allergopedia

Vol. 1: 4 (2025)

Excerpta Dermatologia Botanica: Acanthaceae

A work derived from BOTANICAL DERMATOLOGY by John Mitchell & Arthur Rook, originally published in 1979 by Greengrass Ltd, Vancouver [ISBN 0-88978-047-1] and its subsequent online re-incarnation as BoDD – Botanical Dermatology Database. None of the information presented here should be regarded as a recommendation by the author(s) on how to investigate or treat any particular disease or disorder.

Richard J. Schmidt

Penarth, Wales, UK

Keywords: contact allergens, lapachol, mechanical injury, naphthoquinones, sesamin, sesamolin, traditional medicine, tryptanthrin

Suggested citation: Schmidt RJ (2025) Acanthaceae. Allergopedia 1: 4. doi: 10.14320/allergopedia.20250104

ACANTHACEAE

(Acanthus or Ruellia family)

• *Medicinal / Folk-medicinal aspects:* Some species provide useful topical antifungal activity; others reportedly provide healing activity when applied to boils or infected wounds. •

• *Adverse effects:* Many species, and in particular those in the genera **Acanthus** L., **Anthacanthus** Nees, **Barleria** L., and **Blepharis** Juss. are spiny or thorny and hence capable of inflicting mechanical injury. Other species have been reported to produce contact dermatitis but the causative agents remain unidentified. Whether the acicular calcium oxalate raphides found in **Strobilanthes ixiocephala** Benth. and perhaps in other **Strobilanthes** Blume species (Fernandes & Krishnan 2019, Lawrie *et al*. 2023) are capable of producing skin irritation (see Sakai *et al*. 1984) remains to be determined, as also is the question whether the nickel compounds that certain species are able to hyperaccumulate from soils rich in this element have the capacity to elicit a reaction in nickel-sensitive individuals who might handle them. •

• *Veterinary aspects:* The use of certain species in Indian veterinary practice for the treatment of skin conditions (described as eczema, ringworm, and prurigo) and for wound healing has been documented, but little further detail provided. •

Allergopedia online: https://allergopedia.info • ISSN 3072-564X

Document created: 17 December 2025; last updated: 10 September 2026

This is a large family comprising, according to Mabberley (2017), 3800 species in 202 genera. It is closely allied to the Scrophulariaceae. Members are found mostly in the tropics, but occur also in the United States, the Mediterranean region, and in Australia.

On the basis of phylogenetic evidence, plants formerly classified in the Avicenniaceae are now placed in the Acanthaceae (Angiosperm Phylogeny Group 2003). The 4–7 species in its single genus **Avicennia** L. are found on tropical coasts as constituents of mangrove vegetation (Mabberley 2017). Earlier classifications have included these plants in the Verbenaceae. The timber from all species is practically identical and has been investigated as a source of paper pulp (Record & Hess 1943, Watt & Breyer-Brandwijk 1962).

Some members of the genera **Acanthus** L., **Aphelandra** R.Br., **Barleria** L., **Crossandra** Salisb., **Eranthemum** L., **Fittonia** Coëm., **Justicia** L., **Strobilanthes** Blume, and **Thunbergia** Retz. are grown as houseplants or as garden ornamentals (Hunt 1968/70).

Acanthus ebracteatus Vahl

[syn. **Dilivaria ebracteata** (Vahl) Pers.]

Holly Mangrove, Purple Mangrove Holly, Sea Holly

In the traditional medicine of South-East Asia, the seeds are crushed and applied as a poultice on boils; or after roasting and pulverising they are taken as a depurative by people afflicted with boils. Also, the roots prepared as a decoction are drunk as a remedy for shingles (Perry & Metzger 1980).

Acanthus mollis L.

[syn. **Acanthus spinosissimus** Host]

Bear's Breeches, Gator Plant, Oyster Plant, Sea Dock, Soft-Leaved Bear's Breech, Weicher Akanthus

The plant has mostly soft, smooth leaves, but it features spiny reddish-purple bracts around its snapdragon-like flowers.[a,b]

Acanthus Mollis Leaf Extract [INCI; CAS RN 90320-09-5; of uncertain composition (see Schmidt 2017)][c] is a recognised cosmetic product ingredient purported to have skin conditioning properties (Standing Committee on Cosmetic Products 2019, CosIng 2023/4).

[a] https://plantfinder.mobot.org/PlantFinderDetails.aspx?taxonid=275338; accessed August 2026
[b] https://herbaria.plants.ox.ac.uk/bol/plants400/Profiles/ab/Acanthus; accessed Aug 2026
[c] INCI is a registered trademark of the Personal Care Products Council; CAS Registry Number is a registered trademark of the American Chemical Society.

Index

Acanthus spinosus L.
[syn. **Acanthus spinosissimus** Pers.]
Spiny Bear's-Breech, Acanthe Épineuse, Dorniger Akanthus, Stachliger Akanthus

The leaves are extremely spiny, the spines being sharp and rigid, making them difficult plants to handle without discomfort.[a]

[a] https://herbaria.plants.ox.ac.uk/bol/plants400/Profiles/ab/Acanthus; accessed Aug 2026

Andrographis paniculata (Burm.f.) Wall. ex Nees
[syn. **Justicia paniculata** Burm.f.]
Creat, Green Chiretta, Green Chireyta, Kalmegh, Rice Bitters

The plant is the source of a crude drug known variously as king of bitters, Indian echinacea, kalmegh, creat, *chuan xin lian* (穿心莲), *etc*., used for treating a variety of ailments in India and elsewhere. Begum & Nath (2000) noted that in the traditional medicine of Northeastern India, the leaves are pounded with water and the supernatant liquid given orally in the treatment of abscesses. In the traditional medicine of South-East Asia, the crushed leaves have been applied to itching skin eruptions when other remedies have failed (Perry & Metzger 1980).

Andrographis Paniculata Extract and Andrographis Paniculata Leaf Extract [INCI; CAS RN 90244-84-1; both of uncertain composition (see Schmidt 2017)][a] are recognised cosmetic product ingredients purported to have astringent and skin conditioning properties (Standing Committee on Cosmetic Products 2019, CosIng 2023/4).

[a] INCI is a registered trademark of the Personal Care Products Council; CAS Registry Number is a registered trademark of the American Chemical Society.

Aphelandra squarrosa Nees
[syn. **Ruellia comosa** Vell.]
Saffron Spike, Zebra Plant, Glanzkölbchen

Lynne-Davies & Mitchell (1974) applied portions of the fresh leaf of **Aphelandra squarrosa** 'Louisae' to the backs of 2 males for 48 hours under occlusion. Neither irritant reactions nor delayed flares occurred.

- Barleria rigida
- Barleria schenckii
- *Barleria spicata*
- *Beloperone calycina*
- Blepharis acuminata
- Blepharis capensis
- Blepharis diversispina
- Blepharis furcata
- Blepharis longispica
- Blepharis spinescens
- Blepharis spinifex
- Blepharis spinipes
- Blepharis stainbankiae
- Blepharis trispina
- *Blepharis trispinosa*
- *Bontia germinans*
- Brillantaisia lamium
- *Brillantaisia eminii*
- *Carvia callosa*
- Clinacanthus nutans
- *Cryphiacanthus udus*
- Dianthera calycina
- Dianthera pectoralis
- Dianthera secunda
- *Diapedium chinense*
- Dicliptera chinensis
- Dicliptera hensii
- *Dicliptera spinosa*
- *Dilivaria ebracteata*
- *Duvernoia buchholzii*
- *Duvernoia extensa*
- *Duvernoia maxima*
- *Duvernoia robusta*
- *Duvernoia stuhlmannii*
- *Ecbolium extensum*
- *Ecbolium gendarussa*
- *Ecbolium pectorale*
- *Endopogon integrifolius*
- *Eranthemum bicolor*
- Eranthemum viscidum
- *Gendarussa vulgaris*
- *Goldfussia cusia*
- *Graptophyllum hortense*
- Graptophyllum pictum
- Haplanthodes verticillata
- *Haplanthus verticillaris*
- Hygrophila angustifolia
- Hygrophila auriculata
- *Hygrophila erecta*
- *Hygrophila obovata*
- *Hygrophila quadrivalvis*
- Hygrophila ringens subsp. ringens
- *Hygrophila salicifolia*
- *Hygrophila salicifolia* var. *angustifolia*
- *Hygrophila spinosa*

