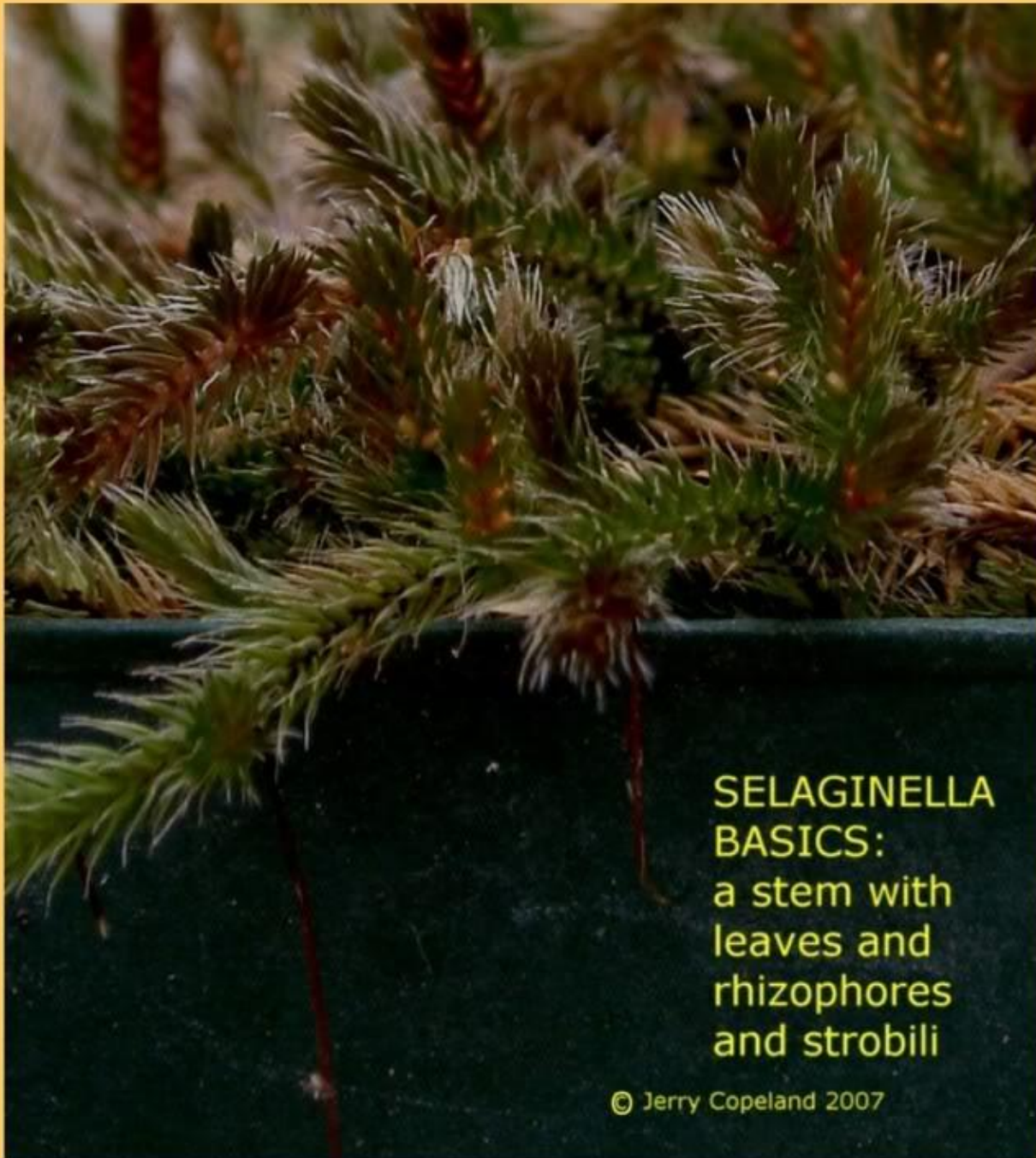


# SELAGINELLA: An illustrated glossary



SELAGINELLA  
BASICS:  
a stem with  
leaves and  
rhizophores  
and strobili

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for sub genus: TETRAGONOSTACHYS



STEM DECUMBENT

## DECUMBENT:

lying down with growing tips ascending  
*asprella*, *leucobryoides*, *rupestris*, *scopulorum*,  
*sibirica*, *standleyi*, *utahensis*, *underwoodii*,  
*watsonii*, *cinerascens*, *mutica*, *wallacei*, *densa*

## STEMS



STEM PROSTRATE

## ERECT: standing upright

*acanthonota*, *arenicola*, *bigelovii*, *rupicola*,  
*tortipila*, *viridissima*, *weatherbiana*,  
*Xneomexicana*.

