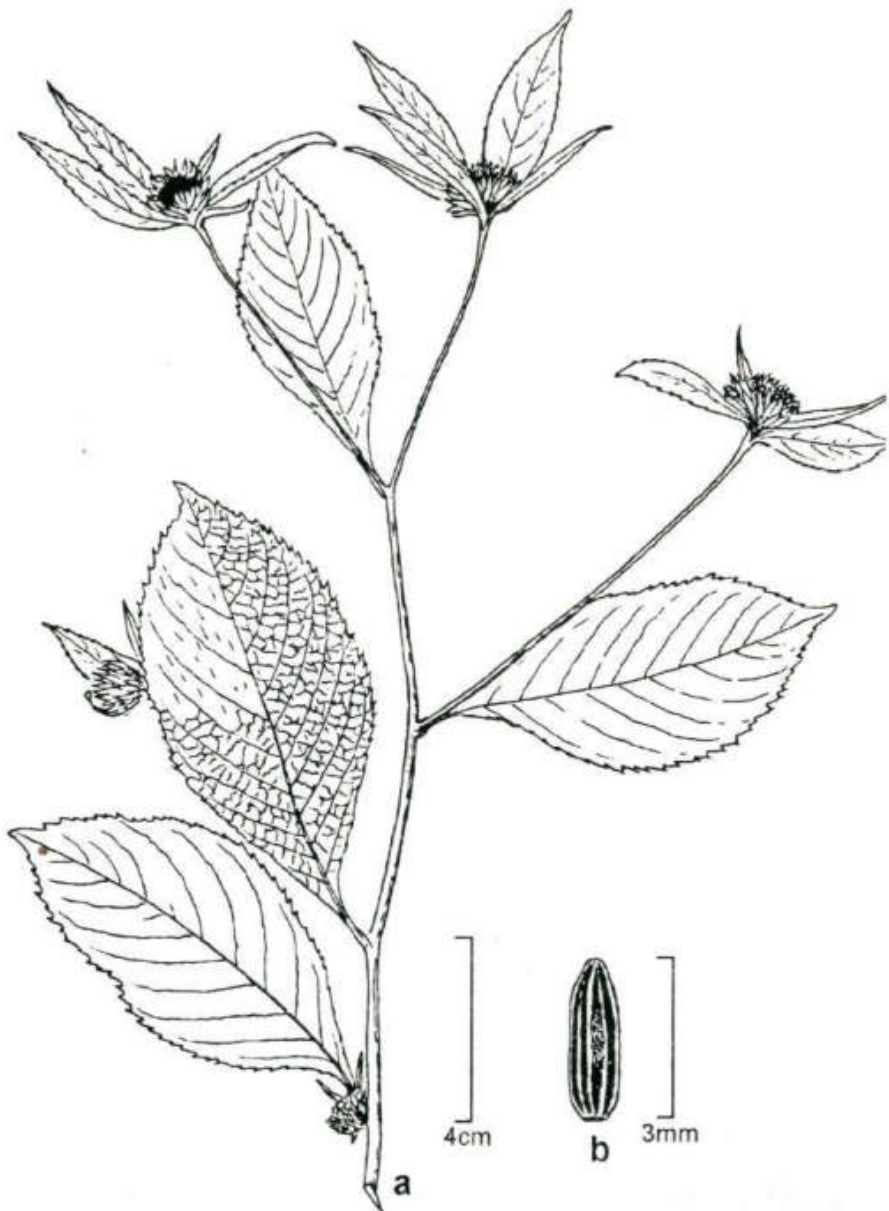


Fig. 105. *Phyllocephalum phyllolaenum* (DC.) Narayana : a. Habit; b. Achene without pappus.

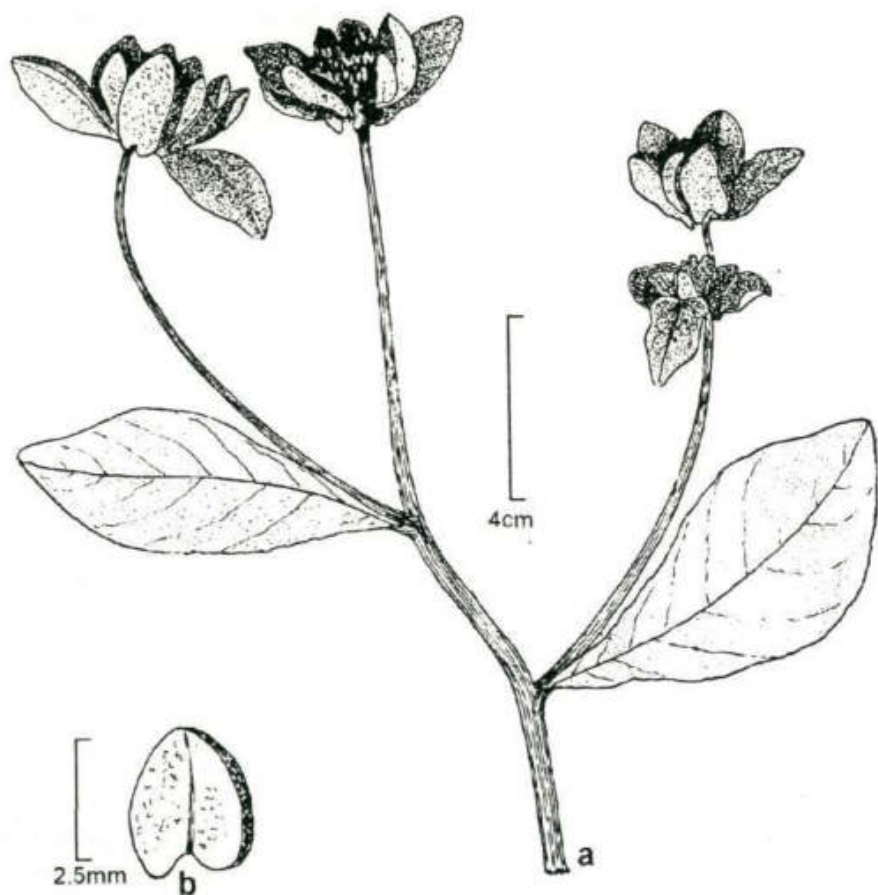


Fig. 106. *Phyllocephalum ritchiei* (Hook.f.) Narayana : a. Habit; b. Outer involucrel bract.

Herbs, up to 60 cm high; stems ridged, glabrous. Leaves elliptic or elliptic-lanceolate, acute or acuminate, spinous toothed on margins, up to 9 x 5 cm, somewhat strigose above, white tomentose beneath. Heads solitary, axillary and terminal; peduncle up to 10 cm long. Outer involucre bracts foliaceous, ca 2.5 x 1.5 cm, cordate at base, white tomentose on the outer surface, rough on the inner surface, margins recurved and distantly mucronate; inner often purple tipped, linear-oblong, ca 8 mm long, scarious, white woolly on the back. Achenes glabrous, 10-ribbed. Pappus hairs reddish, as long as or longer than the corolla.

Fl. Sept. - Nov.

Distrib. India: Maharashtra and Karnataka.

Endemic.

Note. Easily distinguished by the cordate nature of the foliaceous involucre bracts.

7. *Phyllocephalum scabridum* (DC.) Kirkman in *Rhodora* 83: 10. 1981. *Decaneurum scabridum* DC. in Wight, *Contrib. Bot. Ind.* 7. 1834. *Centratherum molle* Benth. & Hook.f., *Gen. Pl.* 2: 225. 1873; Hook.f., *Fl. Brit. India* 3: 227. 1881. *Centratherum courtallense* (Wight) Benth. & Hook.f. in *Fl. Brit. India* 3: 227. 1881.

Herbs; stems scabrous, ridged. Leaves ovate-lanceolate, acuminate, serrate, occasionally entire, up to 10.5 x 4 cm, upper surface with scattered moniliform hairs, lower surface white tomentose, base narrowed to ca 2 cm long, a petiole. Heads solitary or two, axillary and terminal, ca 1.1 cm across; peduncle up to 1 cm long, hairy. Outer most involucre bracts ca 2 cm long, white felted beneath; intermediate up to 7 cm long, scarious, somewhat notched at the top. Pappus very short.

Fl. & Fr. July - Dec.

Distrib. India: Madhya Pradesh, Gujarat, Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala.

8. *Phyllocephalum sengaltherianum* (Narayana) Narayana in *Curr. Sci.* 51: 438. 1982. *Centratherum sengaltherianum* Narayana in *Curr. Sci.* 50: 279. 1981.

Erect, stunted, perennials (?); stems terete, inconspicuously ribbed. Leaves elliptic or elliptic-lanceolate, sharply serrate, up to 9 x 3.8 cm, white tomentose beneath, petioled or upper sessile. Heads solitary, axillary or terminal, 5-7 mm across, subtended by a single leafy bract. Involucral bracts 4-5-seriate. Outer obovate, 6 x 3-4 mm; middle longest, up to 7 mm long, scarious at the base. Achenes ca 2 mm long, 10-ribbed. Pappus hairs 6-10.

Fl. & Fr. March.

Distrib. India: ca 1100 m, in rock crevices. Tamil Nadu, Sengaltheri.

Endemic.

Note. Most of the characters on which this species is based are common with *P. rangacharii* (Gamble) Narayana except in number of pappus hairs (1-4 in case of *P. rangacharii*).

9. *Phyllocephalum tenue* (C.B. Clarke) Narayana in Curr. Sci. 51: 439. 1982. *Centratherum tenue* C.B. Clarke, Comp. Ind. 4. 1876; Hook.f., Fl. Brit. India 3: 228. 1881.

Herbs, erect, dichotomously branched, up to 1.5 m tall; stems and branches glabrous. Leaves broadly elliptic-lanceolate, acute or acuminate, serrate, up to 15 x 6 cm, short hairy above, white woolly beneath; upper leaves sessile. Heads ca 1.3 cm across. Outer involucral bracts foliaceous, oblong-lanceolate, white beneath; intermediate linear; innermost linear-oblong, scarious, white tomentose. Achenes glabrous, faintly 10-ribbed. Pappus pale reddish, much shorter than the corolla tube.

Fl. & Fr. Oct.

Distrib. India: W. Ghats. Maharashtra, Goa and Karnataka.

6. *Pseudelephantopus* Rohr.

Herbs, erect, perennial; stems solitary, branched. Leaves alternate, pinnately veined, sessile-subsessile. Inflorescence several, terminal, racemose-spicate. Heads clustered in the axils of leaf like bracts, with 4 florets. Involucral bracts 8, in decussate pairs. Florets bisexual; corolla tubular, funnellform; tube slender; limb 5-cleft, deeply divided on adaxial side. Anthers sagittate at base, appendaged apically. Style bifid; branches slender, flattened and stigmatic

adaxially. Achenes obovoid, slightly flattened, hispidulous or strigulose mainly on ribs, 10-ribbed. Pappus in 1-series of 5-10 bristles, doubly bent or spiralled towards apex, ciliolate.

Neotropic genus; 2 species, 1 in India

Literature. BUSEY PHILIP (1975). Elephantopodinae. *Ann. Miss. Bot. Gard.* 62: 873.

Pseudelephantopus spicatus (Juss.) C.E. Baker in *Trans. Acad. Sci. St. Ows* 12: 55. 1902; N.M. Dutta & D. Mitra in *Ind. For.* 87 (5): 308. 1961. *Elephantopus spicatus* Juss. ex Aubl., *Hist. Pl. Guire* 2: 808. 1775.

Herbs; stems sparsely hairy. Leaves alternate, linear-oblong, obtuse revolute, up to 8 x 3 cm, glandular and strigose on the mid nerve beneath, hairy; upper leaves much shorter, linear-lanceolate. Heads discoid, 4-flowered, clustered in glomerules. Involucral bracts ca 17 x 3 mm, scarious margined. Corolla shortly 5-lobed. Achenes ca 2.5 mm long, 10-ribbed, hairy on the ribs. Pappus of 4 bristles, 2 longest and curved twice.

Fl. & Fr. June - Oct.

Distrib. India: Uttar Pradesh and W. Bengal.

China, Philippines, Jamaica, Mexico, Malay Archipelago, Hongkong, Taiwan, Africa and C. & S. America.

Note. Best distinguished by two doubly bent pappus bristles.

7. *Struchium* Browne

Herbs, annual, erect. Leaves simple, alternate, subentire or dentate, pinnately veined. Inflorescence single or heads clustered, axillary. Heads discoid. Involucral bracts 3-4-seriate, acuminate or subspinescent at tip, scarious margined. Corolla 3-4-lobed. Anthers sagittate to acute at base. Style bifid; branches hirtellous. Achenes angular, ribbed. Pappus coroniform.

Mexico, W. Indies. America, Africa and Indian subcontinent.

Monotypic.

Literature. ELLAS THOMAS, S. (1975). *Vernoniaeae-Struchium* in *Ann. Miss. Bot. Gard.* 62: 864-66.

Struchium sparganophorum (L.) Kuntze, *Rev. Gen. Pl.* 1: 366. 1891; Vasudevan in *Bull. Bot. Surv. India* 8: 202. 1966. *Ethulia sparganophora* L., *Sp. Pl. ed. 2.* 1171. 1763. **Fig. 107.**

Herbs, up to 1 m high, rooting from basal nodes; stems glabrous or sparsely puberulous, angled. Leaves simple, alternate, elliptic, narrowed at both the ends, dentate, ca 15 x 4.5 cm, subglabrous; petiole ca 1.5 cm long, somewhat amplexicaul. Inflorescence axillary, globose. Heads discoid, ca 5 mm across; florets ca 50. Involucral bracts in 3-4 series, acuminate-subspinescent, ciliolate; inner larger. Corolla purple, salver shaped, 1-2 mm long. Anthers sagittate. Achenes glabrous, 3-4-ribbed. Pappus coroniform, cartilaginous.