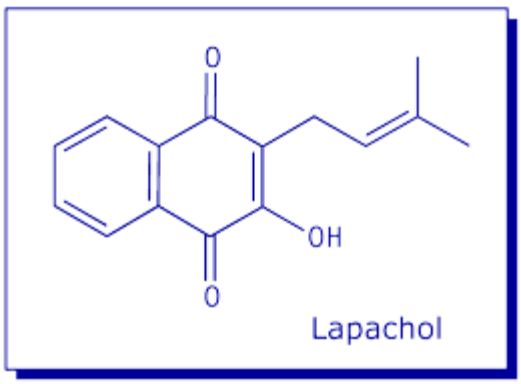
Avicennia germinans (L.) L.
[syns **Avicennia africana** P.Beauv., **Avicennia nitida** Jacq., **Avicennia tomentosa** Jacq., **Bontia germinans** L.]
Black Mangrove, Black-Wood, Limewood, Olive Mangrove, White Mangrove, Faux Palétuvier, Mangle Blanc, Palétuvier Blanc

von Reis & Lipp (1982) found an herbarium note stating that the tree contains a resin that irritates the eyes when the wood is sawn.

The French Guiana Palikur mix stem and leaf with a smaller amount of **Rhabdadenia biflora** (Jacq.) Müll.Arg. (fam. Apocynaceae) and **Nicotiana tabacum** L. (fam. Solanaceae) in a soothing remedy for stingray wounds (DeFilipps *et al*. 2004).

Referring to **Avicennia nitida** Jacq., Ainslie (1937) noted that in Nigerian traditional medicine, the powdered bark used as a paste is efficacious in dermatitis of various kinds. Irvine (1961) noted that in West African traditional medicine, the dry pulverised bark of **Avicennia africana** P.Beauv. is used as a paste for parasitic skin diseases, itch, and dermatitis.

Record & Hess (1943), describing the black mangrove found in southern Florida, the West Indies, and through Central America to the north coast of South America, [incorrectly] considered **Avicennia nitida** Jacq. to be conspecific with **Avicennia marina** (Forssk.) Vierh., and stated that the yellowish powder contained in the heartwood is lapachol. According to Bournot (1913), the heartwood of **Avicennia tomentosa** Jacq. yields lapachol. Lapachol is a known elicitor of contact dermatitis (Schulz *et al*. 1968, Schulz *et al*. 1977), and is also present in **Tectona grandis** L.f. (fam. Labiatae) and other species of timber trees, particularly those in the family Bignoniaceae.



- Hypoestes aristata var. aristata
- *Hypoestes antennifera*
- *Hypoestes insularis*
- *Hypoestes staudtii*
- *Justicia acuminatissima*
- Justicia adhatoda
- *Justicia aristata*
- *Justicia baronii*
- Justicia buchholzii
- *Justicia calycina*
- *Justicia chinensis*
- Justicia euosmia
- Justicia extensa
- Justicia gendarussa
- *Justicia glabra*
- *Justicia kotschyi*
- Justicia ladanoides
- *Justicia latibracteata*
- Justicia maxima
- *Justicia nasuta*
- *Justicia paniculata*
- *Justicia pectoralis*
- *Justicia picta*
- *Justicia procumbens*
- *Justicia procumbens* var. *hispida*
- Justicia scandens
- *Justicia schimperi*
- *Justicia secunda*
- *Justicia simplex*
- *Justicia spinosa*
- Justicia striata
- *Justicia talbotii*
- *Justicia thyrsiflora*
- Justicia tranquebariensis
- Justicia tristis
- *Justicia verticillata*
- *Lepidagathis cephalotes*
- Lepidagathis formosensis
- *Lepidagathis hyalina*
- Lepidagathis incurva
- *Lepidagathis sphaerostachya*
- *Leucorhaphis lamium*
- *Lychniothyrsus hygrophilus*
- *Mackenziea integrifolia*
- Mendoncia hoffmannseggiana
- *Mendoncia pubescens*
- *Mendoncia schomburgkiana*
- Neuracanthus sphaerostachyus
- Odontonema lindavii
- Oplonia spinosa
- *Peristrophe hensii*
- *Phidiasia lindavii*
- *Psacadocalymma pectorale*
- Pseuderanthemum bicolor
- *Pseuderanthemum connatum*
- Ptyssiglottis fusca
- *Rhacodiscus calycinus*

Perhaps reflecting past botanical nomenclatural uncertainty, the common name white mangrove is also used for **Avicennia marina** (Forssk.) Vierh. [see below] and for the unrelated **Laguncularia racemosa** (L.) C.F.Gaertn. (fam. Combretaceae). **Avicennia alba** Blume is a separate accepted species that also is known by the common name white mangrove.[a]

[a] https://combine.ncscm.res.in/combine/details?cid=3156; accessed February 2023

Avicennia marina (Forssk.) Vierh.
[syn. **Sceura marina** Forssk.]
Gray Mangrove, Grey Mangrove, White Mangrove, Manglier Gris, Palétuvier Gris

Record & Hess (1943) stated that the yellowish powder contained in the heartwood is lapachol [but see **Avicennia germinans** (L.) L. above].

Avicennia officinalis L.
Indian Mangrove, White Mangrove, Palétuvier

The sapwood of **Avicennia officinalis** L. yields a resin that has been used in the Philippines as a local application in snake-bite, and in Western Java as a oral contraceptive. In India as well as in the Philippines the seed cooked in water is applied as a maturative poultice and as a cicatrizing agent in ulcers (Quisumbing 1951, Watt & Breyer-Brandwijk 1962, Perry & Metzger 1980). A cataplasm of the unripe fruit has been applied to sores and for healing the skin lesions of smallpox (Watt & Breyer-Brandwijk 1962, Nadkarni 1976, Perry & Metzger 1980).

- Rhinacanthus nasutus
- *Rhytiglossa pectoralis*
- *Rostellaria procumbens*
- Rostellularia adscendens var. hispida
- *Rostellularia mollissima*
- Rostellularia procumbens
- *Ruellia comosa*
- Ruellia hygrophila
- *Ruellia indigofera*
- *Ruellia quadrivalvis*
- *Ruellia ringens*
- *Sceura marina*
- *Stethoma pectoralis*
- Streptosiphon hirsutus
- *Strobilanthes acrocephala*
- Strobilanthes affinis
- *Strobilanthes balansae*
- Strobilanthes callosa
- Strobilanthes cusia
- Strobilanthes integrifolia
- Strobilanthes ixiocephala
- *Strobilanthes perfoliata*
- Strobilanthes scabra
- *Thelepaepale ixiocephala*
- Thunbergia alata
- *Thunbergia albiflora*
- *Thunbergia grandiflora* var. *laurifolia*
- Thunbergia laurifolia

- References

Barleria L.

The following species (and others) are described as spiny by Darbyshire *et al*. (2019), variously having spiny stems, leaf margins, bracteoles, and/or calyces:

Barleria calole I.Darbysh.
Barleria capitata Klotzsch
Barleria carruthersiana S.Moore
Barleria coriacea Oberm.
Barleria crassa C.B.Clarke
Barleria craveniae I.Darbysh.
Barleria damarensis T.Anderson
Barleria elegans S.Moore ex C.B.Clarke
Barleria jubata S.Moore
Barleria lanceolata (Schinz) Oberm.
Barleria lichtensteiniana Nees
Barleria meeuseana P.G.Mey.
Barleria merxmuelleri P.G.Mey.