## PROSTRATE:

growing tip lying flat on the ground  
*arizonica*, *eremophila*, *hansenii*, *peruviana*,  
*wrightii*

## EPIPHYTIC: in trees *oregana*

## RHIZOPHORES

Root-like structures that occur along a stem or may be confined to the base of a stem and/or underground rhizomes.

ON UNDERGROUND RHIZOMES: *arenicola*

ON BASE/RHIZOMES: *acanthonota*, *bigelovii*, *tortipila*,  
*viridissima*, *weatherbiana*

THROUGHOUT OR ON BASE: those not listed above.



RHIZOPHORES

## LEAF CHARACTERISTICS

### DIMORPHIC: occurs with prostrate species

and in the  
*S. densa*  
complex of  
*densa*,  
*scopulorum*,  
*standleyi*.

Based upon  
differences

between leaves on the upperside of the stem to those on the underside of the stems. Differences may range from shape to size.



LEAVES DIMORPHIC

### UNIFORM: occurs with decumbent, erect, and epiphytic species except in *S. densa* complex where leaves unequal in size.



LEAVES UNIFORM

## PLACEMENT OF A LEAF:

The position of a leaf to its stem ranges from erect to appressed even on the same plant. Older stems have leaves that are very appressed while younger stems may have erect to/or very appressed leaves. Prostrate species have tightly appressed leaves. (Appression is poorly defined in the literature.)

### ERECT TO LIGHTLY APPRESSED:

*cinerascens*, *hansenii*, *underwoodii*, *viridissima*, *wallacei*

### APPRESSED TO TIGHTLY APPRESSED:

the other species and includes *S. wallacei*



LEAVES ERECT



LEAVES APPRESSED

This leaf characteristic is indicative of environmental conditions with tightly appressed leaves common among species of arid places.



LEAVES  
LINEAR



# LEAVES

of the sub-genus TETRAGONOSTACHYS

**LINEAR:** long and narrow of uniform width  
*densa, rupestris, scopulorum, standleyi, underwoodii*

**LINEAR-LANCEOLATE:** linear from base to mid-section and then tapering to leaf tip

**SPECIES WITH RHIZOMES-LEAVES ON AERIAL STEMS:**  
*Xneomexicana, bigelovii, rupicola, tortipila, viridissima, weatherbiana*

**PROSTRATE SPECIES-UPPERSIDE LEAVES:**

*arizonica*, (*densa*-decumbent species with noticeable size variation), *peruviana* (central ranks\*), *wrightii*

**UNIFORM (MONOMORPHIC) SPECIES:**

*asprella, cinerascens, densa* (may show dimorphic leaves in size only), *leucobryoides, mutica, organa, rupestris, scopulorum, sibirica, standleyi, underwoodii, utahensis, wallacei, watsonii*

**PROSTRATE SPECIES-UNDERSIDE LEAVES:**

(*densa*-decumbent species with noticeable size variation), *hansenii, peruviana* (narrowly so on central ranks\*), *wrightii* (narrowly so)

**LANCEOLATE:** widest in middle of leaf and tapering towards both ends of the leaf.

**UNIFORM (MONOMORPHIC) SPECIES:**

*acanthonota* (narrowly so), *mutica, sibirica* (narrowly so)

**DIMORPHIC PROSTRATE SPECIES:**

*arizonica* (underside), *eremophila* (underside & upperside)

**DIMORPHIC RHIZOMATOUS SPECIES:** aerial stems only

All narrowly lanceolate:

*arenicola, bigelovii, tortipila, viridissima, weatherbiana*

**LANCEOLATE-ELLIPTIC:** from middle of leaf to base lanceolate, to leaf tip elliptic.

*eremophila* (underside, central ranks\*), *mutica*

**LANCEOLATE-TRIANGULAR:** from the middle of the leaf to the base lanceolate, from the middle to the apex triangular.

*acanthonota, arenicola* (narrowly so on aerial stems), *asprella* (narrowly so), *organica* (narrowly so), *underwoodii* (narrowly so)

**LINEAR-TRIANGULAR:** mostly linear with tip portion of leaf triangular. *hansenii* (upperside leaves)

**LINEAR-OBLONG:** a linear type leaf that is wider than linear and longer than oblong. *standleyi, utahensis*

**FALCATE:** sickle shaped leaves, found on prostrate species with distinctly dimorphic leaves. *arizonica* (slightly so, on upperside), *eremophila* (underside, marginal ranks\*), *peruviana* (on marginal ranks\*, upperside or lowerside), *wrightii* (underside, marginal ranks\*)

**SCALE-LIKE:** small scab-like or tongue-like leaves found on the underground stems (rhizomes) of rhizomatous species.

*Xneomexicana, arenicola, bigelovii, rupicola, tortipila, viridissima, weatherbiana*

\* ranks: see next page for image.

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LEAVES  
LINEAR  
LANCEOLATE



LEAVES ELLIPTIC



LEAVES  
OBLONG





# LEAF ORIENTATION

for sub-genus TETRAGONOSTACHYS

LEAVES IN  
PSEUDOWHORLS



**PSEUDOWHORL:** an arrangement of leaves around an axis (stem) that is like a whorl (leaves arranged around a stem all at the same position on the stem) but differing in that each leaf is placed slightly above or below each adjacent leaf. Characteristic of species with erect or decumbent stems, mostly not used in characterizing species with rhizomes

acanthonota (with 4 or 5 leaves per), arenicola (with 4 per), asprella (with 4 per), densa (with 5 or 6 per in poorly defined pseudowhorls), leucobryoides (with 4 per), mutica (with 3 per), oregana (with 4 on main stems, 3 on branches), rupestris (with 6 on main stems, 4 on branches), scopulorum (with 4 or 6 per in poorly defined pseudowhorls), sibirica (with 5 per), standleyi (with 5 or 6 in poorly defined pseudowhorls), tortipila (with 5 per), underwoodii (with 4 on old growth, 3 on new growth), utahensis (with 4 per), wallacei (with 4 per), watsonii (with 4 per)

**RANKS:** leaves arranged in rows along the stem with the lower leaves overlapping the upper leaves. Characteristic of prostrate species, with delineation into upperside, underside, and marginal ranks. Upperside and underside ranks are often called the central ranks.

arizonica (in 8 ranks), eremophila (in 8 ranks), peruviana (in 8 ranks), wrightii (in 8 ranks)



Abaxial ridges are distinct lines that arise from the base of the leaf, along the midrib of the leaf, growing up to near the leaf tip. The ridges occur on both the leaves and sporophylls. Some species have ridges that are very distinct on their leaves and/or on their sporophylls.

**RIDGES PROMINENT ON LEAVES AND SPOROPHYLLS:** mutica, oregana, rupestris, sibirica, underwoodii, viridissima, wallacei, watsonii, weatherbiana

**RIDGES PROMINENT ON SPOROPHYLLS ONLY:** Xneomexicana, asprella, densa, leucobryoides, rupicola, standleyi, scopulorum, tortipila, utahensis

\*tortipila may have ridges from tip to middle of leaf.

**RIDGES NOT PROMINENT ON SPOROPHYLLS AND INCONSPICUOUS ON LEAVES:** cinerascens

**RIDGES PROMINENT ON SPOROPHYLLS AND**

**INCONSPICUOUS ON LEAVES:** tortipila\*

**RIDGES ABSENT ON LEAVES, NOT PROMINENT ON SPOROPHYLLS:** wrightii © 2007 Jerry Copeland



# LEAF FEATURES

## LEAF BASE ATTACHMENT

**ADNATE:** the entire base of the leaf is wholly attached to the stem.

**DECURRENT:** the base and immediate lower portion of the leaf is attached to the stem.

**PROSTRATE WITH UNDERSIDE LEAVES**

**DECURRENT/UPPERSIDE ADNATE:**

*arizonica*, *eremophila*, *peruviana*

**PROSTRATE WITH UNDERSIDE AND**

**UPPERSIDE LEAVES ADNATE:** *wrightii*, *hansenii*

**ERECT WITH LEAVES DECURRENT:**

*acanthonota* (slightly), *arenicola*, *tortipila*, *viridissima*, *weatherbiana* (on main stems)