Fl. & Fr. Throughout the year.

Distrib. India: Tamil Nadu, Kerala and Andamans.

Sri Lanka, Thailand, Malay Archipelago, Africa, Brazil, Guyana, Tropical America, C. America, W. Indies, and Mexico.

Note. Easily distinguished by axillary, clustered heads and coroniform, cartilaginous pappus.

8. *Vernonia* Schreb.

Herbs, shrubs or trees, rarely scandent; branches ribbed, sulcate or grooved, glabrous, variously pubescent, tomentose or woolly. Leaves alternate, simple, variously shaped, membranous, chartaceous, rigid, glabrous to variously pubescent, villous or tomentose, entire, undulate, serrate or crenate dentate. Inflorescence axillary, terminal, corymbose or paniculate, rarely heads paired or solitary. Heads discoid with 1-many florets. Involucre narrowly campanulate, subcylindric to broadly hemispheric; bracts few-many-seriate, closely to laxly imbricate; outer series usually shorter, progressively increasing in length. Corolla pink, purple or violet, regular, 5-lobed, glandular or eglandular. Stamens 5; anthers sagittate at base, rounded or subacute at apex, appendaged. Style arms subulate, hairy. Achenes terete, angled, ribbed or winged, glabrous, pubescent, silky villous, glandular or eglandular. Pappus hairs white, yellowish or reddish, uniseriate or biseriate; outer short or minute or paleaceous rarely longer; inner longer, barbed, rarely paleaceous.

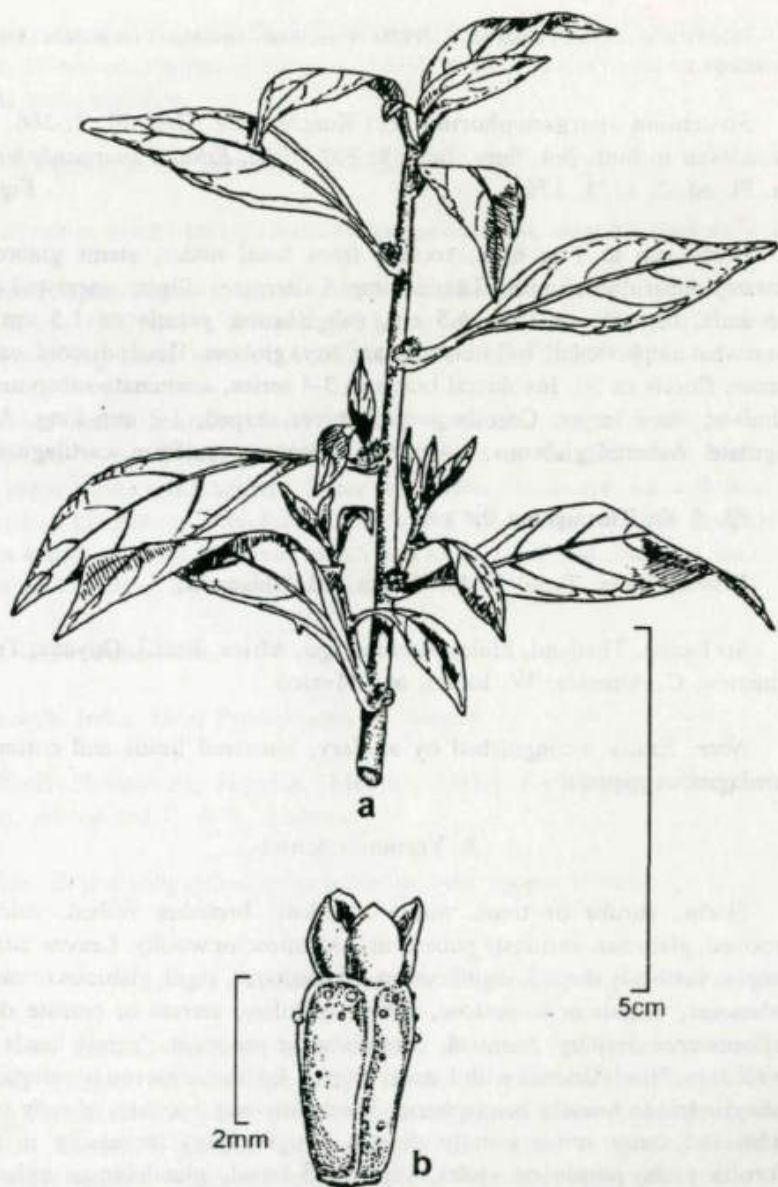


Fig. 107. *Struchium sparganophorum* (L.) Kuntze : a. Habit; b. Achene.

Chiefly tropical and mostly American; ca 1000 species, 52 in India.

KEY TO THE SPECIES

- | | |
|--|--------------------------------|
| 1a. Scandent | 2 |
| b. Erect herbs, shrubs or trees | 6 |
| 2a. Heads 3-5-flowered; pappus hairs white | 20. <i>V. elliptica</i> |
| b. Heads more than 5-flowered; pappus hairs greyish or reddish | 3 |
| 3a. Achenes glabrous | 51. <i>V. vagans</i> |
| b. Achenes puberulous or pubescent | 4 |
| 4a. Outer pappus hairs absent; receptacle fulvous pubescent | 6. <i>V. andersoni</i> |
| b. Outer pappus hairs present; receptacle glabrous | 5 |
| 5a. Involucral bracts puberulous; pappus hairs reddish | 11. <i>V. blanda</i> |
| b. Involucral bracts ciliate; pappus hairs greyish | 5. <i>V. andamanica</i> |
| 6a. Trees | 7 |
| b. Herbs or shrubs | 13 |
| 7a. Heads 1-flowered (very rarely 2-flowered) | 8 |
| b. Heads more than 1-flowered | 9 |
| 8a. Leaves obovate-elliptic, densely brownish tomentose beneath | 52. <i>V. vivekanathanii</i> |
| b. Leaves oblanceolate, scabrid pubescent beneath | 45. <i>V. shevaroyensis</i> |
| 9a. Leaves densely white woolly beneath | 17. <i>V. comorinensis</i> |
| b. Leaves glabrous or pubescent but not white woolly | 10 |
| 10a. Pappus hairs reddish | 49. <i>V. talaumifolia</i> |
| b. Pappus hairs whitish or yellowish | 11 |
| 11a. Achenes glandular | 50. <i>V. travancorica</i> |
| b. Achenes eglandular | 12 |
| 12a. Achenes puberulous; pappus uniseriate | 8. <i>V. arborea</i> |
| b. Achenes with few scattered hairs; pappus biseriate | 53. <i>V. volkameriaefolia</i> |
| 13a. Achenes glabrous | 14 |
| b. Achenes silky pubescent or puberulous | 36 |
| 14a. Achenes 10-ribbed | 15 |
| b. Achenes 3-5-angled or ribbed | 26 |
| 15a. Leaves white tomentose beneath | 16 |
| b. Leaves green beneath, scabrid, but not white tomentose | 19 |
| 16a. Achenes glandular | 17 |
| b. Achenes eglandular | 18 |
| 17a. Leaves crenulate-serrate; pappus hairs biseriate | 3. <i>V. anaimudica</i> |
| b. Leaves faintly serrate in the upper half only; pappus hairs uniseriate | 22. <i>V. fysoni</i> |
| 18a. Leaves sessile; pappus hairs reddish, of the outer row short | 24. <i>V. heynei</i> |
| b. Leaves petioloid or subsessile; pappus hairs yellowish, outer series absent | 25. <i>V. indica</i> |
| 19a. Leaves amplexicaul, subauriculate | 28. <i>V. meeboldii</i> |
| b. Leaves not as above | 20 |
| 20a. Heads 5-flowered | 19. <i>V. divergens</i> |
| b. Heads more than 5-flowered | 21 |
| 21a. Involucral bracts araneous | 37. <i>V. pulneyensis</i> |
| b. Involucral bracts not araneous | 22 |
| 22a. Heads less than 1 cm across, 6-12-flowered | 42. <i>V. saligna</i> |
| b. Heads more than 1 cm across, 10-30-flowered | 23 |

- 23a. Leaves not membranous; branches terete
 b. Leaves membranous; branches ribbed and grooved
- 24a. Involucral bracts acute, apiculate or obtuse; outer ovate
 b. Involucral bracts long awned or obtuse and mucronate
- 25a. Achenes glandular; involucral bracts acuminate
 b. Achenes eglandular; outer involucral bracts filiform
- 26a. Achenes winged
 b. Achenes not winged
- 27a. Outer pappus paleaceous
 b. Outer pappus setose or absent
- 28a. Achenes glandular
 b. Achenes eglandular
- 29a. Achenes trigonous
 b. Achenes 4-5-angled
- 30a. Leaves acute
 b. Leaves obtuse
- 31a. Leaves sessile, obtuse
 b. Leaves petioled, acute
- 32a. Leaves appressedly golden pubescent beneath; outer pappus hairs very short
 b. Leaves without golden pubescence beneath; outer pappus either very distinct or absent
- 33a. Pappus hairs reddish
 b. Pappus hairs white
- 34a. Branches greyish villous; leaves silky villous, glandular beneath
 b. Branches ferruginous or rusty pubescent; leaves rough hairy or thickly rusty tomentose beneath
- 35a. Leaves ovate, acute or acuminate, serrate
 b. Leaves elliptic or obovate, obtuse-rotundate
- 36a. Outer involucral bracts foliaceous.
 b. Outer involucral bracts not foliaceous
- 37a. Leaves membranous
 b. Leaves not membranous
- 38a. Pappus hairs reddish
 b. Pappus hairs white or straw coloured
- 39a. Leaves subsessile; involucral bracts numerous, acicular, outer subulate
 b. Leaves distinctly petioled; involucral bracts few, outer obtuse
- 40a. Achenes glandular
 b. Achenes eglandular
- 41a. Stems tetragonous
 b. Stems terete or striate
- 42a. Outer pappus paleaceous
 b. Outer pappus hairs setose
- 43a. Achenes glandular
 b. Achenes eglandular
- 44a. Leaves gland-dotted; outer involucral bracts long aristate
 b. Leaves not gland dotted; outermost involucral bracts minute
- 45a. Heads more than 1 cm across; involucral bracts araneose
 b. Heads less than 1 cm across; involucral bracts not araneose
46. *V. silhetensis* 24
31. *V. ornata* 25
34. *V. pectiniformis*
36. *V. peninsularis*
29. *V. multibracteata* 27
- 27 28
- 32 29
- 31
23. *V. gossypina* 30
26. *V. malabarica*
12. *V. bourdillonii*
43. *V. salvifolia*
17. *V. comorinensis*
3. *V. anamallica* 33
27. *V. mastersii* 34
33. *V. patula*
44. *V. setigera*
13. *V. bourneana*
7. *V. anthelmintica* 37
- 38
- 46
- 39
- 41
48. *V. subsessilis* 40
21. *V. extensa*
31. *V. ornata*
40. *V. rauii* 42
4. *V. anceps* 43
- 44
- 45
36. *V. peninsularis*
35. *V. peguensis*
30. *V. uayarii*
15. *V. cinerea*

46a. Heads less than 1 cm across	47
b. Heads more than 1 cm across	54
47a. Outer pappus paleaceous; heads solitary or paired	39. <i>V. ramaswamii</i>
b. Outer pappus hairs subulate, setose or absent; heads more than 2	48
48a. Leaves sessile, spatulate	14. <i>V. cinerascens</i>
b. Leaves petioled, lanceolate, ovate-lanceolate, elliptic, obovate or ovate-rhomboid	49
49a. Achenes glandular	50
b. Achenes eglandular	51
50a. Leaves ovate, serrate, acute-acuminate	44. <i>V. setigera</i>
b. Leaves elliptic, elliptic or obovate, crenate, obtuse-rotundate	13. <i>V. bouraeana</i>
51a. Stems and leaves densely white tomentose	1. <i>V. albicans</i>
b. Stems and leaves glabrous, pubescent or fulvous but not white tomentose	52
52a. Involucral bracts obtuse; achenes 10-ribbed	16. <i>V. clivorum</i>
b. Involucral bracts acute, almost awn tipped; achenes terete	53
53a. Leaves undulately toothed; outer pappus hairs long	15. <i>V. cinerea</i>
b. Leaves sharply serrate; outer pappus hairs very short	18. <i>V. conyzoides</i>
54a. Plants dwarf, up to 20 cm high; leaves linear, erect	41. <i>V. revoluta</i>
b. Plants tall, leaves spreading	55
55a. Outer pappus hairs paleaceous	4. <i>V. anceps</i>
b. Outer pappus hairs setose or absent	56
56a. Involucral bracts numerous, rigid	57
b. Involucral bracts few	58
57a. Heads solitary or few, subsessile	47. <i>V. squarrosa</i>
b. Heads many, corymbose or paniced	48. <i>V. subsessilis</i>
58a. Achenes yellow glandular	35. <i>V. peguensis</i>
b. Achenes eglandular	59
59a. Plants glabrous; leaves sessile	10. <i>V. beddomei</i>
b. Plants scabrid or pubescent at least in the upper part; leaves subsessile	60
60a. Involucral bracts pilose	32. <i>V. parryae</i>
b. Involucral bracts not as above	61
61a. Achenes villous all over	9. <i>V. attenuata</i>
b. Achenes hairy between the ribs only	38. <i>V. pyramidale</i>

1. *Vernonia albicans* DC. in Wight, Contrib. Bot. Ind. 6. 1834. *V. cinerea* Sensu Hook.f., Fl. Brit. India 3: 233. 1881, p.p. non Less. 1829. Fig. 108.