Barleria papillosa T.Anderson
Barleria schenckii Schinz

Other spiny **Barleria** species are considered in the monographs below.

Barleria cristata L.
[syns **Barleria ciliata** Roxb., **Barleria dichotoma** Roxb., **Barleria napalensis** Nees]
Blue Bell, Bluebell Barleria, Crested Philippine Violet, Gueule de Loup

This prickly shrub has been used as a hedge plant (Howes 1946).

Perry & Metzger (1980) noted that in Chinese traditional medicine, the plant is crushed and applied to malignant sores.

Barleria grandicalyx Lindau
[syn. **Barleria mucronata** Lindau]

Watt & Breyer-Brandwijk (1962) record that the Masai use the thorns to prick the skin around a snake bite in order to permit the sucking out or pressing out of blood.

Barleria lupulina Lindl.
[syn. **Dicliptera spinosa** G.Lodd. ex Philippar]
Hophead Philippine Violet

This species bears sharp spines at its leaf bases (Anon 2003),[a] which may cause mechanical injury (Oakes & Butcher 1962). It has been used as a hedge plant (Howes 1946).

[a] https://weeds.org.au/profiles/barleria-porcupine-flower/; accessed June 2024

Barleria prionitis L.
[syn. **Barleria spicata** Roxb.]
Barleria, Porcupine Flower, Madame Gustave, Picanier Jaune, Stachelschweinblume

This prickly shrub has been used as a hedge plant in the tropics (Howes 1946), but is regarded as a serious environmental weed in Australia. The bases to the leaves are protected by three to five sharp, pale-coloured spines, each about 15 mm in length (Anon 2003).[a]

von Reis & Lipp (1982) found an herbarium note on a specimen collected in Tanganyika [now Tanzania] stating that in disease that blisters hands and feet, the thorns [are] used to prick the blisters, [and the] leaves [are] rubbed on them.

According to Nadkarni (1976), the juice of this plant is used in Indian traditional medicine as an application to the feet in the rainy season in order to prevent cracks and lacerations; a paste of the root is applied to boils and glandular swellings; and a medicated oil prepared from this plant is applied to unhealthy wounds. In Indonesian traditional medicine, the roots are finely ground, mixed with lemon juice [**Citrus × limon** (L.) Osbeck, fam. Rutaceae], and applied to ringworm (Perry & Metzger 1980).

Barleria Prionitis Bark Extract, Barleria Prionitis Extract, Barleria Prionitis Powder, Barleria Prionitis Root Extract, and Barleria Prionitis Stem Extract [INCI; all of uncertain composition (see Schmidt 2017)][b] are

recognised cosmetic product ingredients variously purported to have uses in oral care, skin conditioning, and fragrancing (Standing Committee on Cosmetic Products 2019, CosIng 2023/4).

[a] https://weeds.org.au/profiles/barleria-porcupine-flower/; accessed June 2024
[b] INCI is a registered trademark of the Personal Care Products Council.

Barleria rigida Willd. ex Nees
[syn. **Barleria irritans** var. **rigida** (Willd. ex Nees) C.B.Clarke]
Scorpion Bushviolet, Scorpion Thistle

This species, which forms a much-branched spiny shrublet, is one of the most widespread and variable species of **Barleria** in Namibia. Together with **Barleria irritans** Nees and **Barleria bechuanensis** C.B.Clarke from South Africa, it forms a difficult species complex (Darbyshire *et al*. 2019). Both the common names and the specific epithet **irritans** allude to its hazardous nature.

Blepharis Juss.

This is a genus of 128 species found from Africa across to Vietnam and Java.[a] Almost all species within this genus possess a characteristically spiny, prickly, or thorny growth habit featuring strongly spinescent leaf margins, spiny bracts, or heavily armed cushions. The following species are representative:

Blepharis diversispina (Nees) C.B.Clarke
[syn. **Acanthodium diversispinum** Nees]
Blepharis furcata (L.f.) Pers.
[syns **Acanthus furcatus** L.f., **Blepharis trispinosa** Hainz]
Blepharis longispica C.B.Clarke
Blepharis spinescens Vollesen
Blepharis spinifex Merxm.
Blepharis spinipes Vollesen
Blepharis trispina Napper

[a] https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:427-1; accessed September 2025

Blepharis acuminata Oberm.

Upto 2000 µg/g (ppm) nickel has been found in the leaves of this plant growing in the ultramafic soils of the Great Dyke in Zimbabwe (Brooks & Yang 1984, Baker & Brooks 1989). The contact sensitising capacity of nickel and its salts is well documented (Malten *et al*. 1976, Cronin 1980, Spruit *et al*. 1980, Fowler 1990, Uter *et al*. 2016) but it remains to be determined whether the nickel compounds in this plant present a dermatological hazard.

Blepharis capensis (L.f.) Pers.
[syn. **Acanthus capensis** L.f]
Cape Lashes

In southern-African traditional medicine, the plant is used as an application to wounds (Watt & Breyer-Brandwijk 1962).

Blepharis stainbankiae C.B.Clarke

In the Transvaal the African rubs the root on the skin to relieve itching (Watt & Breyer-Brandwijk 1962).

Brillantaisia lamium (Nees) Benth.
[syns **Brillantaisia eminii** Lindau, **Leucorhaphis lamium** Nees]
Tropical Giant Salvia

In Nigerian traditional medicine, the leaves pounded and made into a paste in their own juice, are applied externally for yaws (Ainslie 1937).

Clinacanthus nutans (Burm.f.) Lindau
[syn **Justicia nutans** Burm.f.]
Sabah Snake Grass

Clinacanthus Nutans Leaf Extract [INCI; of uncertain composition (see Schmidt 2017)][a] is a recognised cosmetic product ingredient purported to have skin conditioning and skin protecting properties (Standing Committee on Cosmetic Products 2019, CosIng 2023/4).

[a] INCI is a registered trademark of the Personal Care Products Council.

Dianthera calycina (Nees) B.D.Jacks.
[syns **Beloperone calycina** Nees, **Justicia acuminatissima** (Miq.) Bremek., **Justicia calycina** (Nees) V.A.W.Graham, **Rhacodiscus calycinus** (Nees) Bremek.]

Referring to **Justicia calycina**, DeFilipps *et al*. (2004) noted that the juice from macerated leaves is used for treating eczema, ringworm, and sores by the Guyana Patamona.

Dianthera pectoralis (Jacq.) Murray
[syns **Ecbolium pectorale** (Jacq.) Kuntze, **Justicia pectoralis** Jacq., **Psacadocalymma pectorale** (Jacq.) Bremek., **Rhytiglossa pectoralis** (Jacq.) Nees, **Stethoma pectoralis** (Jacq.) Raf.]
Carpenter Bush, Carpenter Grass, Death Angel, Freshcut, Garden Balsam, Herbe à Charpentiers

All studies cited here refer to **Justicia pectoralis** rather than to **Dianthera pectoralis**, it having only recently[a] become recognised from phylogenetic studies that New World 'justicioids' including **Justicia pectoralis** Jacq. could be treated as members of a separate genus, namely **Dianthera** L. Accordingly, **Dianthera pectoralis** (Jacq.) Murray is now the accepted name.[b] von Reis & Lipp (1982) found an herbarium note on a specimen collected in Columbia that an infusion of the plant is used for conjunctivitis. Wong (1976) noted in a review of folk medicinal plants from Trinidad that a leaf poultice is applied to bleeding wounds. Further, the plant is recognised as a vulnerary in Jamaican folk medicine (Mills *et al*. 1986); and in the traditional medicine of the Guianas, the leaf is macerated for a vulnerary, and also applied externally for haematoma (DeFilipps *et al*. 2004). In eastern Cuba, a decoction is prepared from the aerial parts of this species together with the aerial parts of **Ocimum basilicum** L. (fam. Labiatae) and of **Stachytarpheta jamaicensis** Vahl (fam. Verbenaceae) for use in the bath and orally in the treatment of allergic eruptions (Cano & Volpato 2004).