**ERECT WITH LEAVES ADNATE:** *acanthonota*, *bigelovii*, *Xneomexicana*, *rupincola*, *viridissima* (if cuneate\* then is decurrent), *weatherbiana* (only on apical branches)

**DECUMBENT WITH LEAVES DECURRENT:**

*asprella* (may be adnate on new growths), *densa* (with leaves on underside slightly so), *leucobryoides* (adnate on young branches), *scopulorum* (slightly so to adnate on upperside leaves), *sibirica* (adnate on new growths), *standleyi*, *underwoodii* (adnate on new growths), *utahensis*, *watsonii*

**DECUMBENT WITH LEAVES ADNATE:** *cinerascens* (if cuneate\* then slightly decurrent), *mutica*, *rupestris* (decurrent on underside leaves), *wallacei* (if cuneate\* then slightly decurrent)

\* CUNEATE: wedge shaped with narrow point attaching to stem.

OF SUB GENUS TETRAGONOSTACHYS



LEAF BASE ADNATE



LEAF BASE  
OBLIQUE  
DECURRENT

LEAF APEX ACUTE



LEAF APEX



LEAF APEX ATTENUATE

BRISTLES



**PROSTRATE WITH OPAQUE TO TRANSPARENT BRISTLES 0.3MM (OR LESS) LONG:**

*arizonica* (bristle may break off leaving an acute tip), *eremophila* (bristle deciduous and twisted leaving an acute tip)

**PROSTRATE WITH WHITISH BRISTLES OVER 0.3 MM LONG:** *hansenii* (bristle length up to 1.4 mm), *peruviana* (bristle less than .9 mm long and persistent)

**PROSTRATE WITH YELLOWISH BRISTLES UP TO 0.5 MM LONG:**

*wrightii* (apex may become denticulate when bristle breaks off)

**ERECT WITH APEX ACUTE LACKING A BRISTLE:** *viridissima*

**ERECT WITH APEX PLANE (FLAT) WITH A BRISTLE:** *acanthonota*, *arenicola*, *rupincola*

**ERECT WITH APEX KEELED (V-SHAPED) WITH A BRISTLE:** *bigelovii*, *Xneomexicana*, *tortipila*, *weatherbiana*

**DECURRENT WITH APEX LACKING A BRISTLE:** *cinerascens*

**DECURRENT WITH APEX KEELED:** *asprella*, *mutica*, *rupestris* (slightly so), *sibirica*, *standleyi*, *underwoodii*, *utahensis*, *watsonii* (strongly so) **DECURRENT WITH APEX NOT KEELED:** *densa* (may be slightly keeled), *leucobryoides*, *scopulorum* (to slightly keeled), *wallacei* (may be keeled)



# LEAF PUBESCENCE

OF SUBGENUS TETRAGONOSTACHYS

Pubescence is the presence of hairs. There may be hairs on the surface of the leaf as well as along the margins of the leaf.

CILIATE: hairs on the leaf margins

GLABROUS: no hairs on the leaf surface

PUBESCENT: soft short hairs on leaf surface

PROSTRATE WITH MARGINS CILIATE AND UNDERSIDE LEAVES GLABROUS:

*arizonica*, *eremophila*

PROSTRATE WITH MARGINS CILIATE AND UNDERSIDE LEAVES PUBESCENT: *hansenii*

(sometimes glabrous), *peruviana* (sometimes glabrous), *wrightii* (sometimes glabrous)

ERECT WITH LEAVES PUBESCENT AND MARGINS CILIATE: *acanthonota*, *Xneomexicana* (margins long-ciliate), *rupincola* (long-ciliate)

ERECT WITH LEAVES PUBESCENT OR WITH LEAVES GLABROUS AND MARGINS SHORT-CILIATE BECOMING DENTICULATE TOWARDS APEX OF LEAF: *arenicola*, *bigelovii*, *weatherbiana*