Herbs, tall; stems and branches white tomentose. Leaves broadly ovate, rhomboid-obovate, lanceolate, rounded at the tip or subacute, crenate, up to 7 x 5.5 cm (including the petiole), thick, tomentose on both the surfaces but more beneath; petiole almost winged. Heads in terminal panicles. Involucral bracts many-seriate, acuminate, pubescent; outer lanceolate, ca 1.5 mm long; inner ca 3.5 mm long. Florets pinkish, violet or purplish. Achenes ca 1.5 mm long, silky, obtusely angled. Pappus hairs white, biseriate; outer shorter.

Fl. & Fr. July - Oct.



Fig. 108. *Vernonia albicans* DC. : a. Habit; b. Achene.

Distrib. India: E. Ghats, W. Ghats, Deccan Plateau, Upper Gangetic Plain, ascending to W. Himalayas. Uttar Pradesh, Rajasthan, Andhra Pradesh, Karnataka and Tamil Nadu.

2. *Vernonia anaimudica* Shetty & Vivek. in Bull. Bot. Surv. India 12: 266. 1970. **Fig. 109.**

Shrubs, up to 2.5 m tall; stems striate, brown tomentose above. Leaves alternate in pentastichous arrangement, ovate, ovate-lanceolate, elliptic-lanceolate or elliptic-ovate, crenulate-serrulate, up to 12 x 5 cm, coriaceous, bullate, white tomentose beneath with pale brown-green tinge, petioled. Heads in terminal corymbs or in the axils of upper leaves, ca 19-flowered. Involucral bracts green, tip and margins often pigmented brown, 5-6-seriate, mucronate; outer ovate, ca 2 mm long, tomentose; innermost linear, ca 6 mm long, puberulous. Florets fragrant; corolla glandular. Achenes ca 3.5 mm long, 10-ribbed, glandular between the ribs. Pappus hairs buff or dirty white, biseriate; outer shorter.

Fl. Feb.

Distrib. India: Kerala.

Endemic.

3. *Vernonia anamallica* Beddome ex Gamble in Kew Bull. 1920: 339. 1920. **Fig. 110.**

Shrubs, up to, 1.5 m tall; stems and branches angled, appressed pubescent, internodes somewhat zigzag. Leaves elliptic-lanceolate, crenate-serrate, 11.5 x 3.8 cm, appressedly golden pubescent beneath, petioled. Heads in terminal corymbs, ca 1 cm across. Involucral bracts 4-5-seriate, ovate, mucronate, thick, appressed hairy on the back, ciliate on the margins; outermost ca 1.5 mm long; innermost ca 5 mm long. Achenes shining white, ca 2.5 mm long, 4-5-angled, smooth, glandular, broad above with a conspicuous hollow pappus ring.

Fl. & Fr. Nov. - March.

Distrib. South India. Tamil Nadu and Kerala. Located from Pettimudi, Devicolam, Kerala during 1965 and 1970.

Endemic.

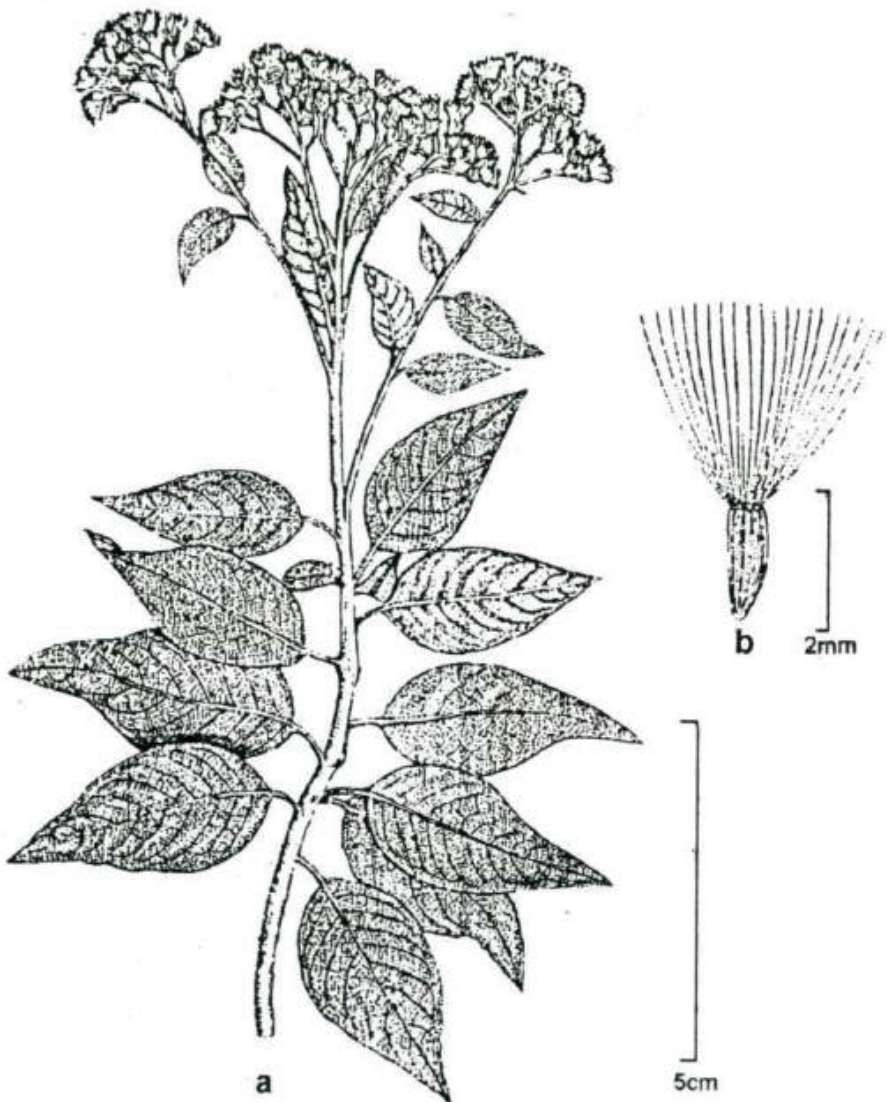


Fig. 109. *Vernonia anaimudica* Shetty & Vivek.: a. Habit; b. Achene.

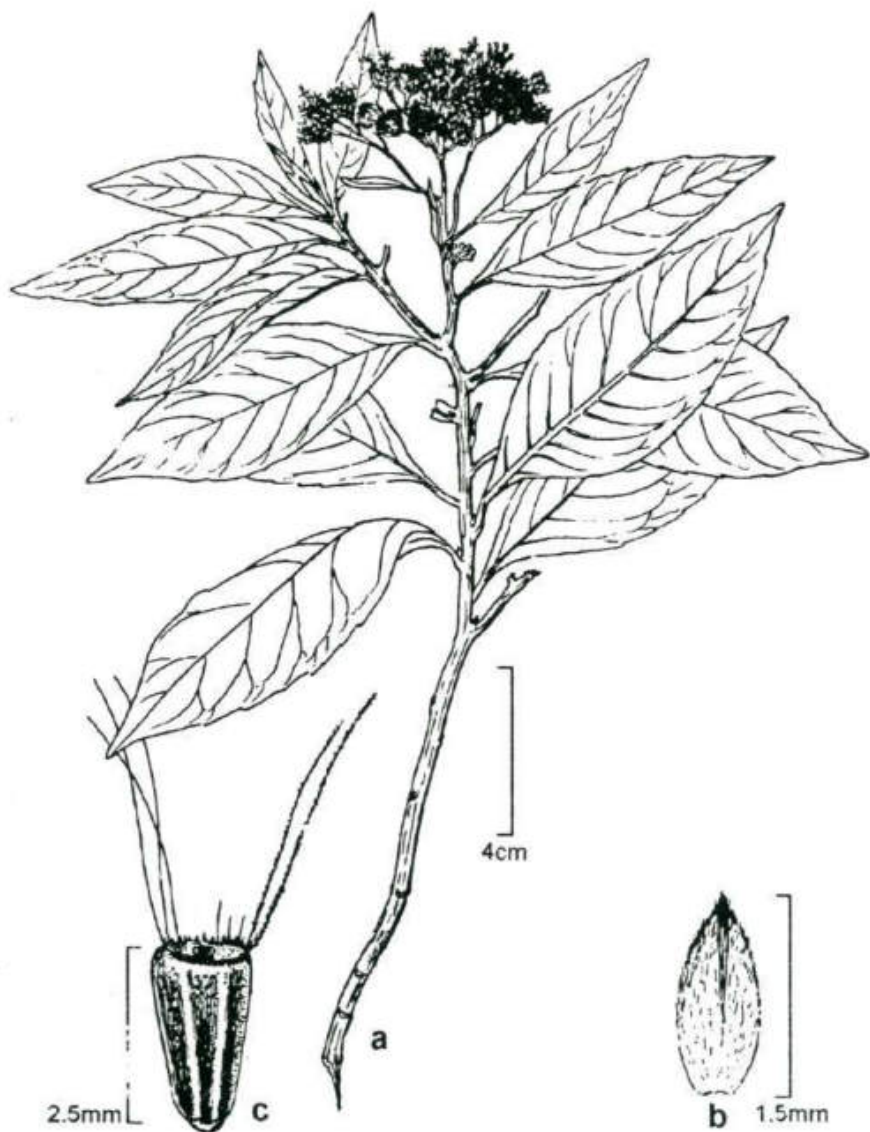


Fig. 110. *Vernonia anamallica* Beddome ex Gamble : a. Habit; b. Outer involucre bract; c. Achene.

Note. The appressed golden pubescence on the under surface of the leaves is very characteristic.

4. *Vernonia anceps* C.B. Clarke ex Hook.f. in Fl. Brit. India 3: 233. 1881.

Shrubs, erect, up to 50 cm high; young stems brownish pubescent, later becoming glabrous. Leaves lanceolate or elliptic-lanceolate, acute, apiculate, margins distantly serrate, somewhat revolute, 4-8 x 0.4-1 (-2-5) cm, almost glabrous on both surfaces or pubescent on veins and punctate beneath, attenuate and subpetiolate at the base. Capitula campanulate, borne in loose corymbs, ca 30-flowered. Pedicels bearing narrow, linear bracts. Involucral bracts 4-seriate, lanceolate, acute, pubescent. Corolla purplish mauve, 6.5-7 (8) mm long, glandular puberulous on the tube. Achenes pale brown, 2.5-3 mm long, 4-5-ribbed, puberulous, glandular. Pappus dirty white; outer hairs paleaceous.

Distrib. India: Rajasthan.

Sri Lanka.

Note. Grierson (Flora of Ceylon 1: 130. 1980) reported it to be endemic to Sri Lanka. However the species has been included here on the authority of G.S. Puri *et al.*, [Rec. Bot. Surv. India 19(1): 73. 1964].

5. *Vernonia andamanica* Balak. & Nair in Bull. Bot. Surv. India 24: 32-33. 1982.

Shrubs, scandent. Leaves spirally arranged, elliptic, ovate or obovate, entire, up to 10.5 x 5.5 cm, glabrous, glossy green above, pale beneath. Heads in terminal panicles, few, many-flowered. Receptacle glabrous. Involucral bracts many, ciliate; outer ovate, 1.5-2.5 mm; inner ovate, oblong or lanceolate, up to 9 mm long. Achenes ca 4 mm long, thinly pubescent, 10-ribbed. Pappus hairs pale greyish, biseriate.

Fl. & Fr. Nov. - Dec.

Distrib. India: In open scrub jungle. Andamans.

Endemic.

6. *Vernonia andersoni* C.B. Clarke, Comp. Ind. 27. 1876; Hook.f., Fl. Brit. India 3: 241. 1881.

Shrubs, scandent; stems somewhat woody, terete, striate; branches pubescent, more or less divaricate. Leaves broadly ovate, acute, entire or distantly repand-serrulate, up to 7.5 x 2 cm, glabrous or pubescent, finely reticulate. Heads in axillary and terminal corymbose panicles. Involucral bracts 3-4-seriate, ovate, acute or obtuse; outer ca 1 mm long; innermost oblong-lanceolate, ca 6.5 mm long. Receptacle fulvous hairy. Achenes somewhat clavate, ca 4 mm long, puberulous, 5-ribbed on each face. Pappus red, uniseriate, deciduous, leaving a conspicuous ring.

Fl. & Fr. June - July.

Distrib. India: Assam and Nagaland.

Myanmar and Hongkong.

Note. Divaricate branches with abundant reddish pappus are quite remarkable.

7. *Vernonia anthelmintica* (L.) Willd., Sp. Pl. 3: 1634. 1803; Hook.f., Fl. Brit. Ind. 3: 236. 1881. *Conyza anthelmintica* L., Sp. Pl. 861. 1753.

Fig. 111.

Beng.: *Kaliziri, Somraj*; Eng.: *Purple Fleabane*; Guj.: *Kadvojiri, Kalijiri*; Hindi: *Kalijiri, Somraj*; Mar.: *Kalengiri, Ranachajiri*; Sans.: *Agnibija, Kshudrapatra, Somraji*; Tam.: *Kattuchiragam, Neychitti*; Tel.: *Garitikamma, Nelavavili*; Urd.: *Janghijiri*.

Herbs, annual, robust, up to 1.5 m tall; stems striate, pubescent. Leaves lanceolate, oblanceolate or elliptic-lanceolate, acute, coarsely serrate, pubescent on both the surfaces. Heads corymbose or subcorymbose, ca 40-flowered; peduncle with a linear bract near the top. Involucral bracts 4-5-seriate; outermost foliaceous; inner often purple tipped, linear-oblong, scarious. Florets mauve. Achenes ca 4.5 mm long, 10-ribbed, pubescent on the ribs, glandular in between. Pappus hairs reddish, biseriate; inner very short, paleaceous.

Fl. & Fr. Sept. - March.