[a] Keil CA, Daniel TF, McDade LA (2018) Phylogenetics of New World 'justicioids' (Justicieae: Acanthaceae): major lineages, morphological patterns, and widespread incongruence with classification. Systematic Botany 43(2): 459-484. https://doi.org/10.1600/036364418X697201
[b] https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:47290-1; accessed November 2022

Dianthera secunda (Lam.) Griseb.
[syn. **Justicia secunda** Vahl]
Blood Leaf, Blood Root, Saint John Bush, Carmantine Unilatérale

In a review of folk medicinal plants from Trinidad, Wong (1976) noted that **Justicia secunda** is used [in an unspecified way] in herb baths for [unspecified] rashes and amenorrhea.

In a review of ethnomedicines used by hunters for themselves and their hunting dogs in Trinidad, Lans et al. (2001) noted that dogs with rashes are bathed with St John's bush (**Justicia secunda**), adding that the plant imparts a red colour to the bath water.

Dicliptera chinensis (L.) Juss.
[syns **Diapedium chinense** (L.) K.D.Koenig, **Justicia chinensis** L.]
Chinese Dicliptera, Chinese Foldwing, Magenta Plant

According to Perry & Metzger (1980), the plant is used in Taiwanese traditional medicine as an application for the eyes or in an eye wash.

Dicliptera hensii Lindau
[syn. **Peristrophe hensii** (Lindau) C.B.Clarke]

In the traditional medicine of Natal [now KwaZulu-Natal], the crushed leaves of **Peristrophe hensii** are used as a poultice for sore eyes (Hulme 1954).

Eranthemum viscidum Blume

According to Perry & Metzger (1980), the juice from the finely crushed leafy tops is used in the Soenda Islands (Indonesia) as drops for inflammation of the eyes.

Graptophyllum pictum (L.) Griff.
[syns **Graptophyllum hortense** Nees, **Justicia picta** L.]
Caricature Plant, Jamaican Croton

In the traditional medicine of South East Asia, the leaves (preferably the red, variegated form) are mostly used as a poultice on cuts, wounds, all kinds of swellings, ulcerating breasts or other ulcers, furuncles and certain skin complaints. Fishermen in the northern part of the Celebes often use the leaves to treat the stab-wounds caused by venomous fish. Within a few hours, such wounds become red, swollen, very hot and painful, later developing an abscess which takes weeks or months to heal. If the mashed leaves are applied at once and the poultice changed every six hours, within 24 hours the symptoms of sepsis disappear (Perry & Metzger 1980).

Haplanthodes verticillata (Roxb.) R.B.Majumdar
[syns **Haplanthus verticillaris** Nees, **Justicia verticillata** Roxb.]
Spiny Bottle Brush

A native of India, the cladodes (modified stems that function as leaves) of this erect annual herb bear two spines at their tip. An accidental prick from these spines can be very painful and stinging.[a]

[a] https://efloraofindia.com/efi/haplanthodes-verticillatus/; accessed July 2025

Hygrophila angustifolia R.Br.
[syn. **Hygrophila salicifolia** var. **angustifolia** (R.Br.) Kuntze]
Karamat

The leaves from this species are used in the traditional medicine of South East Asia for poulticing fresh wounds, sprained limbs, swellings, abscesses, boils, and for headache (Perry & Metzger 1980).

Hygrophila auriculata (Schumach.) Heine
[syns **Asteracantha longifolia** (L.) Nees, **Barleria auriculata** Schumach., **Barleria longifolia** L., **Hygrophila spinosa** T.Anderson]
Hygrophila, Kulekhara, Long-Leaved Barleria, Marsh Barbel, Hygrophile Auriculée

The plants bear a straight sharp yellow spine in their leaf axils (Agharkar 1953).

The leaves from this species are used in the traditional medicine of South East Asia for poulticing fresh wounds, sprained limbs, swellings, abscesses, boils, and for headache (Perry & Metzger 1980).

Hygrophila ringens (L.) R.Br. ex Steud. subsp. **ringens**
[syns **Hygrophila erecta** (Burm.f.) Hochr., **Hygrophila obovata** Wight, **Hygrophila quadrivalvis** (Buch.-Ham.) Nees, **Hygrophila salicifolia** (Vahl.) Nees, **Ruellia quadrivalvis** Buch.-Ham., **Ruellia ringens** L.]
Erect Hygrophila, Water Wisteria, Schmalblättriger Wasserfreund

Nadkarni (1976) noted that in Indian traditional medicine, the leaves of **Hygrophila obovata** are used to reduce oedematous swellings. According to Perry & Metzger 1980, the leaves from this species are used in the traditional medicine of South East Asia for poulticing fresh wounds, sprained limbs, swellings, abscesses, boils, and for headache.

Hypoestes aristata (Vahl) Sol. ex Roem. & Schult. var. **aristata**
[syns **Hypoestes antennifera** S.Moore, **Hypoestes insularis** T.Anderson, **Hypoestes staudtii** Lindau, **Justicia aristata** Vahl]
Buckwheat, Ribbon Bush

In the traditional medicine of Natal [now KwaZulu-Natal], the crushed leaves of **Hypoestes antennifera** are used to make poultices for eye affectations (Hulme 1954).

Justicia adhatoda L.
[syns **Adhatoda zeylanica** Medik., **Adhatoda vasica** Nees]
Malabar Nut, Indisches Lungenkraut

Nadkarni (1976), in a treatise on Indian traditional medicine, noted that in Burma and Northern India, the leaves are applied locally in the form of a poultice on rheumatic joints, inflammatory swellings and in neuralgia; that a strong decoction is an efficacious fomentation to rheumatic and painful swellings; that it is also a good application for scabies and other skin complaints; and that the fresh flowers are bound over the eyes in ophthalmia. In Nepal, the fresh leaves are crushed and the paste applied to rheumatic joints (Joshi & Joshi 2000). Citing earlier literature referring to **Adhatoda vasica**, Biswas & Mukherjee (2003) noted that in Ayurvedic medicine the leaves are used in the treatment of diabetic carbuncles.

Sharma & Joshi (2004) noted that in Indian veterinary practice, a paste prepared from turmeric (**Curcuma longa** L., fam. Zingiberaceae) and leaves of **Adhatoda vasica** with cow urine is rubbed on skin affected with prurigo and eczema; and Jaiswal *et al*. (2004) referred to the use of an ointment prepared from an alcoholic extract of **Adhatoda vasica** in white petroleum jelly being used for tissue healing in animals.

Justicia Adhatoda Leaf Extract and Justicia Adhatoda Root Extract [INCI; both of uncertain composition (see Schmidt 2017)][a] are recognised cosmetic product ingredients purported to have skin conditioning properties (Standing Committee on Cosmetic Products 2019, CosIng 2023/4).

[a] INCI is a registered trademark of the Personal Care Products Council.

Justicia buchholzii (Lindau) I.Darbysh.
[syns **Adhatoda buchholzii** (Lindau) S.Moore, **Adhatoda latibracteata** (De Wild.) Benoist, **Duvernoia buchholzii** Lindau, **Justicia latibracteata** De Wild.]

Referring to **Adhatoda buchholzii**, Ainslie (1937) noted that in Nigerian traditional medicine, the green leaves are pounded into a paste and applied externally for rheumatism.

Justicia euosmia Lindau

Watt & Breyer-Brandwijk (1962) noted that in southern-African traditional medicine the leaves are made into an ointment with butter for application to pimples, pustules, and blisters.