ERECT WITH LEAVES GLABROUS WITH MARGINS SHORT-CILIATE TO DENTICULATE: *tortipila* (margin may be entire-without cilia or serrations), *viridissima*

DECUMBENT WITH LEAVES PUBESCENT AND MARGINS CILIATE:

*asprella*, *wallacei* (rarely glabrous, margins may be short-ciliate to denticulate)

DECUMBENT WITH LEAVES PUBESCENT OR GLABROUS, MARGINS VARY: *mutica* (margins from ciliate to denticulate), *rupestris* (long-ciliate), *underwoodii* (from short ciliate to entire)

DECUMBENT WITH LEAVES GLABROUS AND MARGINS SHORT-CILIATE: *cinerascens*, *leucobryoides*, *scopulorum*, *standleyi* (margins may range to denticulate), *utahensis* (may range from short-ciliate to entire), *watsonii* (may be pubescent, may have margins entire)

DECUMBENT WITH LEAVES GLABROUS AND MARGINS LONG-CILIATE: *densa* (upperside leaves may be pubescent), *sibirica* (may be pubescent)



## STROBILUS (STROBILI, as pleural form):

A leaf-like branch bearing reproductive structures known as sporangium (individually) or sporangia (pleurally). The sporangia are found at the base of leaf-like sporophylls which are similar to the leaves but may possess different characteristics than those of the leaves.

SPECIES THAT MAY HAVE TWO STROBILI AT EACH BRANCH: *oregana*, *underwoodii*, *wallacei*

ALL OTHER SPECIES ONLY HAVE ONE STROBILUS PER BRANCH.



# SPOROPHYLL CHARACTERISTICS

OF SUBGENUS TETRAGONOSTACHYS



SPOROPHYLLS

SPOROPHYLLS OVATE (INCLUDING -DELTATE AND -TRIANGULAR) WITH INCONSPICUOUS ABAXIAL RIDGES: *arizonica*, *eremophila*, *hansenii*, *peruviana*

SPOROPHYLLS LANCEOLATE (INCLUDING OVATE-LANCEOLATE) WITH INCONSPICUOUS ABAXIAL RIDGES: *acanthonota*, *arenicola*, *bigelovii*, *wrightii*

SPOROPHYLLS LANCEOLATE (INCLUDING OVATE-LANCEOLATE) WITH CONSPICUOUS ABAXIAL RIDGES: *densa*, *Xneomexicana*, *oregana*, *rupincola*, *scopulorum*, *tortipila*, *underwoodii*, *utahensis*, *watsonii*, *weatherbiana*

SPOROPHYLLS OVATE (INCLUDING -DELTATE, -ELLIPTIC) TO LANCEOLATE (INCLUDING OVATE-LANCEOLATE) WITH CONSPICUOUS ABAXIAL RIDGES: *asprella*, *leucobryoides*, *mutica*, *rupestris*, *sibirica*, *standleyi* (rarely lanceolate), *viridissima*, *wallacei*

SPOROPHYLLS OVATE-DELTATE TO OVATE-LANCEOLATE WITH INCONSPICUOUS ABAXIAL RIDGES: *cinerascens*

## SPOROPHYLLS LACKING A BRISTLE:

*arizonica*, *cinerascens*, *eremophila*, *oregana* (may be short bristled), *viridissima*, *wrightii* (bristle so minute to appear lacking)

## SPOROPHYLLS WITH A TWISTED BRISTLE: *tortipila*



SPOROPHYLLS WITH BRISTLES



Sporophylls ovate with abaxial ridge

## SPOROPHYLLS WITH SHORT BRISTLES:

*leucobryoides*, *mutica*, *Xneomexicana*, *oregana* (may not be bristled), *scopulorum*, *underwoodii* (may be long bristled), *utahensis*, *wallacei*, *watsonii*

## SPOROPHYLLS WITH LONG BRISTLES:

*densa*, *rupestris*, *rupincola*, *underwoodii* (may be short bristled)

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## REFERENCES USED IN THE PREPARATION OF THIS GLOSSARY

**EFLORAS.ORG:** taxonomic information per each species  
**A California Flora** by Philip A. Munz and David D. Keck, 1963  
published by the University of California Press: glossary