Distrib. India: Throughout, ascending to 1700 m in the Himalayas.

Afghanistan, Nepal, China, Sri Lanka, Malay Archipelago and Laos.

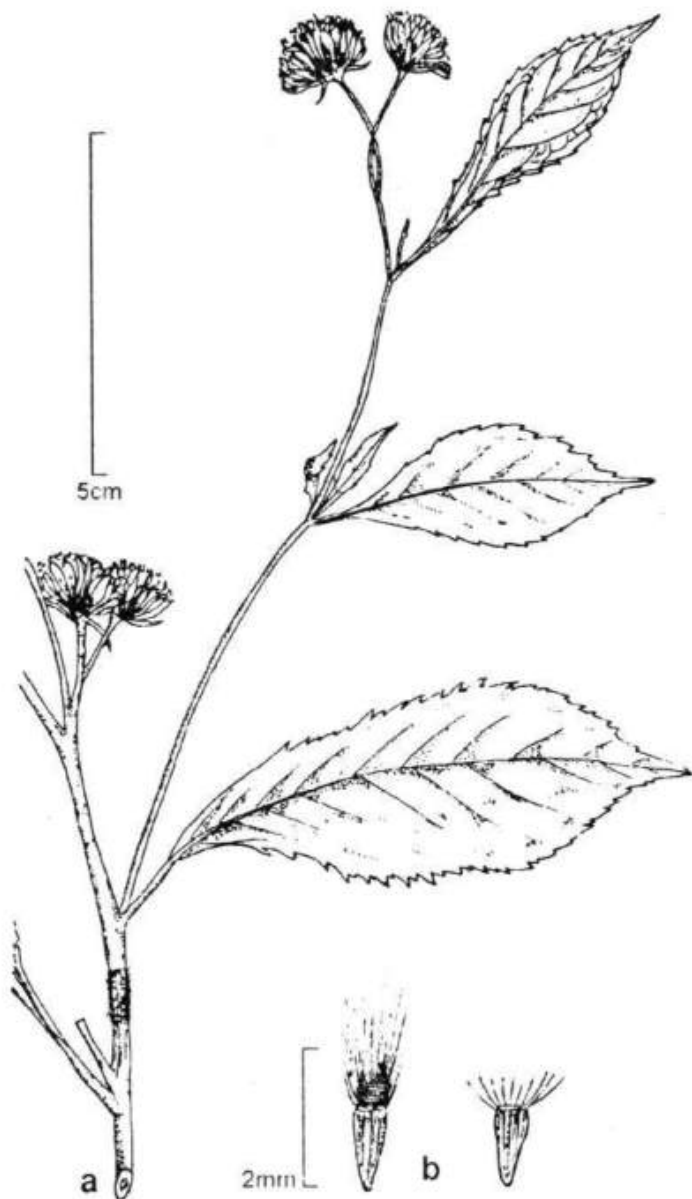


Fig. 111. *Vernonia anthelmintica* (L.) Willd. : a. Habit; b. Achene.

Note. Easily distinguished from other species of *Vernonia* by the outer foliaceous involucre bracts and the short, inner paleaceous pappus hairs. A plant of considerable medicinal value.

Paul & Kapoor [J. Econ. Taxon. Bot. 6(3): 728. 1985.] treated it under *Phyllocephalum anthelmnicum*.

8. *Vernonia arborea* Buch.-Ham. in Trans. Linn. Soc. London 14: 218. 1825; Hook.f., Fl. Brit. India 3: 239. 1881.

Asm.: *Mas-Koita*; Kach.: *Somkhari-Phang*; Naga.: *Pachet*.

Trees, middle sized, deciduous; young twigs pubescent. Leaves elliptic, oblong-elliptic or ovate-elliptic, acuminate, entire or sinuate, up to 20 x 8 cm, coriaceous, glabrous above, uniformly pubescent or only on the nerves beneath, petioled. Heads in loose, terminal, ferruginous pubescent panicles, 4-6-flowered. Involucre bracts 5-6-seriate, obtuse or subacute, fulvously pubescent at tips. Achenes ca 3.5 mm long, angled or ribbed, glabrous or sparsely pubescent, glandular. Pappus white or pale, uniseriate.

KEY TO THE VARIETIES

- 1a. Leaves oblong-elliptic, abruptly acuminate, glabrous or pubescent except on the veins beneath 8.1. var. *arborea*
 b. Leaves ovate-elliptic, gradually acuminate, uniformly pubescent beneath 8.2. var. *javanica*

8.1. var. *arborea*

Fl. & Fr. Sept. - March.

Distrib. India: Assam, Nagaland, Manipur, Meghalaya, Karnataka, Tamil Nadu, Kerala and Andamans.

Pakistan, Nepal, Bangla Desh, Myanmar, Sri Lanka, China, Malay Archipelago, New Guinea and Philippines.

Note. Bark chewed by the Nagas as "PAN" (Kanjital, Fl. Assam 3: 105. 1939).

8.2. var. *javanica* (Blume) C.B. Clarke, Comp. Ind. 23. 1876. *Eupatorium javanicum* Blume, Bijdr. 903. 1826.

Fl. & Fr. Almost throughout the year.

Distrib. India: Assam.

Myanmar, Sri Lanka and Malay Archipelago.

Note. In the Malay Archipelago the wood is used for making matches and match boxes. (Koster in *Blumea* 1: 386. 1935).

9. *Vernonia attenuata* DC., *Prodr.* 5: 33. 1836; Hook.f., *Fl. Brit. India* 3: 231. 1881.

Herbs; branches rigid, sulcate or angled, sparsely appressed hairy. Leaves elliptic-lanceolate or oblong-obovate, acute, distantly minutely dentate, up to 11 x 4.5 cm, hard, hairy on the nerves, prominently reticulately veined, shortly petioled; upper leaves sessile. Heads axillary, solitary or two together, ca 1.2 cm across. Involucral bracts 4-5-seriate, almost spine tipped; outermost subulate, ca 1.5 mm long; innermost oblong-lanceolate, ca 7 mm long, more or less awned at tip. Achenes ca 1.5 mm long, villous, striate. Pappus hairs white; outer hairs few, short.

Fl. & Fr. Sept. - Nov.

Distrib. India: E. Himalayas and N.E. region in dry tropical forests, ascending to 1600 m. W. Bengal, Sikkim, Arunachal Pradesh, Assam, Manipur, Mizoram and Meghalaya.

Myanmar and China.

10. *Vernonia beddomei* Hook.f., *Fl. Brit. India* 3: 231. 1881.

Undershrubs; stems and branches angled, glabrous. Leaves linear-lanceolate to ovate-lanceolate, caudate-acuminate, crenate-serrate, upto 14.5 x 3.5 cm, pubescent on nerves beneath, prominently reticulately veined. Heads mostly solitary, on long, filiform peduncle, 2.5 cm across. Involucral bracts many-seriate, glabrous; outermost subulate, ca 1.5 mm long, progressively increasing in length; innermost linear-oblong, ca 11 mm long. Achenes ca 2.5 mm long, villous, 5-ribbed on each face. Pappus hairs white, in 2 rows.

Fl. & Fr. Dec. - Jan.

Distrib. India: W. Ghats. Kerala.

Endemic.

Note. Much branched corymbs mentioned by Hooker (op. cit.) is not observed in the specimens examined.

11. *Vernonia blanda* DC., *Prodr.* 5: 32. 1836; Hook.f., *Fl. Brit. India* 3: 241. 1881. *V. blandula* C.B. Clarke, *Comp. Ind.* 26. 1876. **Fig. 112.**

Shrubs, scandent; branches ribbed, more or less glandular, glabrous or short greyish pubescent. Leaves elliptic-obovate, entire, up to 11 x 5 cm, glabrous above, glandular beneath. Heads in axillary and terminal, leafy panicles, many-flowered. Involucral bracts 5-6-seriate, oblong-lanceolate, ciliate on margins, acute at tip; outer ca 2 mm long; inner ca 7.5 mm long. Achenes compressed, pubescent, glandular, feebly ribbed. Pappus hairs reddish.

Fl. & Fr. Jan. - Feb.

Distrib. India: Nagaland, Manipur, Mizoram and Meghalaya.

Myanmar, Anaam, Cochinchina, Laos, Malay Archipelago, Thailand and China.

Note. Very similar to *V. vagans* but differs in having densely pubescent achenes.

12. *Vernonia bourdillonii* Gamble in *Kew Bull.* 1920: 339. 1920.

Fig. 113.

Shrubs, up to 1 m high; young branches densely fulvous hairy. Leaves oblanceolate, obtuse, obscurely crenate, up to 5 x 1.5 cm, rough and punctate above, white-tawny tomentose beneath, narrowed to a short petiole. Heads in terminal corymbs, few, ca 1.5 cm across; many-flowered; peduncle pubescent, bracteate. Bracts 1-4, linear-subulate. Involucral bracts many, ovate-lanceolate, pubescent on the back; outermost ca 2.2 mm long. Corolla violet, glandular. Achenes ca 2 mm long, 4-angled, truncate at apex, nearly glabrous, (few hairs on the ribs only), glandular. Pappus hairs biseriate; outer shorter, paleaceous.

Fl. & Fr. Nov. - April.

Distrib. India: Tamil Nadu and Kerala.



Fig. 112. *Vernonia blanda* DC.

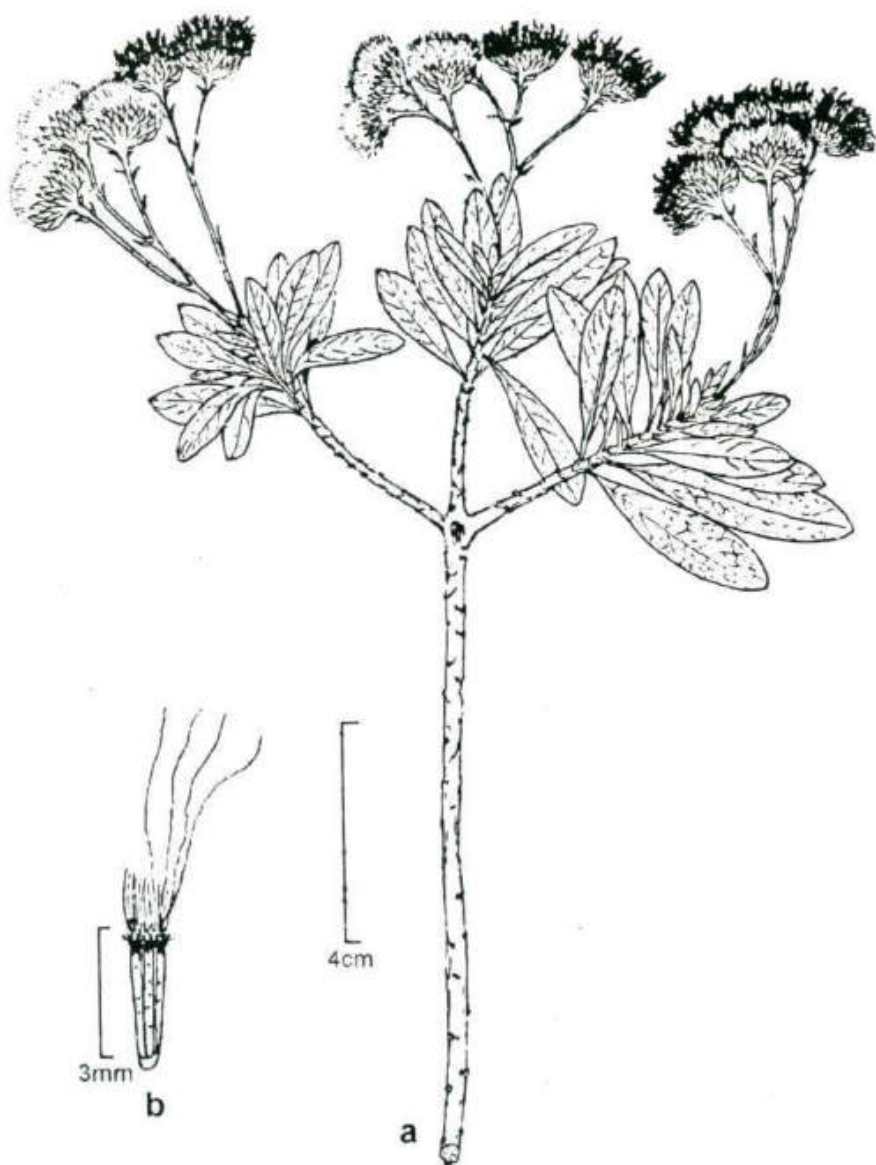


Fig. 113. *Vernonia bourdillonii* Gamble : a. Habit; b. Achene.

Endemic.

Note. Relocated after a gap of four decades in 1979 from Pathankal, on way to Chemungi. The leaves and twigs simulate a *Rhododendron* in vegetative condition.

13. *Vernonia bourneana* W.W. Smith in Rec. Bot. Surv. India 6: 101. 1914. **Fig. 114.**

Shrubs, much branched; branches densely rusty pubescent, minutely ridged. Leaves elliptic or obovate, obtuse, entire, up to 12 x 4 cm, thickly rusty tomentose beneath. Inflorescence large, terminal, corymbose panicles; panicle branches fulvous tomentose. Heads ca 8 mm across, 10-12-flowered. Involucral bracts linear-subulate, 2-3 mm long. Achenes ca 1.5 mm long, 3-5-angled, glandular. Pappus hairs biseriate; outer short, subulate.

Fl. & Fr. Jan.

Distrib. India. South India. Tamil Nadu and Kerala.

Endemic.

Note. The curved backs of the leaves are very characteristic [Fyson, Fl. S. Indian Hill Station 1: 315. 1977. Rep. ed.].