Justicia extensa T.Anderson
[syns **Duvernoia extensa** (T.Anderson) Lindau, **Duvernoia stuhlmannii** Lindau, **Ecbolium extensum** (T.Anderson) Kuntze, **Justicia talbotii** S.Moore, **Justicia thyrsiflora** S.Moore]
Camouflage Plant, Extended Justicia, Silverspot Justicia

In Nigerian traditional medicine, the root, bruised and mixed with lime juice, is applied to ringworm and cutaneous diseases; the leaf is also used for these purposes (Ainslie 1937).

Justicia gendarussa Burm.f.
[syns **Ecbolium gendarussa** (Burm.f.) Kuntze, **Gendarussa vulgaris** Nees]
Warer Willow, White Justicia, Willow-Leaved Justicia, Plus Fort que la Femme, Natchouli, Yapana Bois, Yapana Marron

According to Agharkar (1953) in his treatise on Indian traditional medicine, an oil prepared from the leaves is said to be useful in eczema. Nadkarni (1976), referring to **Gendarussa vulgaris**, makes no mention of this use. However, he did note that an infusion of the leaves mixed with oil is used as an application to glandular swellings of the neck. Begum & Nath (2000) noted that in the traditional medicine of Northeastern India, the leaves are crushed and the resulting paste applied to boils.

Justicia ladanoides Lam.
[syns **Asystasia schimperi** T.Anderson, **Justicia kotschyi** (Hochst.) Dandy, **Justicia schimperi** (Hochst.) Dandy]

In the Bulamogi county of Uganda, the leaves from **Asystasia schimperi**, warmed to make a poultice, are used to treat dermatitis (Tabuti *et al*. 2003).

Justicia maxima (Lindau) S.Moore
[syns **Adhatoda robusta** C.B.Clarke, **Duvernoia maxima** Lindau, **Duvernoia robusta** (C.B.Clarke) Lindau, **Justicia baronii** V.A.W.Graham]

Referring to **Adhatoda robusta**, Ainslie (1937) noted that in Nigerian traditional medicine, the green leaves are pounded into a paste and applied externally for rheumatism.

Justicia scandens Vahl
[syn. **Justicia glabra** K.D.Koenig ex Roxb.]

According to an herbarium note found on a specimen of **Justicia glabra** collected in Tanganyika [now Tanzania], the green leaves pounded up and mixed with butter are put on a hot iron and then put on boils as a plaster (von Reis & Lipp 1982).

Justicia striata (Klotzsch) Bullock
[syn. **Adhatoda striata** Klotzsch]

The leaf is used in East African traditional medicine as a remedy for pimples (Watt & Breyer-Brandwijk 1962).

Justicia tranquebariensis L.f.

In a treatise on Indian Materia Medica, Nadkarni (1976) noted that the bruised leaves from a plant with the Tamil name Sivanarvembu, which he identified as **Justicia tranquebariensis** [no botanical authority], are applied to contusions. Sivanar Vembu may refer to the botanically unrelated **Indigofera aspalathoides** Vahl ex DC. (fam. Leguminosae);[a] and **Justicia tranquebariensis** may refer to **Justicia tranquebariensis** Roxb., which is now recognised as a synonym of **Justicia glauca** Rottler.[b]

[a] Ariharan VN, Meena Devi VN, Paraweswaran NK, Nagendra Prasad P (2015) Antibacterial activity of Sivanar Vembu (*Indigofera aspalathoides*) against some human pathogenic bacteria. Journal of Chemical and Pharmaceutical Research 7(3): 937-941; accessed June 2024
[b] https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:51747-1; accessed June 2024

Justicia tristis (Nees) T.Anderson
[syn. **Adhatoda tristis** Nees]

Referring to **Adhatoda tristis**, Ainslie (1937) noted that in Nigerian traditional medicine, the green leaves are pounded into a paste and applied externally for rheumatism.

Lepidagathis formosensis C.B.Clarke ex Hayata
Taiwan Lepidagathis, Taiwanese Chicks-a-Nest

According to Perry & Metzger (1980), the Taiwanese chew the leaves and apply them to wounds.

Lepidagathis incurva Buch.-Ham. ex D.Don
[syns **Lepidagathis cephalotes** (Link) Kuntze, **Lepidagathis hyalina** Nees]
Curved Lepidagathis

Begum & Nath (2000) noted that in the traditional medicine of Northeastern India, a decoction prepared from the whole plant is given orally in the treatment of measles.

Mendoncia hoffmannseggiana Nees
[syns **Mendoncia pubescens** Hoffmanns. ex Nees, **Mendoncia schomburgkiana** Nees]

A decoction prepared from the crushed plant is used as a wash to treat skin rashes by the Surinam Akuriyo; and a decoction prepared from the crushed leaves and rasped bark is used as a wash for treatment of athlete's foot by the Surinam Tirio and Wayana (DeFilipps *et al*. 2004).

Neuracanthus sphaerostachyus (Nees) Dalzell
[syn. **Lepidagathis sphaerostachya** Nees]
Pin Cushion Plant

Nadkarni (1976) noted in a treatise on Indian materia medica that [an unspecified preparation of] this plant is used [in an unspecified way] to treat ringworm. Sharma & Joshi (2004) seemingly echoed this use, listing **Neuracanthus sphaerostachyus** as a treatment for ringworm in Indian veterinary practice, but again provided no further detail.

Odontonema lindavii (Urb.) Acev.-Rodr.
[syn. **Phidiasia lindavii** Domin]

Phidiasia lindavii, endemic to the old serpentine soils of the Sierra del Cristal and Sierra de Nipe in Cuba, was noted to have a moderate ability to accumulate Ni, a level of up to 1853 µg/g (ppm) nickel having been found in leaf samples (Reeves *et al*. 1999). The contact sensitising capacity of nickel and its salts is well documented (Malten *et al*. 1976, Cronin 1980, Spruit *et al*. 1980, Fowler 1990, Uter *et al*. 2016) but it remains to be determined whether the nickel compounds in this plant present a dermatological hazard.

Oplonia spinosa (Jacq.) Raf.
[syns **Anthacanthus spinosus** (Jacq.) Nees, **Justicia spinosa** Jacq.]
Catch and Keep, Pricklybush

This spiny species can cause mechanical injury (Oakes & Butcher 1962).

Pseuderanthemum bicolor (Schrank) Radlk.
[syn. **Eranthemum bicolor** Schrank]

In the Philippines, a decoction of the whole plant is used to treat aphthae, and to heal wounds and ulcers; and the leaves are applied to boils (Perry & Metzger 1980).

Ptyssiglottis fusca B.Hansen

Leaf samples from a plant found growing on ultramafic soils in Sabah, Malaysia, tentatively identified as **Ptyssiglottis fusca**, was found to contain up to 1160 µg/g (ppm) nickel (van der Ent *et al*. 2015). The contact sensitising capacity of nickel and its salts is well documented (Malten *et al*. 1976, Cronin 1980, Spruit *et al*. 1980, Fowler 1990, Uter *et al*. 2016) but it remains to be determined whether the nickel compounds in this plant present a dermatological hazard.

Rhinacanthus nasutus (L.) Kurz
[syns **Justicia nasuta** L., **Pseuderanthemum connatum** Lindau, **Rhinacanthus communis** Nees]
Dainty Spurs, Ringworm Root, Snake Jasmine, White Crane Flower

In China and India, the leaves and woody root [of **Rhinacanthus communis** Nees], made into a paste with lime juice, have been employed in eczema, ringworm, and dhobie itch (Dymock 1876, Anon 1881, Piffard 1881, Felter & Lloyd 1898, Nadkarni 1976). Referring to **Rhinacanthus nasutus**, Perry & Metzger (1980) listed to a number of similar preparations used in the traditional medicine of East and South-East Asia to treat cutaneous affections such as herpes and a skin disease known locally as cascado [= stephanofiliariasis, a bovine dermatitis caused by **Stephanofilaria dedoesi** Ihle & Ihle-Landenberg, 1933, fam. Filariidae; a nematode]. Begum & Nath (2000) noted that in the traditional medicine of Northeastern India, the root is pounded with a few match tips, mixed with vaseline, and applied in the treatment of ringworm.