14. *Vernonia cinerascens* Sch.-Bip. in Schweinf., Fl. Aethiop. 162. 1867; Hook.f., Fl. Brit. India 3: 237. 1881. **Fig. 115.**

Merwara : *Lalia*.

Shrubs; branches terete, elongated, ashy. Leaves spathulate, entire or few dentate in the upper half, up to 2.5 x 0.8 cm., punctate on both the surfaces, pubescent, sessile. Heads in corymbose panicles, solitary on divaricating branches, small. Involucral bracts 3-4-seriate, oblong, hairy on the back; outermost ca 1 mm long; inner oblong-oblongeolate, ca 3.5 mm long. Achenes ca 2.5 mm long, silky, 5-angled. Pappus hairs white, in two rows; outer shorter.

Fl. & Fr. Sept. - Dec.



Fig. 114. *Vernonia bourneana* W.W. Smith



Fig. 115. *Vernonia cinerascens* Sch.-Bip. : a. Habit; b. Outer involucre bract; c. Achene.

Distrib. India: Punjab, Rajasthan, Gujarat, Karnataka and Tamil Nadu.

Pakistan, Abyssinia and Tropical Africa.

Note. Easily distinguished by the ashy branches and sessile, spathulate leaves.

15. *Vernonia cinerea* (L.) Less. in *Linnaea* 4: 291. 1829; Hook.f., *Fl. Brit. India* 3: 233. 1881. *Conyza cinerea* L., *Sp. Pl.* 862. 1753.

Herbs, annual or perennial, erect, up to 80 cm high; stems terete, ribbed, greyish pubescent; branches occasionally fulvous pubescent, glandular. Leaves various, obtuse or acute, repand-serrate, undulate or almost entire, up to 8.5 x 3.5 cm, glabrous, fulvously pubescent villous, or glandular beneath, petioled or subsessile. Heads in terminal corymbose panicles, 4-5 mm across, 18-20-flowered. Involucral bracts 4-seriate, lanceolate, pointed at the tip or recurved, with few glands; outer ca 1.5 mm long; inner ca 4.5 mm long. Achenes terete, ca 1.5 mm long, appressedly silky, faintly ribbed, sometimes dimorphic. Pappus hairs white or fulvous, biseriate; of the outer row short.

Note. Juice of plants given in piles. Flowers administered for conjunctivitis. Fresh juice of leaves given in blood dysentery. Externally used for rheumatism. Seeds for intestinal colics, cough, leucoderma and other chronic skin diseases (*J. Bombay Nat. Hist. Soc.* 56: 241. 1959).

Very variable species. Following varieties have been reported from India.

KEY TO THE VARIETIES

- | | |
|--|--------------------------------|
| 1a. Achenes dimorphic | 15.4. var. <i>ludens</i> |
| b. Achenes of one kind | 2 |
| 2a. Heads 4-5 mm long; involucre 2.5-3.5 mm long; | |
| b. Heads 6-7 mm long; involucre 4-5 mm long | 15.6. var. <i>parviflora</i> |
| 3a. Leaves glabrous on both the surfaces | 3 |
| b. Leaves greyish or fulvously pubescent or villous beneath | 15.2. var. <i>glabriuscula</i> |
| 4a. Leaves densely fulvously villous beneath | 4 |
| b. Leaves pubescent beneath | 15.5. var. <i>montana</i> |
| 5a. Leaves more or less elliptic or ovate, edges not recurved | 5 |
| b. Leaves linear-lanceolate or lanceolate-elliptic, edges recurved | 15.1. var. <i>cinerea</i> |
| | 15.3. var. <i>linifolia</i> |

15.1. var. cinerea

Fl. & Fr. Throughout the year.

Distrib. India: Throughout, ascending to 1500 m.

Tropical Asia, Australia, Africa and New Guinea.

15.2. var. glabriuscula DC., Prodr. 5: 24. 1836.

Distrib. India: Tamil Nadu.

Malay Archipelago.

15.3. var. linifolia (Blume) Koster in Blumea 1: 414. 1935. *V. linifolia* Blume, Bijdr. 893. 1826.

Fl. & Fr. Jan. - June

Distrib. India: Meghalaya.

Myanmar and Malay Archipelago.

15.4. var. ludens C.B. Clarke, Comp. Ind. 21. 1876.

Distrib. India: Assam.

15.5. var. montana C.B. Clarke, Comp. Ind. 21. 1876.

Fl. & Fr. Apr. - May; Aug. - Dec.

Distrib. India: Meghalaya.

Malay Archipelago.

15.6. var. parviflora (Reinw.) DC., Prodr. 5: 24. 1836. *V. parviflora* Reinw. in Blume, Bijdr. 893. 1826.

Fl. & Fr. Almost throughout the year.

Distrib. India: Karnataka, Tamil Nadu and Lakshadweep.

Tropical Asia, New Guinea, Polynesia, Fiji, Hawaii Islands and Indo-China.

16. *Vernonia clivorum* Hance in J. Bot. 7: 164. 1869; Hook.f., Fl. Brit. India 3: 232. 1881. *V. kingii* C.B. Clarke, Comp. Ind. 12. 1876.

Branches grooved, puberulous. Leaves lanceolate, acuminate, rigid, distantly serrate, up to 12.5 x 5 cm, puberulous and reticulate beneath. Heads corymbose, on short lateral branches, ca 7 mm across, 15-25-flowered. Involucral bracts linear, acute; outermost subulate. Achenes pubescent, 10-ribbed. Pappus hairs white, biseriate; outer few, very short.

Distrib. India: Manipur.

Myanmar and China.

17. *Vernonia comorinensis* W.W. Smith in Rec. Bot. Surv. India 4: 283. 1911.

Shrubs or small trees; stems and branches angled, white tomentose. Leaves linear-lanceolate, acute, crenulate, up to 10 x 2 cm, minutely puberulous above, densely tomentose beneath, shortly petioled. Heads in terminal corymbs, ca 1.2 cm across, ca 15-flowered. Outer involucral bracts linear-oblong, ca 4 mm long, lanate; intermediate ovate-apiculate, pubescent; inner 7-8 mm long, glabrous or pilose at apex. Achenes pyriform, compressed, ca 4 mm long, 4-5-ribbed, glabrous. Pappus hairs biseriate; outer paleaceous, fimbriate.

Distrib. India: Hills of Tinnevalley and Travancore. Tamil Nadu and Kerala.

Endemic.

18. *Vernonia conyzoides* DC. in Wight, Contrib. Bot. Ind. 6. 1834; Hook.f., Fl. Brit. India 3: 234. 1881.

Herbs, sturdy, stems ribbed, pubescent. Leaves ovate, oblong-lanceolate, acute, up to 7.5 x 3 cm, nearly glabrous above, pubescent or tomentose beneath, prominently nerved, petioled. Heads corymbose, terminating the branches, ca 0.6 cm across. Involucral bracts lanceolate-linear, spine tipped; outer ones not much shorter than the inner. Achenes hairy. Pappus hairs white, biseriate; outer very short.

Fl. & Fr. Sept. - March.

Distrib. India: Rajasthan, Karnataka, Tamil Nadu and Kerala.

19. *Vernonia divergens* (Roxb.) Edgew. in J. Asiat. Soc. Bengal 21: 172. 1853; Hook.f., Fl. Brit. India 3: 234. 1881. *Eupatorium divergens* Roxb., Fl. Ind. 3: 414. 1832.

Tam.: *Kattupooru, Poomakilla.*

Shrubs, perennials, up to 2.5 m tall; stems stout, pubescent; branches divergent. Leaves elliptic-ovate or lanceolate, acute, serrate, up to 15 x 7 cm, downy when young, scabrous when old. Heads in corymbose panicles. Involucral bracts few seriate, nearly glabrous or pubescent, occasionally woolly; outer ovate; inner oblong-obtuse, sometimes apiculate. Achenes ca 3 mm long, glabrous, 10-ribbed, glandular between the ribs. Pappus hairs dirty white or reddish brown; outer very short or absent.

Fl. & Fr. Nov. - Jan., May.

Distrib. India: Uttar Pradesh, Bihar, Assam, Manipur, Madhya Pradesh, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala.

Myanmar, China and Thailand.

✓ 20. *Vernonia elliptica* DC. in Wight, Contrib. Bot. Ind. 5. 1834. *V. elaeagnifolia* DC., Prodr. 5: 22. 1836; Hook.f., Fl. Brit. India 3: 237. 1881.

Shrubs, climbing; branches pendulous. Leaves oblong or elliptic-lanceolate, acute or obtuse, entire, up to 4 x 1.5 cm, glabrous and dotted above, appressedly silky beneath, shortly petioled. Heads aggregated in axillary or terminal corymbs, ca 3 mm across. Involucral bracts scarious to herbaceous; outer ovate-obovate, ca 1 mm long, pubescent without; inner ca 3 mm long, obtuse, thinly ciliate on margins. Achenes ca 2 mm long, glabrous, 5-8-ribbed. Pappus hairs white; outer few.

Fl. & Fr. Jan. - April.

Distrib. India: Mostly planted.

Myanmar and Thailand.

21. *Vernonia extensa* DC., Prodr. 5: 33. 1836; Hook.f., Fl. Brit. India 3: 238. 1881. *V. cylindriceps* C.B. Clarke, Comp. Ind. 34. 1876.

Shrubs, to 2.5 m tall; stems and branches rusty pubescent. Leaves lanceolate-elliptic, narrowed at both the ends, sharply serrate, up to 25 x 7.5 cm, sparsely short hairy above, more hairy on the nerves beneath. Heads in terminal corymbs, 8-10-flowered. Involucral bracts 3-4-seriate, concave; outermost ovate, ca 1 mm long, shortly ciliate on the margins; innermost pinkish tinged at the tip, oblong-lanceolate, ca 6 mm long. Achenes ca 2.5 mm long, pubescent, ribbed. Pappus hairs reddish.

Fl. & Fr. Dec. - Feb.

Distrib. India: E. Himalayas and N.E. region. Sikkim, Assam and Manipur.

Nepal, Bhutan and Myanmar.

22. *Vernonia fysoni* Calder in Rec. Bot. Surv. India 6: 343. 1914.

Undershrubs, erect or subscandent, 2-3 m tall; stems striate, tomentose above. Leaves alternate in a pentastichous arrangement, lanceolate, acute, faintly serrate in the upper half, up to 12 x 3.3 cm, glabrous above, white tomentose beneath. Heads in corymbs, up to 5 mm across ca 15-flowered, peduncle tomentose. Involucral bracts about 4-seriate; outer ovate, ca 1 mm long, apiculate, sparsely tomentose on the upper margins; inner linear, ca 5 mm long, acute-apiculate. Achenes ca 2.8 mm long, 10-ribbed, glandular between the ribs. Pappus hairs uniseriate.

Fl. & Fr. Feb.

Distrib. India: South India, in light sholas. Tamil Nadu; rare.

Endemic.

23. *Vernonia gossypina* Gamble in Kew Bull. 1920: 340. 1920.

Undershrubs or shrubs; young branches and branchlets woolly. Leaves lanceolate, minutely serrate, up to 15 x 5 cm, sessile, subamplexicaul; young leaves long silky woolly on both the surfaces. Heads in long peduncled, terminal and axillary corymbs, 5-flowered. Involucral bracts ovate, acute, margins cottony. Corolla glabrous glandular. Achenes trigonous, ca 1 mm long, glandular. Pappus hairs biseriata; outer paleaceous, fimbriate.

Fl. & Fr. March.

Distrib. India: South India between 1000-2000 m. Tamil Nadu.

Endemic.

Note. Collected from Singamapatti, Tirunelveli in 1958 after the type collection.

24. *Vernonia heynei* Beddome ex Gamble in Kew Bull. 1920: 340. 1920.

Undershrubs or shrubs; branches sulcate, greyish puberulous. Leaves elliptic-lanceolate, acuminate, serrate, mucronate (recurved) teeth up to 12 x 5 cm, glabrous above except on the nerves, white tomentose beneath, sessile. Heads in terminal corymbs, ca 12-flowered. Outer involucre bracts ovate, acuminate, ciliate, pubescent; inner obtuse, mucronate, almost glabrous. Achenes glabrous, 10-ribbed, pappus hairs reddish, biseriate; of the outer row shorter.

Distrib. India: Tamil Nadu and Kerala.

Endemic.

Note. Collected from Mahendragiri hills, Kanyakumari District in 1969 after the type collection.

25. *Vernonia indica* Wallich ex C.B. Clarke, Comp. Ind. 16. 1876; Hook.f., Fl. Brit. India 3: 238. 1881.

Undershrubs, up to 90 cm high; stems striate, densely whitish tomentose. Leaves elliptic-oblong, acute, sharply serrate, up to 15 x 6 cm, densely white tomentose beneath and prominently nerved, shortly petioled or subsessile. Heads in axillary, terminal, corymbose panicles; panicle branches white tomentose. Bracts ca 5 mm long, linear, tomentose. Involucre bracts purple tipped, elliptic-oblong, tomentose on the back, becoming glabrous with age; outer shorter, ca 1.2 mm long; inner ca 2 mm long. Achenes ca 1.5 mm long, glabrous and shining, 5-ribbed on each face. Pappus hairs yellowish.

Fl. & Fr. Oct. - Dec.

Distrib. India: W. Ghats and Deccan Plateau, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala.

Endemic.

26. *Vernonia malabarica* Hook.f., Fl. Brit. India 3: 230. 1881. *V. bababudensis* Talbot in J. Bombay Nat. Hist. Soc. 11: 237: 1897.

Shrubby; branches softly pubescent. Leaves elliptic-lanceolate, acute or acuminate, serrulate, up to 10 x 5 cm, thinly tomentose beneath. Heads in terminal, corymbose panicles, ca 1.2 cm across, ca 12-flowered. Involucral bracts few, linear-subulate, pubescent. Corolla lobes glandular-pubescent. Achenes obtusely 5-angled, glabrous, white glandular. Pappus hairs yellowish; outer paleaceous.

Fl. & Fr. Oct.

Distrib. India: South India, up to ca 1700 m. Karnataka, Tamil Nadu and Kerala.

Endemic.

27. *Vernonia mastersii* Watt; Kanjilal *et al.*, Fl. Assam 3: 107. 1939.

Shrubs. Leaves ovate-oblong, acute or acuminate, 12-20 x 5-7.5 cm, coriaceous, glabrous above, tomentose and prominently nerved beneath, petioled. Heads 16-20-flowered. Involucral bracts ovate, concave, pubescent without. Achenes ca 2.5 mm long, obscurely 4-angled, glabrous. Pappus hairs reddish.

Fl. & Fr. Oct. - Jan.

Distrib. India: Assam, Nagaland and Meghalaya. (vide Kanjilal *et al.*, l.c.)

Note. One of the poorly known species. The original citation for this species could not be traced out as the name does not appear in Index Kewensis (1885-1975). If Flora Assam (Kanjilal *et al.* l.c.) be taken as the first publication for this species, it would need a latin diagnosis for validation.

The specimen kept under *V. mastersii* at ASSAM has achenes ribbed between angles.

28. *Vernonia meeboldii* W.W. Smith in Rec. Bot. Surv. India 4: 283. 1911.

Shrubs or undershrubs. Leaves obovate or oblanceolate, obtuse, rotundate, apiculate, nearly entire, 6-8 x 1.5-2.5 cm, glabrous, base amplexicaul,

subauriculate. Heads large, in 1-3-capitulate corymbs, 30-40 flowered. Involucral bracts many seriate, ca 4 mm long, obtuse; outer smaller, oblong, triangular at tip, glabrous or puberulous without; inner completely glabrous. Achenes 2.5 mm long, glabrous, 10-ribbed. Pappus hairs reddish, outer row absent.

Distrib. India: Kerala.

Endemic.

29. *Vernonia multibracteata* Gamble in Kew Bull. 1920: 340. 1920.

Fig. 116.

Shrubs; branches white lanate. Leaves lanceolate, acuminate, crenulate, up to 20 x 6 cm, densely white tomentose beneath, petioled. Heads in terminal corymbs. Involucral bracts lanceolate, ca 1 cm long; outer long acuminate, araneous; intermediate almost glabrous; inner somewhat smaller, mucronate. Achenes tetragonous, angles winged. Pappus hairs biseriate; outer paleaceous.

Fl. & Fr. Dec.

Distrib. India: Tamil Nadu and Kerala.

Endemic.

Note. The winged achenes are very characteristic.

30. *Vernonia nayarii* Uniyal in Ind. J. For. 11(2): 171. 1988. *V. recurva* Beddome ex S. Moore in J. Bot. 63: 171. 1925, non Gleason 1906.

Undershrubs or shrubs; stems angled, densely brownish pubescent, ultimately glabrescent. Leaves ovate or ovate-oblong, acute or shortly acuminate, mucronulate, crenulate-serrulate, up to 8.5 x 4 cm, scabrous above, minutely pubescent on the nerves beneath, shortly petioled. Heads in corymbs, ca 40-flowered. Involucral bracts about 6-seriate, araneose; outer 2 mm long (excluding awns); middle 3-4.5 mm long; inner 6 mm long; awns 3-3.5 mm long. Achenes clavate-turbinate, 2.5 mm long, puberulous, 10-ribbed. Pappus hairs straw coloured, biseriate.

Distrib. India: S.W. Ghats at an altitude of ca 1700 m. Tamil Nadu.

Endemic.



Fig. 116. *Vernonia multibracteata* Gamble : a. Habit; b. Achene.

Note. Known by the type collection only.

31. *Vernonia ornata* Talbot in J. Bombay Nat. Hist. Soc. 11: 691. Pl. 13. 1898. *V. dalzelliana* Drumm. et Hutch. in Kew Bull. Misc. Inform. 1909: 261. 1909.

Herbs or undershrubs, up to 1.25 m tall; stems ribbed, glandular pubescent above. Leaves elliptic, oblanceolate, ovate or obovate, acute or acuminate, up to 14 x 5 cm, membranous, sparsely pubescent above and on the nerves beneath, petioled. Inflorescence corymbose, axillary and terminal. Heads ca 1.2 cm across, ca 15-flowered; peduncle slender, up to 6.8 cm long, with 1 or more subulate bracts. Involucral bracts many-seriate, decurrent on the peduncle, acute, obtuse, apiculate or mucronate, ciliate and darker near the tip; outer ca 2.5 mm long; innermost ca 6 mm long. Achenes ca 2 mm long, glabrous or hairy, 10-ribbed. Pappus hairs reddish; outer very short.

Fl. & Fr. Oct. - March.

Distrib. India: W. Ghats between 650-950 m. Karnataka and Kerala.

Endemic.

32. *Vernonia parryae* C. Fischer in Kew Bull. 1929: 6. 1929.

Undershrubs; branches thin, sulcate, fulvous pubescent towards upper end. Leaves elliptic, somewhat linear, often falcate, acuminate, minutely dentate, up to 20 x 2.5 cm, narrowed into petiole. Heads axillary, cymose, ca 20-flowered. Bracts 1-2.5 cm long, resembling floral leaf, fulvous pubescent towards base. Involucral bracts laxly pilose without, scarious margined. Corolla purple. Achenes ca 2-5 mm long, with white hairs, costate. Pappus hairs white.

Fl. & Fr. Jan.

Distrib. India: Mizoram; rare.

Endemic.

Note. Known by the type collection only.

33. *Vernonia patula* (Dryand.) Merr. in Philip. J. Sci. 3: 439. 1908. *Conyza patula* Dryand. in Hort. Kew 3: 184. 1789. *Vernonia chinensis* Less.

in *Linnaea* 4: 674. 1829; Mitra & Giri in *J. Bombay Nat. Hist. Soc.* 77: 168. 1980.

Herbs, up to 70 cm high; stems terete, ribbed, appressedly pubescent; young branches greyish villous. Leaves broadly ovate, ovate-elliptic, acute, acuminate or obtuse, subentire, up to 10.5 x 4.5 cm, silky villous, glandular beneath. Heads at the top of dichotomous branches, terminal or in the upper axils. Bracts linear. Involucral bracts 4-seriate, sparsely greyish villous, more or less glandular, spine tipped; outer subulate; inner oblong-lanceolate, mucronate. Corolla glandular. Achenes ca 1.5 mm long, 5-angled, glabrous, glandular. Pappus hairs white, uniseriate.

Fl. & Fr. Throughout the year.

Distrib. India: Andaman & Nicobar Islands.

Myanmar, China, Cochinchina, Indo-China, Japan, Malay Peninsula, New Guinea, Philippines and Thailand. Introduced in America and W. Indies.

34. *Vernonia pectiniformis* DC. in Wight, *Contrib. Bot. Ind.* 2. 1834; Hook.f., *Fl. Brit. India* 3: 239. 1881.

Undershrubs or shrubs; branches terete, striate, glabrous or pubescent. Leaves elliptic-lanceolate, or ovate-lanceolate, acuminate, sharply serrate, up to 9 x 1.5 cm, narrowed towards base, glabrous above, pilose hairy beneath. Heads in terminal corymbs, 10-25-flowered. Involucral bracts dark tipped, obtuse, mucronate; outer ca 0.75 mm long; intermediate elliptic-oblong, ca 4 mm long; inner ca 5.5 mm long. Achenes ca 2 mm long, glandular, 10-ribbed. Pappus hairs reddish or dirty white; outer hairs short.

Fl. & Fr. April - Dec.

Distrib. India: Andhra Pradesh, Karnataka, Tamil Nadu and Kerala.

Sri Lanka.

35. *Vernonia peguensis* C.B. Clarke, *Comp. Ind.* 13. 1876 et in *J. Linn. Soc.* 25: 35. 1889; Hook.f., *Fl. Brit. India* 3: 232. 1881.

Undershrubs; stems striate upwards, pubescent. Leaves obovate-lanceolate, serrate, acute, 15-30 cm long, scabrid above, pubescent beneath, becoming

glabrous. Heads in terminal panicles, 10-12-flowered. Involucral bracts oblong, acute, scarious at apex when dry; outermost shorter. Achenes yellow glandular. 10-ribbed. Pappus white, biseriate, setose, persistent.

Fl. Cold season *Fr.* Hot season.

Distrib. India: Nagaland (vide C.B. Clarke, J. Linn. Soc. 25: 35. 1889).

Myanmar.

36. *Vernonia peninsularis* (C.B. Clarke) C.B. Clarke ex Hook.f., in *Fl. Brit. India* 3: 233. 1881. *V. bracteata* Wallich var. *peninsularis* C.B. Clarke, *Comp. Ind.* 18. 1876.

Erect herbs or undershrubs, up to 1 m high; stems ribbed, pubescent with moniliform hairs. Leaves ovate, elliptic or lanceolate, mucronate, crenate, up to 12 x 5.5 cm, membranous, glabrous or with few scattered hairs, on the upper surface, hairy on the nerves beneath, petioled; petiole ca 1 cm long, hairy. Heads few, corymbose, 20-40-flowered. Involucral bracts many, acuminate; outer ca 2.5 mm long, long aristate, tip recurved or not, somewhat hairy on the margins; inner ca 6.5 mm long, mucronate, hairy near the tip. Achenes glabrous or hairy along grooves, ribbed. Pappus hairs reddish or white.

KEY TO THE VARIETIES

- 1a. Tip of involucral bracts recurved; achenes glabrous; pappus reddish **36.2. var. *peninsularis***
 b. Tip of involucral bracts not recurved; achenes hairy along grooves; pappus white
36.1. var. *kodayarensis*

36.1. var. *kodayarensis* Henry & Gopalan in *J. Econ. Taxon. Bot.* 11(1): 233-34. 1987 (88).

Distrib. India: Tamil Nadu.

36.2. var. *peninsularis*

Fig. 117.

Distrib. India: Tamil Nadu and Kerala.

Endemic.

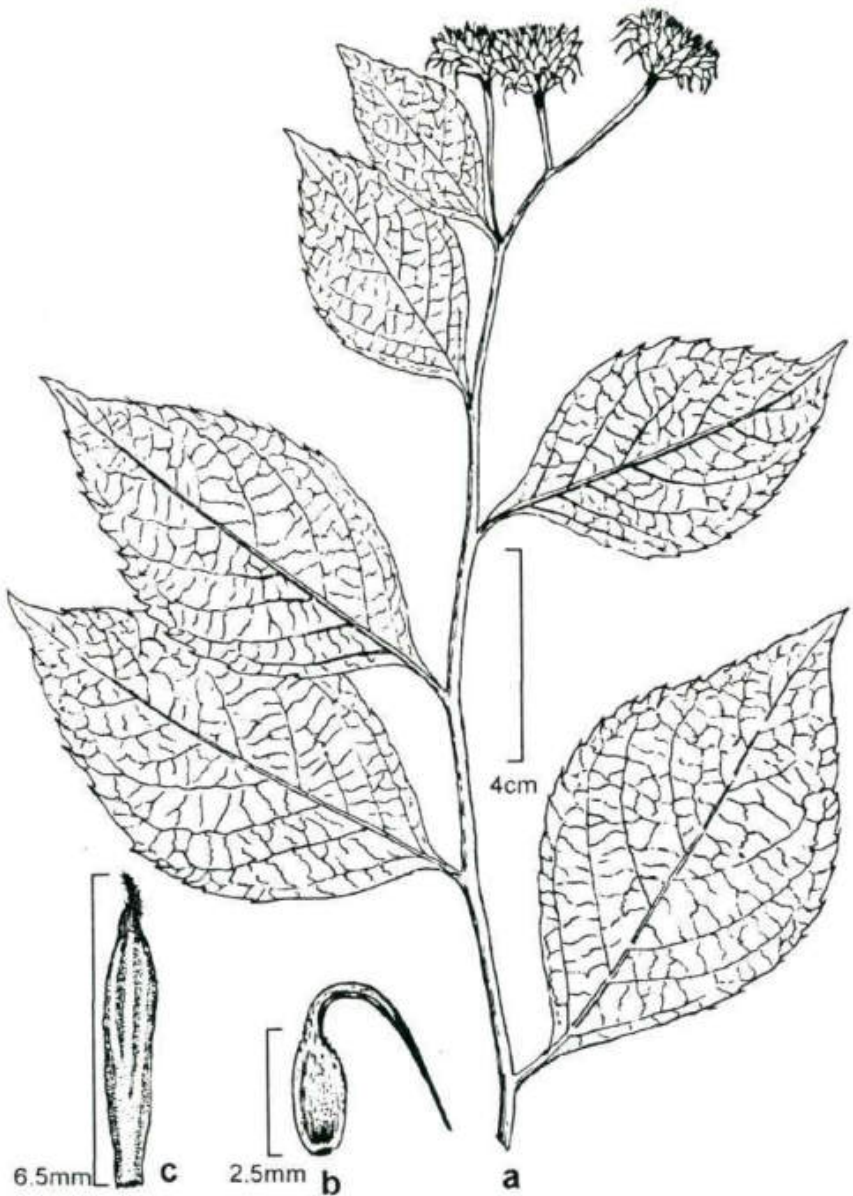


Fig. 117. *Vernonia peninsularis* (C.B. Clarke) C.B. Clarke ex Hook.f. var. *peninsularis* : a. Habit; b. Outer involucre bract; c. Inner involucre bracts.

37. *Vernonia pulneyensis* Gamble in Kew Bull. 1920: 341. 1920.