Sharma & Joshi (2004) included **Rhinacanthus nasuta** [sic] root as a treatment for ringworm and eczema in a list of plants used in Indian veterinary practice, but provided no further detail.

According to Anon (1881), the antifungal agent is rhinacanthin, a quinone-like substance resembling chrysophanic acid. In more recent studies (see Wu *et al*. 1998), a range of structurally-related naphthoquinones named rhinacanthin-A, rhinacanthin-B, rhinacanthin-C, *etc*. have been characterised from the roots of **Rhinacanthus nasutus** along with other dermatologically significant substances including dehydro-α-lapachone, methyl vanillate, and allantoin.

Rhinacanthus Communis Extract, Rhinacanthus Nasutus Extract, Rhinacanthus Nasutus Leaf Extract, Rhinacanthus Nasutus Leaf Powder, and Rhinacanthus Nasutus Root Powder [INCI; all of uncertain composition (see Schmidt 2017)][a] are recognised cosmetic product ingredients variously purported to have astringent, skin conditioning, and humectant properties (Standing Committee on Cosmetic Products 2019, CosIng 2023/4).

[a] INCI is a registered trademark of the Personal Care Products Council.

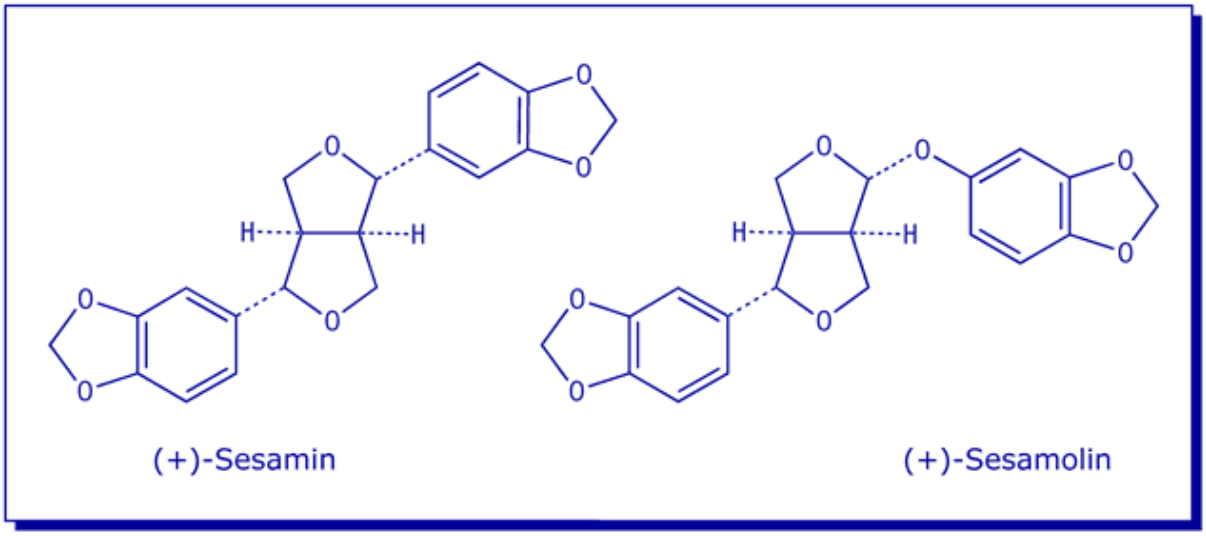
Rostellularia adscendens var. **hispida** (Domin) R.M.Barker
[syn. **Justicia procumbens** var. **hispida** Domin]

Reeves (2003) found 1790–2190 µg/g (ppm) nickel in leaves from this taxon growing on ultramafic soil in Queensland, Australia, showing it to be a hyperaccumulator of this element. The contact sensitising capacity of nickel and its salts is well documented (Malten *et al*. 1976, Cronin 1980, Spruit *et al*. 1980, Fowler 1990, Uter *et al*. 2016) but it remains to be determined whether the nickel compounds in this plant present a dermatological hazard.

Rostellularia procumbens (L.) Nees
[syns **Justicia mollissima** (Nees) Y.F.Deng & T.F.Daniel, **Justicia procumbens** L., **Justicia simplex** D.Don, **Rostellaria procumbens** (L.) Nees, **Rostellularia mollissima** (Nees) Nees]
Water Willow

According to Agharkar (1953) and Nadkarni (1976) in their treatises on Indian traditional medicine, the leaf juice from **Justicia procumbens** is squeezed into the eyes in cases of ophthalmia. In the Philippines, the leaves of **Justicia procumbens** are used externally as an astringent in the cure of certain [unspecified] skin eruptions (Perry & Metzger 1980).

Referring to **Justicia simplex** D.Don, Ghosal *et al*. (1979) reported the isolation of sesamin, sesamolin, and the structurally similar simplexolin from an extract of the whole plant. Sesamin and sesamolin have been shown to elicit dermatitis in persons with contact sensitivity to sesame seed oil [see **Sesamum indicum** L., fam. Pedaliaceae].



Ruellia hygrophila Mart.
[syns **Cryphiacanthus udus** Nees, **Lychniothyrsus hygrophilus** (Mart.) Bremek.]

The leaves of an entire plant are decocted in water and this preparation used by the Criollos herdsmen of Northwestern Argentina to wash wounds (Scarpa 2004).

Streptosiphon hirsutus Mildbr.
Hairy Streptosiphon

According to Watt & Breyer-Brandwijk (1962) the crushed root is used in Tanganyika [now Tanzania] as an application to wounds.

Strobilanthes affinis (Griff.) Terao ex J.R.I.Wood & J.R.Bennett
[syns **Adenosma affinis** Griff., **Strobilanthes acrocephala** T.Anderson]

Referring to **Strobilanthes acrocephalus**, Begum & Nath (2000), citing an earlier source, noted that in the traditional medicine of Northeastern India, the leaves are crushed and the juice applied in the treatment of ringworm.

Strobilanthes callosa Nees
[syn. **Carvia callosa** (Nees) Bremek.]
Karvi, Karvy

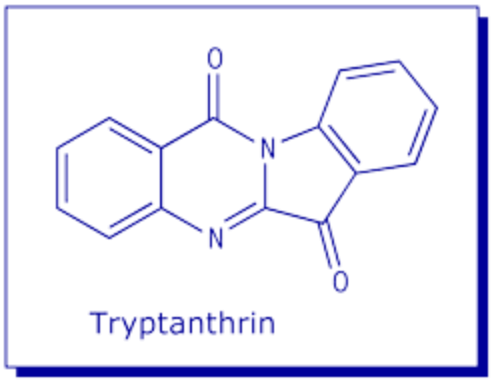
This species, which grows in India, may cause painful itching, swelling, and blistering when handled (Behl & Captain 1979).

In Indian traditional medicine, the juice of the flowers mixed with an equal quantity of the juice from **Randia dumetorum** Lam. (fam. Rubiaceae) flowers is smeared over bruises; and the juice of the bark mixed with an equal amount of juice from the bark of **Eclipta alba** Hassk. (fam. Compositae), boiled down to half its volume and mixed with old sesamum oil (**Sesamum indicum** L., fam. Pedaliaceae), a few peppercorns (**Piper nigrum** L., fam. Piperaceae), and ginger (**Zingiber officinale** Roscoe, fam. Zingiberaceae) is used externally for parotitis (Nadkarni 1976).