Undershrubs; branches striate, pilose with moniliform hairs. Leaves ovate, acute, mucronate, distantly serrate, up to 10 x 4 cm, membranous, sparsely moniliformly hairy above, villous beneath. Heads corymbose, ca 1 cm across, 12-15-flowered, subsessile. Involucral bracts cobwebby; outer ovate, long mucronate; innermost straw coloured, ca 5 mm long, scarious, obtuse. Achenes glabrous, 10-costate. Pappus hairs white.

Fl. & Fr. March - April.

Distrib. India: South India, in thin forest along the river bank. Karnataka and Tamil Nadu.

Endemic.

Note. Not collected after the type.

38. *Vernonia pyramidale* (D. Don) S.N. Mitra in Ind. For. 99: 100. 1973. *Eupatorium pyramidale* D. Don, Prodr. Fl. Nepal. 170. 1825. *Vernonia aspera* DC., Prodr. 5: 31. 1836, non Ham. *V. roxburghii* Less. in Linnaea 6: 674. 1831; Hook.f., Fl. Brit. India 3: 232. 1881. Fig. 118.

Ori.: Agnijal.

Herbs or undershrubs, scabrous hairy. Leaves elliptic or obovate, subcoriaceous, deeply serrate; serrations blunt or ending in a mucro; 6-14 x 3-6 cm, scabrous on the nerves, subsessile. Heads in axillary and terminal, compact, corymbose panicles, many-flowered, ca 2.5 cm across. Bracts linear-subulate. Involucral bracts many seriate, mucronate-apiculate; outermost ca 9 mm long, scarious margined. Florets pink. Achenes ca 3.5 mm long, strongly 10-ribbed, hairy between the ribs. Pappus hairs white or with reddish tinge, uniseriate.

Fl. & Fr. Sept. - Feb.

Distrib. India: Ascending up to 1250 m, chiefly in *Shorea robusta* Forest. Uttar Pradesh, Bihar, W. Bengal, Assam, Nagaland, Manipur, Meghalaya, Orissa, Madhya Pradesh and Maharashtra.

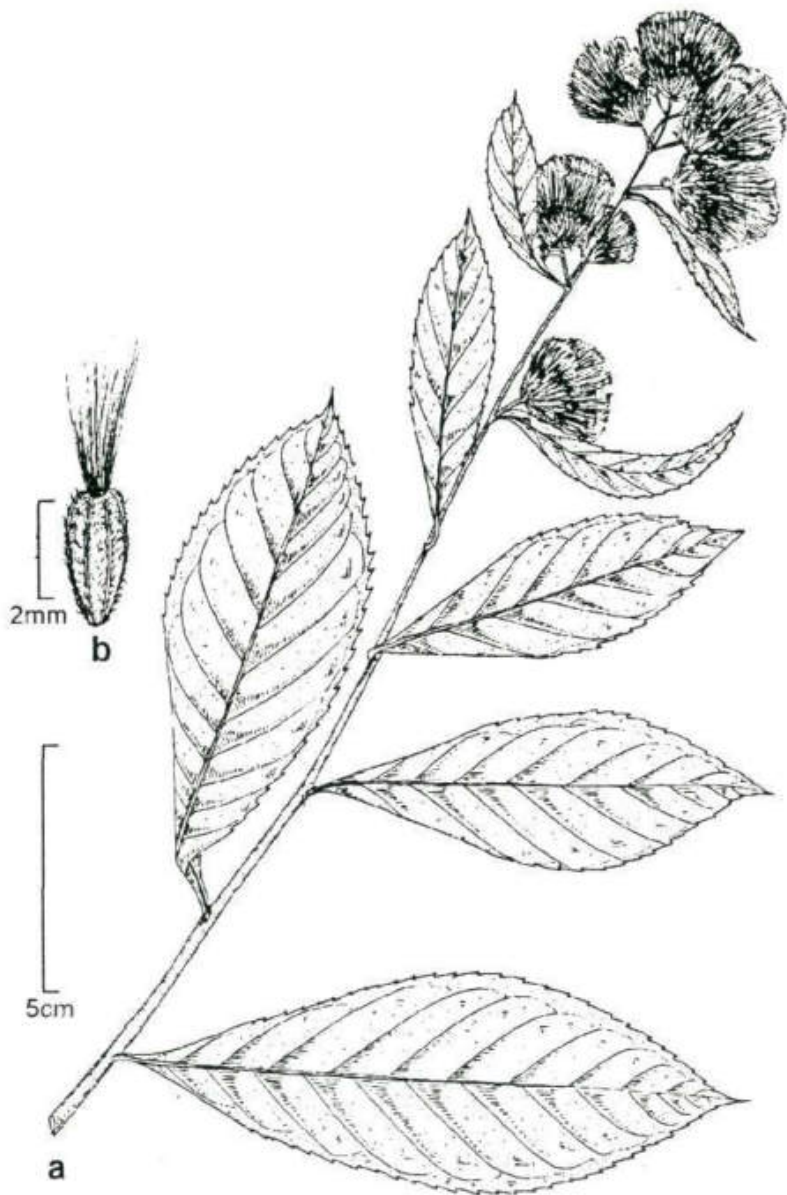


Fig. 118. *Vernonia pyramidale* (D. Don) S.N. Mitra. : a. Habit; b. Achene.

Nepal, Bhutan, China and Thailand.

Note. The leaves are ground in water and the mixture drunk for cholera in Sambalpur [Haines, Bot. Bihar & Orissa 2: 482. 1961 (Rep. ed.)].

The generally accepted name for this species is *V. aspera* Buch.-Ham. The achenes are glabrous in *V. aspera* Buch.-Ham. ("Semina glabra" Trans. Linn. Soc. London 14: 219. 1825) but the specimens studied by the author have hairy achenes as mentioned by De candolle (Prodr. 5: 31. 1836). Therefore, the name *V. pyramidale* (D. Don) S.N. Mitra has been retained for this species.

39. *Vernonia ramaswamii* Hutch. in Kew Bull. 1916: 35. 1916.

Undershrubs; stems trichotomously branched. Leaves linear-lanceolate, obscurely serrulate in the upper part, entire in the lower part, upto 6 x 0.8 cm, glabrous above, pubescent and glandular beneath; petiole ca 7 mm long, hirsute. Heads solitary or paired, terminal, ca 0.9 cm across, long peduncled. Involucral bracts ca 4-seriate; outer subulate-lanceolate, acute; inner oblong-lanceolate, subacute. Achenes 5-costate, sparsely pubescent between the ribs. Pappus hairs white, biseriate; outer shorter.

Fl. & Fr. Feb. - Sept.

Distrib. India: Tamil Nadu and Kerala.

Endemic.

40. *Vernonia rauii* Uniyal, *nom. nov.* *V. membranacea* Beddome ex S. Moore in J. Bot. 63: 170. 1925, non Gardn. 1846.

Shrubs; stems tetragonous, few striate, brown pubescent. Leaves elliptic, short acuminate, mucronate, crenate-dentate, up to 15 x 6.5 cm, membranous, scabrous above, puberulous on the nerves beneath. Heads in ample corymbs, ca 16-flowered; peduncle slender, ca 2 cm long. Involucral bracts ca 6-seriate; outermost 1.5-2.5 mm long; middle oblong-lanceolate, ca 3.5 mm long, with a filiform, black appendage, recurved above; innermost ca 5 mm long, acute. Corolla tube narrow, infundibular; lobes oblong-lanceolate. Achenes ca 2 mm long, sparsely white papillose. Pappus hairs sordid white, biseriate; outer much shorter.

Distrib. India: Tamil Nadu.

Endemic.

Note. Known by the type collection only. Named in the honour of Dr. M.A. Rau, a renowned Botanist and founder of the Northern Circle, Botanical Survey of India, Dehra Dun.

41. *Vernonia revoluta* Buch.-Ham. in Trans. Linn. Soc. 14. 218. 1825; Hook.f., Fl. Brit. India 3: 233. 1881. **Fig. 119.**

Herbs, perennial, 6-20 cm high; rootstock woody; stems minutely grooved, appressed hairy. Leaves linear, erect, revolute, up to 4 x 0.3 cm, 1-nerved, sessile. Heads solitary or subsolitary, terminal, ca 1 cm across, 30-40-flowered. Involucral bracts 4-seriate, linear-lanceolate, acuminate, appressed hairy; outer ca 3 mm long; inner ca 9.5 mm long. Corolla violet or pink; lobes hairy. Achenes ca 3.5 mm long, hairy, ribbed. Pappus hairs dirty white, uniseriate.

Distrib. India: Uttar Pradesh and West Bengal.

Nepal and Bhutan.

Note. Smallest of *Vernonia* spp. with erect leaves and usually solitary heads.

42. *Vernonia saligna* DC., Prodr. 5: 33. 1836; Hook.f., Fl. Brit. India 3: 235. 1881.

Herbs; stems grooved; branches pubescent or glandular pubescent. Leaves lanceolate, elliptic-lanceolate, acute or acuminate, serrate, up to 16 x 3.5 cm, sparsely moniliformly hairy above, scabrous on the nerves beneath. Heads paniced, ca 0.5 cm across. Involucral bracts purplish tipped, 4-5-seriate; outermost subulate, ca 1 mm long; innermost ca 4 mm long, hyaline on the margins, with a short mucro at the tip. Achenes ca 2.5 mm long, glabrous, glandular, 10 ribbed. Pappus hairs reddish or white, uniseriate.

KEY TO THE VARIETIES

- | | |
|---|--------------------------------|
| 1a. Branches and inflorescence glandular pubescent | 42.1. var. nilghirensis |
| b. Branches and inflorescence not glandular pubescent | 42.2. var. saligna |

42.1. var. nilghirensis Hook.f., Fl. Brit. India 3: 235. 1881.

Fl. & Fr. Dec. - Jan.



Fig. 119. *Vernonia revoluta* Buch.-Ham.

Distrib. India: Tamil Nadu and Kerala.

Endemic.

42.2. var. saligna

Fl. & Fr. Oct. - Jan.

Distrib. India: E. Himalayas, N.E. region and W. Ghats, ascending to 1300 m. West Bengal, Sikkim, Arunachal Pradesh, Assam, Manipur, Meghalaya and Karnataka.

Nepal, Bhutan, Bangladesh, China and Myanmar.

43. Vernonia salvifolia Wight, *Icon. t.* 1079. 1846; Hook.f., *Fl. Brit. India* 3: 237. 1881. **Fig. 120.**

Shrubs, up to 1 m high; branches thick, white woolly towards apex. Leaves crowded at the ends of branches, ovate-lanceolate, obtuse, entire or irregularly crenulate, up to 15 x 2.5 cm, rugose above, silky-woolly beneath. Heads pink, in terminal corymbs, congested, 10-14-flowered. Involucral bracts cottony, spine tipped; outermost linear-lanceolate, ca 3.5 mm long; inner oblong-lanceolate, ca 6 mm long. Achenes ca 3 mm long, compressed, glabrous, ribbed. Pappus hairs biseriate; outer paleaceous; inner setose, as long as the corolla.

Fl. & Fr. May - Oct.

Distrib. India: Tamil Nadu and Kerala.

Endemic.

44. Vernonia setigera Arn. in *Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur.* 18: 345. 1836; Hook.f., *Fl. Brit. India* 3: 235. 1881.

Undershrubs or shrubs; stems grooved, covered with ferruginous, spreading hairs. Leaves ovate, acuminate, serrate, up to 10.5 x 4 cm (including petiole), rough hairy on both the surfaces, narrowly winged to a petiole. Heads blue or violet, in terminal corymbs, ca 0.8 cm across, 6-10-flowered. Involucral bracts 3-4-seriate, hairy on back, aristate; outermost subulate-linear; inner lanceolate, ca 7.5 mm long. Corolla glandular. Achenes ca 2 mm long, glandular, glabrous or with few short hairs, 5-ribbed. Pappus yellowish; outer hairs short or absent.

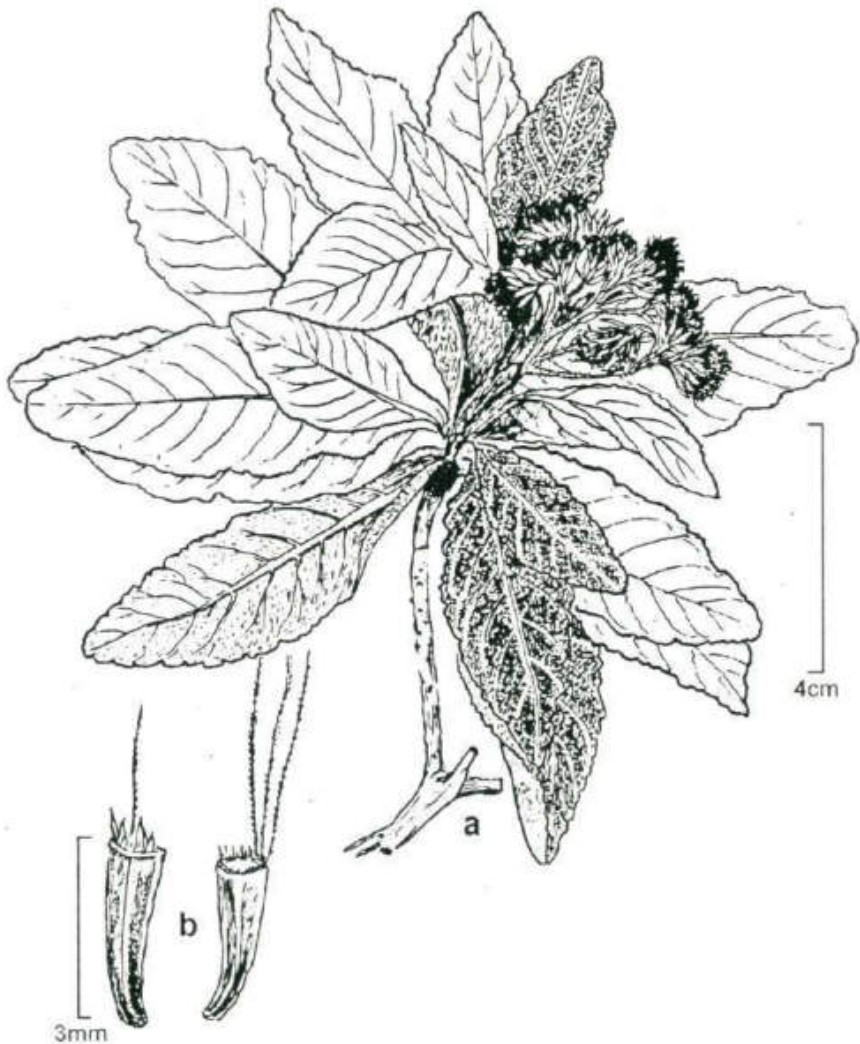


Fig. 120. *Vernonia salvifolia* Wight : a. Habit; b. Achene.

Fl. & Fr. Aug. - Sept.

Distrib. India: South India 1400-2200 m. Tamil Nadu.

Sri Lanka.

Note. Grierson (*Flora Ceylon* 1: 132. 1980) mentioned that this species is endemic to Sri Lanka but it was collected from Tinnevalley Dist. of Tamil Nadu as early as 1916 and later from Kanyakumari Dist. in 1977.

45. *Vernonia shevaroyensis* Gamble in *Kew Bull.* 1920: 341. 1920.

Trees. Leaves oblanceolate, acute, entire or repand-crenate, upto 24 x 8 cm, glabrous above except on the nerves, scabrid pubescent beneath; petiole ca 1 cm long. Heads in panicles, 1-flowered. Involucral bracts oblong, sericeous-villous without; outer small, obtuse; inner longer, acute. Achenes glandular, obscurely 10-ribbed. Pappus stramineus, in two rows; hairs of the rows equal.

Distrib. India: Tamil Nadu.

Endemic.

46. *Vernonia silhetensis* (DC.) Kerr., *Fl. Siam.* 2: 243. 1936. *Decaneurum silhetense* DC., *Prodr.* 5: 67. 1836. *Vernonia bracteata* C.B. Clarke, *Comp. Ind.* 17. 1876; Hook.f., *Fl. Brit. India* 3:232. 1881.

Undershrubs, rigid, sparingly branched. Leaves elliptic or elliptic-lanceolate, acute at both the ends, remotely serrate, upto 10 x 3 cm, scabrid. Heads in terminal corymbs, 1.5-2.5 cm across, 25-35-flowered. Involucral bracts linear-oblong, recurved, awn tipped; outer purplish, subulate. Achenes ca 4 mm long, glabrous, 10-ribbed. Pappus hairs reddish, uniseriate.

Fl. & Fr. Aug.

Distrib. India: Ascending to 1900 m. West Bengal, Sikkim, Manipur, Meghalaya and Madhya Pradesh.

Bangladesh, Myanmar and Thailand.

47. *Vernonia squarrosa* (D. Don) Less. in *Linnaea* 6: 627. 1831. *Acilepis squarrosa* D. Don, *Prodr. Fl. Nepal.* 169. 1825. *Vernonia teres* Wallich ex DC., *Prodr.* 5: 15. 1836; Hook.f., *Fl. Brit. India* 3: 229. 1881.

Rigid shrubs; stems simple; branches glandular-pubescent. Leaves oblanceolate-oblong, obovate or obovate-elliptic, rigid, acute, slightly recurved at margins, upto 17.5 x 3 cm, prominently reticulate beneath, subsessile. Heads usually solitary, axillary or terminal, ca 2.5 cm across, many-flowered. Involucral bracts many-seriate, acicular or **subulate-lanceolate**, softly hairy on the back, glabrous with age; outermost **subulate-lanceolate**, ca 6 mm long; inner ca 10 mm long, broader. Achenes ca 4 mm **long**, silky, strongly 10-ribbed. Pappus hairs white or yellowish.

Fl. & Fr. Oct. - Jan.

Distrib. India: Ascending up to 1250 m. Uttar Pradesh, W. Bengal, Bihar, Sikkim, Nagaland, Manipur and Madhya Pradesh.

Nepal, Myanmar, China, Thailand and Indo-China.

48. *Vernonia subsessilis* DC., Prodr. 5: 62. 1836; Hook.f., Fl. Brit. India 3: 230. 1881. *V. subsessilis* DC. var. *bracteolata* Hook.f., Fl. Brit. India 3: 230. 1881.

Undershrubs up to 1 m high; branches pubescent or tomentose. Leaves obovate or oblanceolate, linear-lanceolate or linear-oblanceolate, acute, acuminate or rounded, almost entire, undulate or sinuate-crenate, up to 16 x 6.5 cm, chartaceous, glabrescent above, pubescent beneath, subsessile. Heads corymbose or paniculate, 40-50-flowered. Involucral bracts many, hairy; outermost acicular, ca 3.5 mm long, almost aristate; inner ca 6 mm long, with raised mid nerve. Florets purple, fading to white. Achenes ca 3.5 mm long, densely strigosely hairy, angled. Pappus hairs reddish, biseriate; outer hairs very short.

Very variable with reference to leaves. The following varieties have been distinguished.

KEY TO THE VARIETIES

- | | |
|---|-------------------------------|
| 1a. Leaves obovate-lanceolate, acuminate; heads corymbose | 48.2. var. <i>subsessilis</i> |
| b. Leaves obovate, acute; heads panicled | 48.1. var. <i>macrophylla</i> |

48.1. var. *macrophylla* Hook.f., Fl. Brit. India 3: 230. 1881.

Distrib. India: Sikkim.

Nepal.

48.2. var. *subsessilis*

Fig. 121.

Fl. & Fr. Sept. - Feb.*Distrib.* India: Assam and Meghalaya.

Myanmar and Nepal.

49. *Vernonia talaumifolia* Hook.f. & Thomson ex C.B. Clarke, *Comp. Ind.* 25. 1876; Hook.f., *Fl. Brit. India* 3: 240. 1881.

Trees, up to 8 m tall; branches thick. Leaves obovate or oblanceolate, bluntly acute, entire or sinuate, up to 30 x 13 cm, coriaceous, glabrous or pubescent, prominently reticulately veined, petioled. Heads in large, terminal, much branched panicles; panicles and peduncles felted or not. Bracts linear-subulate. Involucral bracts 3-4-seriate, ovate, obtuse, hairy; outer ovate, ca 1 mm long; intermediate obovate; ca 4.5 mm long; innermost linear-oblong, ca 6.5 mm long. Achenes ca 3.5 mm long, glabrous, ribbed. Pappus hairs reddish, biseriate.

KEY TO THE VARIETIES

- 1a. Leaves hairy on the nerves beneath; panicle and peduncles not felted 49.2. var. *talaumifolia*
 b. Leaves uniformly pubescent beneath; panicle and peduncles felted 49.1. var. *hirsutior*

49.1. var. *hirsutior* C. Fischer in *Kew Bull.* 1935: 319. 1936.

Distrib. India: Meghalaya, (Garo hills); rare.

Note. Known by type collection only.

49.2. var. *talaumifolia*

Fl. & Fr. Nov. - Jan.

Distrib. India: Arunachal Pradesh and Assam.

Nepal and Bhutan.



Fig. 121. *Vernonia subsessilis* DC. var. *subsessilis* : a. Habit; b. Achene.

50. *Vernonia travancorica* Hook.f., Fl. Brit. India 3: 240. 1881.

Fig. 122.

Trees; stems grey pubescent. Leaves elliptic-obovate, obtuse, subentire or undulate, upto 12 x 5 cm, pubescent on nerves only. Heads in terminal corymbose panicles, 5-6-flowered. Involucral bracts 3-4-seriate, ovate, oblong, obtuse, silky; outermost ca 1.5 mm long; inner ca 5 mm long, scarious margined. Achenes ca 3.5 mm long, strongly 10-ribbed, glandular between the ribs. Pappus hairs white, much longer than the achenes, deciduous.

Fl. & Fr. Feb. - July.

Distrib. India: W. Ghats. Karnataka, Tamil Nadu and Kerala.

Endemic.

51. *Vernonia vagans* DC., Prodr. 5: 32. 1836. *V. scandens* DC., Prodr. 5: 32. 1836; Hook.f., Fl. Brit. India 3: 241. 1881.

Shrubs, scandent; branches terete, minutely grooved, brownish pubescent, glandular. Leaves elliptic-obovate, ovate-lanceolate, acute or acuminate, entire, up to 18 x 8 cm., chartaceous, glabrous above, pubescent beneath, glandular on both surfaces, petioled. Heads in terminal panicles, 10-12-flowered. Involucral bracts in many series, glandular pubescent in upper part, short ciliate on the margins; outer ovate; inner ca 6 mm long. Corolla glandular. Achenes ca 7 mm long, glabrous, 10-ribbed. Pappus hairs reddish.

Fl. & Fr. Sept. - March.

Distrib. India: E. Himalayas and N.E. region. West Bengal, Sikkim, Arunachal Pradesh, Nagaland, Mizoram and Meghalaya.

Bangladesh, Myanmar, Malay Archipelago and Australia.

52. *Vernonia vivekanathanii* Uniyal, *nom. nov.* *V. monosis* Benth. ex C.B. Clarke, Comp. Ind. 24. 1876, *non* Sch.-Bip. 1847.

Arboreus; twigs densely pubescent. Leaves obovate-elliptic, entire, upto 18 x 8 cm (including petiole), chartaceous, glabrous above except on nerves, densely brownish tomentose beneath. Inflorescence terminal panicle of corymbs, densely pubescent. Heads usually 1-flowered, very rarely 2-flowered. Involucral bracts 4-5-seriate, silky on back, obtuse; outer less than 1 mm long; innermost



Fig. 122. *Vernonia travancorica* Hook.f. : a. Habit; b. Achene.

oblong, ca 3 mm long. Achenes ca 4 mm long, glandular, sparsely hairy, ribbed. Pappus hairs white.

Fl. & Fr. Nov. - April.

Distrib. India: W. Ghats, in and around evergreen forests. Karnataka, Tamil Nadu and Kerala.

Note. De Candolle (1834) described a new genus *Monosis* (*M. wightiana* DC.) characterised by the single flowered heads. C.B. Clarke (Comp. Ind. 24. 1876) reduced *Monosis* to a species of *Vernonia* but, giving importance to the "single flowered heads", retained *monosis* as specific epithet. Hook.f. (Fl. Brit. India 3: 239. 1881) considered "single flowered heads" merely a variation and treated *Vernonia monosis* as a variety of *Vernonia arborea* with ambiguity. Gamble (Fl. Pres. Madras 2: 672. 1921) reinstated *V. monosis* as a species but later workers (Matthew, Fl. Tamil Nadu Carnatic 3: 826. 1983) considered it to be a variety of *V. arborea* only. Narayana (1985) studied the trichomes of *Vernonia arborea* and *V. monosis* and concluded "*V. monosis* has biseriate vesicular glandular hairs on fruits while they are absent in *V. arborea*". It is relevant to mention here that certain other species (eg. *V. kabaensis* Koster, *V. shevaroyensis* Gamble) also have single flowered heads and therefore *Vernonia monosis* is being treated here as a separate entity. *V. monosis* Benth. ex C.B. Clarke is a later homonym of *V. monosis* Sch.-Bip. and therefore a new name has been proposed here.

The species has been named after K. Vivekanathan for his keen interest in the genus *Vernonia*.

53. *Vernonia volkameriaefolia* DC., Prodr. 5: 32. 1836; Hook.f., Fl. Brit. India 3: 240. 1881.

Trees; young shoots rusty pubescent. Leaves oblanceolate, oblong-ovate or elliptic, acute, entire, repand or coarsely dentate, upto 25 x 10 cm, subcoriaceous, pubescent on nerves, short petioled. Heads in large, terminal panicles, 3-10-flowered; peduncle stout, with small bracts at base. Involucral bracts 4-5-seriate; outer ovate, obtuse, ca 2 mm long, ciliate on the margins; inner purple tipped, oblong, ca 8 mm long, hairy on the back, ciliate on the margins, purple tipped. Corolla purple. Achenes slightly curved, ca 6 mm long, shining, strongly ribbed. Pappus hairs white; outer short.

Fl. & Fr. Dec. - April.

Distrib. India: E. Himalayas, and N.E. region, between 600-1400 m. W. Bengal, Sikkim, Arunachal Pradesh, Assam and Meghalaya.

Nepal, Bhutan, Bangladesh, Myanmar, China, Indochina and Thailand.

EXCLUDED TAXA

Vernonia cymosa Blume, Bijdr. 894. 1826.

This species was included in the checklist (R.R. Rao *et al.*, 1988) on the basis of a collection from Andamans. The identity of the specimen is doubtful.

Vernonia cymosa Blume. var. ***eupatorioides*** (Blume) Koster. in *Blumea* 1: 427. 1935. *Vernonia eupatorioides* Blume, Bijdr. 894. 1826. Wrongly included in the checklist (l.c.).

CULTIVATED SPECIES

Centratherum punctatum Cass., Dict. Sci. Nat. 7: 384. 1817.

Herbs or undershrubs; branches terete, glabrescent to villous. Leaves lanceolate, ovate, elliptic or obovate. Outer involucral bracts foliaceous. Corolla purplish or bluish.

Vernonia altissima Nutt. Gen. Amer. 2: 134. 1818.

Stems upto 3 m tall, glabrous. Leaves lanceolate or lanceolate-oblong, thin, veined. Inflorescence open, loosely branched. Corolla purple.

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