Strobilanthes cusia (Nees) Kuntze
[syns **Baphicacanthus cusia** (Nees) Bremek., **Goldfussia cusia** Nees, **Ruellia indigofera** Griff., **Strobilanthes balansae** Lindau]
Assam Indigo, Chinese Rain Bell

Baphicacanthus cusia is recognised as one of the botanical sources of the traditional Chinese medicine known as *qing dai* (青黛) or Indigo Naturalis, which is used orally and by topical administration in the treatment of a variety of infective conditions including sores, ulcers, and abscesses, and also to stop bleeding.[a,b,c]

Fresh juice from the leaves is used on Okinawa Island, Japan as a popular remedy for athlete's foot. The active principle was found to be an indoloquinazoline alkaloid named tryptanthrin (Honda & Tabata 1979).



[a] 中国药典 Chinese Pharmacopoeia (2015) : http://yaobw.cn/yaobw/book.do?flag=showyao&bookId=1&cid=1&cid2=1&id=309; accessed August 2026
[b] 中藥詞典 Chinese Herb Dictionary : https://alternativehealing.org/indigo.htm; accessed August 2026
[c] https://tcmwiki.com/wiki/indigo-naturalis; accessed August 2026

Strobilanthes integrifolia (Dalzell) Kuntze
[syns **Endopogon integrifolius** Dalzell, **Mackenziea integrifolia** (Dalzell) Bremek., **Strobilanthes perfoliata** T.Anderson]
Cone Head, Entire-Leaf Coneflower, Strobilanthes

Behl & Captain (1979) noted that **Mackenziea integrifolia**, which grows in India, may cause painful itching, swelling, and blistering when handled.

Strobilanthes ixiocephala Benth.
[syn. **Thelepaepale ixiocephala** (Benth.) Bremek.]
Sky Blue Karvy

Behl & Captain (1979), referring to **Thelepaepale ixiocephalus**, noted that this species may cause painful itching, swelling, and blistering when handled.

Strobilanthes scabra Nees
East-Indian Yellow Coneflower

Begum & Nath (2000), citing Maikhuri & Gangwar (1993), both referring to **Strobilanthes scaber**, noted that in the traditional medicine of Northeastern India, the young leaves are crushed and the extract applied in the treatment of itching.

Thunbergia alata Bojer ex Sims
[syn. **Thunbergia albiflora** Gordon]
Black-Eyed Susan, Suzanne aux Yeux Noirs, Schwarzäugige Susanne

In the Bulamogi county of Uganda, the leaves, made into a poultice, are applied to boils (Tabuti *et al*. 2003).

Thunbergia laurifolia Lindl.
[syn. **Thunbergia grandiflora** var. **laurifolia** (Lindl.) Benoist]
Babbler's Vine, Blue Trumpet Vine, Laurel Clockvine, Laurel-Leaved Thunbergia, Purple Allamanda, Malayische Thunbergie

Perry & Metzger (1980) recorded that in China, the leaves are applied to wounds and ulcers; and that in the Malay Peninsula, the leaves are applied to cuts and boils.

Thunbergia Laurifolia Leaf Extract [INCI; of uncertain composition (see Schmidt 2017)][a] is a recognised cosmetic product ingredient purported to have skin conditioning properties (Standing Committee on Cosmetic Products 2019, CosIng 2023/4).

[a] INCI is a registered trademark of the Personal Care Products Council.

References

- Agharkar SP (1953) Gazetteer of Bombay State. BOTANY. Part I-Medicinal Plants, e-Book edn. (Re-published in 2007 by Pathak AS, Gagrani B). Mumbai: Government of Maharashtra [WorldCat] [url]
- Ainslie JR (1937) A List of Plants used in Native Medicine in Nigeria. Institute Paper No. 7: Imperial Forestry Institute, University of Oxford [WorldCat]
- Angiosperm Phylogeny Group (2003) An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. Botanical Journal of the Linnean Society 141(4): 399-436 [doi] [url] [url-2]
- Anon (2003) Weed Management Guide. Barleria or porcupine flower - *Barleria prionitis*. Adelaide: CRC for Australian Weed Management [WorldCat] [url] [url-2]
- Anon (1881) Rhinacanthin, a new remedy for ringworm. The Lancet 117(3013): 887 [doi] [url] [url-2]
- Baker AJM, Brooks RR (1989) Terrestrial higher plants which hyperaccumulate metallic elements — a review of their distribution, ecology and phytochemistry. Biorecovery 1(2): 81-126 [url]
- Begum D, Nath SC (2000) Ethnobotanical review of medicinal plants used for skin diseases and related problems in Northeastern India. Journal of Herbs, Spices & Medicinal Plants 7(3): 55-93 [doi] [url] [url-2]
- Behl PN, Captain RM (1979) Skin-Irritant and Sensitizing Plants Found in India, 2nd edn. New Delhi: S Chand [WorldCat]
- Biswas TK, Mukherjee B (2003) Plant medicines of Indian origin for wound healing activity: a review. International Journal of Lower Extremity Wounds 2(1): 25-39 [doi] [url] [pmid]
- Bournot K (1913) Gewinnung von Lapachol aus dem Kernholz von Avicennia tomentosa. [Isolation of lapachol from the heartwood of Avicennia tomentosa]. Archiv der Pharmazie (und Berichte der Deutschen Pharmazeutischen Gesellschaft) 251(5): 351-354 [doi] [url] [url-2]
- Brooks RR, Yang X-H (1984) Elemental levels and relationships in the endemic serpentine flora of the Great Dyke, Zimbabwe and their significance as controlling factors for the flora. Taxon 33(3): 392-399 [doi] [doi-2] [url] [url-2]
- Cano JH, Volpato G (2004) Herbal mixtures in the traditional medicine of Eastern Cuba. Journal of Ethnopharmacology 90(2-3): 293-316 [doi] [url] [pmid]
- CosIng (2023/4) COSING Ingredients-Fragrance Inventory. [online article]: https://ec.europa.eu/growth/tools-databases/cosing/pdf/COSING_Ingredients-Fragrance%20Inventory_v2.pdf ; accessed March 2023 [url] [url-2]
- Cronin E (1980) Contact Dermatitis. Edinburgh: Churchill Livingstone [WorldCat]
- Darbyshire I, Tripp EA, Chase FM (2019) A taxonomic revision of Acanthaceae tribe Barlerieae in Angola and Namibia. Part 1. Kew Bulletin 74(5): 85 pp. [doi] [url] [url-2]
- DeFilipps RA, Maina SL, Crepin J (2004) Medicinal Plants of the Guianas (Guyana, Surinam, French Guiana). Washington, DC: Department of Botany, National Museum of Natural History, Smithsonian Institute [WorldCat] [url]
- Dymock W (1876) NOTES ON INDIAN DRUGS. RHINACANTHUS COMMUNIS. – *Local name*, GUJKARNEE. Pharmaceutical Journal and Transactions – Third Series 7(Sep 2): 190 [url] [url-2]

- Felter HW, Lloyd JU (1898) King's American Dispensatory, 18th edn; 3rd revn, I & II. Cincinnati: Ohio Valley [WorldCat] [url]
- Fernandes MC, Krishnan S (2019) Anatomical characterization of *Strobilanthes* (Acanthaceae) species from the northern Western Ghats of India and its implication for identification at vegetative state. Nordic Journal of Botany 37(11) [doi] [url] [url-2]
- Fowler JF (1990) Allergic contact dermatitis to metals. American Journal of Contact Dermatitis 1(4): 212-223 [doi] [url] [url-2]
- Ghosal S, Banerjee S, Srivastava RS (1979) Simplexolin, a new lignan from *Justicia simplex*. Phytochemistry 18(3): 503-505 [doi] [url]
- Honda G, Tabata M (1979) Isolation of antifungal principle tryptanthrin, from Strobilanthes cusia O. Kuntze. Planta Medica – Journal of Medicinal Plant Research 36(5): 85-86 [doi] [url] [url-2] [pmid]
- Howes FN (1946) Fence and barrier plants in warm climates. Kew Bulletin 1(2): 51-87 [doi] [url]
- Hulme MM (1954) Wild Flowers of Natal. Pietermaritzburg: Shuter & Shooter [doi] [WorldCat] [url] [url-2]
- Hunt P (Ed.) (1968/70) The Marshall Cavendish Encyclopedia of Gardening. London: Marshall Cavendish [WorldCat]
- Irvine FR (1961) Woody Plants of Ghana. With special reference to their uses. London: Oxford University Press [doi] [WorldCat] [url] [url-2]
- Jaiswal S, Singh SV, Singh B, Singh HN (2004) Plants used for tissue healing of animals. Natural Product Radiance 3(4): 284-292 [url] [url-2]
- Joshi AR, Joshi K (2000) Indigenous knowledge and uses of medicinal plants by local communities of the Kali Gandaki Watershed Area, Nepal. Journal of Ethnopharmacology 73(1-2): 175-183 [doi] [url] [pmid]
- Lans C, Harper T, Georges K, Bridgewater E (2001) Medicinal and ethnoveterinary remedies of hunters in Trinidad. BMC Complementary and Alternative Medicine 1: 10 (17 pp.) [doi] [url] [url-2] [pmid]
- Lawrie NS, Cuetos NM, Sini F, Salam GA, Ding H, Vancolen A, Nelson JM, Erkens RHJ, Perversi G (2023) Systematic review on raphide morphotype calcium oxalate crystals in angiosperms. AoB Plants 15(4): plad031 (16 pp.) [doi] [url] [url-2]
- Lynne-Davies G, Mitchell JC (1974) Patch tests for irritancy – some common house plants. Contact Dermatitis Newsletter (16): 501-502 [url]
- Mabberley DJ (2017) Mabberley's Plant-Book. A portable dictionary of plants, their classification and uses, 4th edn. Cambridge: Cambridge University Press [WorldCat] [doi] [url]
- Maikhuri RK, Gangwar AK (1993) Ethnobiological notes on the Khasi and Garo tribes of Meghalaya, Northeast India. Economic Botany 47(4): 345-357 [doi] [url] [url-2]
- Malten KE, Nater JP, van Ketel WG (1976) Patch Testing Guidelines. Nijmegen: Dekker & van de Vegt [WorldCat]
- Mills J, Pascoe KO, Chambers J, Melville GN (1986) Preliminary investigations of the wound-healing properties of a Jamaican folk medicinal plant (*Justicia pectoralis*). West Indian Medical Journal 35(3): 190-193 [pmid]
- Nadkarni AK (1976) Dr. K. M. Nadkarni's Indian Materia Medica. With ayurvedic, unani-tibbi, siddha, allopathic, homeopathic, naturopathic & home remedies, appendices & indexes, Revised enlarged and reprinted 3rd edn, Vols 1 & 2. Bombay: Popular Prakashan [WorldCat] [url] [url-2]
- Oakes AJ, Butcher JO (1962) Poisonous and Injurious Plants of the U.S. Virgin Islands. Miscellaneous Publication No. 882. Washington, DC: Agricultural Research Service, United States Department of Agriculture [WorldCat] [url] [url-2]
- Perry LM, Metzger J (1980) Medicinal Plants of East and Southeast Asia: Attributed Properties and Uses. Cambridge, MA: MIT Press [WorldCat] [doi] [url] [url-2]
- Piffard HG (1881) A Treatise on the Materia Medica and Therapeutics of the Skin. New York: William Wood & Company [WorldCat] [url] [url-2]
- Quisumbing E (1951) Medicinal Plants of the Philippines. Technical Bulletin 16, Philippines Department of Agriculture and Natural Resources. Manila, Philippine Islands: Manila Bureau of Printing [WorldCat] [url]
- Record SJ, Hess RW (1943) Timbers of the New World. New Haven: Yale University Press [doi] [WorldCat] [url]
- Reeves RD, Baker AJM, Borhidi A, Berazaín R (1999) Nickel hyperaccumulation in the serpentine flora of Cuba. Annals of Botany 83(1): 29-38 [doi] [url] [url-2]
- Reeves RD (2003) Tropical hyperaccumulators of metals and their potential for phytoextraction. Plant and Soil 249(1): 57-65 [doi] [url]
- Sakai WS, Shiroma SS, Nagao MA (1984) A study of raphide microstructure in relation to irritation. Scanning Electron Microscopy (Pt II): 979-986 [pmid]

- Scarpa GF (2004) Medicinal plants used by the Criollos of Northwestern Argentine Chaco. Journal of Ethnopharmacology 91(1): 115-135 [doi] [url] [pmid]
- Schmidt RJ (2017) Regulation (EC) No 1223/2009 – a recast of the Cosmetic Products Directive 76/768/EEC – in regard to the safety of plant-derived cosmetic product ingredients. The Expert Witness (20): 35-37 [doi] [url] [url-2]
- Schulz KH, Schmidt P, Grell H (1968) Allergens of quinone structure. In: Jadassohn W, Schirren CG (Eds) XIII Congressus Internationalis Dermatologiae, 1967, Vol. 2, pp. 1531-1533. Berlin: Springer-Verlag [doi] [WorldCat] [url] [url-2]
- Schulz KH, Garbe I, Hausen BM, Simatupang MH (1977) The sensitizing capacity of naturally occurring quinones. — Experimental studies in guinea pigs. I. Naphthoquinones and related compounds. Archives of Dermatological Research 258(1): 41-52 [doi] [url] [pmid]
- Sharma MC, Joshi C (2004) Plants used in skin diseases of animals. Natural Product Radiance 3(4): 293-299 [url] [url-2]
- Spruit D, Bongaarts PJM, Malten KE (1980) Dermatological effects of nickel. In: Nriagu JO (Ed.) Nickel in the Environment, pp. 601-609. New York: John Wiley [WorldCat]
- Standing Committee on Cosmetic Products (2019) Commission Decision (EU) 2019/701 of 5 April 2019 establishing a glossary of common ingredient names for use in the labelling of cosmetic products. Official Journal of the European Union 62(L 121): 1-370 [url] [url-2]
- Tabuti JRS, Lye KA, Dhillion SS (2003) Traditional herbal drugs of Bulamogi, Uganda: plants, use and administration. Journal of Ethnopharmacology 88(1): 19-44 [doi] [url] [pmid]
- Uter W, Larese Filon F, Rui F, Balato A, Wilkinson M, Kręcisz B, Chomiczewska-Skora D, Kieć-Świerczyńska M, Schuttelaar M-LA, Frosch PJ, Bircher AJ (2016) ESSCA results with nickel, cobalt and chromium, 2009–2012. Contact Dermatitis 75(2): 117-121 [doi] [url] [url-2] [pmid]
- van der Ent A, Erskine P, Sumail S (2015) Ecology of nickel hyperaccumulator plants from ultramafic soils in Sabah (Malaysia). Chemoecology 25(5): 243-259 [doi] [url]
- von Reis S, Lipp FJ (1982) New Plant Sources for Drugs and Foods from The New York Botanical Garden Herbarium. Cambridge, MA: Harvard University Press [WorldCat] [url]
- Watt JM, Breyer-Brandwijk MG (1962) The Medicinal and Poisonous Plants of Southern and Eastern Africa. Being an account of their medicinal and other uses, chemical composition, pharmacological effects and toxicology in man and animal, 2nd edn. Edinburgh: E & S Livingstone [doi] [WorldCat] [url] [url-2]
- Wong W (1976) Some folk medicinal plants from Trinidad. Economic Botany 30(2): 103-142 [doi] [url] [url-2]
- Wu T-S, Hsu H-C, Wu P-L, Teng C-M, Wu Y-C (1998) Rhinacanthin-Q, a naphthoquinone from *Rhinacanthus nasutus* and its biological activity. Phytochemistry 49(7): 2001-2003 [doi] [url] [pmid]